Spring 5-17-2024

Asthma and Peak Flow Assessments Based on NHLBI Asthma Guidelines

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May 7, 2024

TABLE OF CONTENTS

Asthma and Peak Flow Assessments Based on NHLBI Asthma Guidelines

Abstract

Background: Asthma exacerbations are consequences of poor asthma control. Asthma guidelines-grounded interventions can improve adherence to asthma guidelines and assessments in primary care settings. The goals of asthma management are to optimize asthma control, minimize the risk of asthma exacerbations, and minimize the adverse effects of asthma medications.

Local Problem: A primary care practice in Northern California had frequent office visits for acute asthma symptoms. Ongoing asthma control monitoring is a key performance indicator of high-quality asthma care.

Methods: The quality improvement evidence-based observational project examined the effectiveness of interventions. The pre-and post-survey assessments collected clinician knowledge and adherence, and results were analyzed with descriptive statistics, paired t-test, and the binomial test. SPSS version 29.0.2.0 was employed for all calculations.

Interventions: Implement the National Heart, Lung, and Blood Institute (NHLBI) asthma guidelines-based clinician education and asthma toolkit to improve adherence and promote elements of asthma guidelines.

Results: In terms of self-efficacy, the mean difference in comfort level increased from 7.00 to 9.17, and was statistically significant ($p = 0.041$, $p < 0.05$). For knowledge, all participants achieved perfection on all knowledge questions, which was statistically significant from chance expectations ($p<0.031$). There was already a strong agreement with over 80% alignment on the vital instrument ongoing monitoring and 100% advocacy towards adherence to asthma guidelines. The degree of agreement and advocacy were maintained post-intervention, which

indicates a commitment to asthma guidelines-grounded interventions.

Conclusion: The multimodal interventions of clinician education and asthma toolkit exemplified the necessity of quality improvement efforts to improve comfort level to abide by asthma guidelines and promote elements of asthma guidelines, especially when faced with barriers to adherence. Future endeavors should build upon these efforts, concentrating on a chart review and asthma guidelines-grounded education across a larger sample size.

Keywords: *Asthma guidelines, peak flow, asthma severity, asthma assessments, asthma control, asthma management, primary care, quality improvement*

Asthma and Peak Flow Assessments Based on NHLBI Asthma Guidelines

Introduction

Background

Asthma, characterized by coughing, wheezing, and breathlessness, is caused by inflammation, airflow obstruction, and bronchial hyperresponsiveness (NAEPPCC, 2007). Asthma exacerbations stem from inadequate asthma management (Castillo et al., 2017). In 2021, asthma was the primary diagnosis for almost one million emergency department (ED) visits, straining healthcare resources (CDC, 2023). Despite strides in asthma treatment, asthma-specific visits remained stable from 2010 to 2018 for all ages (CDC, 2021). Healthy People 2030 aims to reduce acute attacks in adults with asthma from 39.6% to 35.1% (Healthy People 2030, n.d.). The prevalence of poor asthma control was highest in Hispanic adults and adults older than 55 years. Healthy People 2030 aims to reduce acute attacks in adults with asthma from 39.6% to 35.1%. Acute attacks underscored the imperative to improve the breach in asthma care.

Approximately 25 million people in the United States have asthma (CDC, 2023). Moreover, the highest prevalence nationwide is in California. The heavy impact of asthma transcended beyond the individual and added a toll on the economy. The 2008-2013 Medical Expenditure Panel Survey (MEPS) estimated that the total cost of asthma in the United States was $81.9 billion, of which $3 billion was accredited to missed work and school days, $29 billion to asthma-specific mortality, and $50.3 billion in direct medical expenses (Song et al., 2020). The annual direct medical expenses escalated based on asthma severity as it was $3305 for mild asthma, $7250 for moderate asthma, and $9175 for severe asthma.

The prevalence of work-related asthma is up to 48% of asthma patients (Dodd & Mazurek, 2020). This group was the only cohort that attained all the goals of Healthy People

2020 respiratory disease objectives. Compared to the rest of the asthma population, adults with work-related asthma had higher percentages of education on asthma management, use of asthma action plans, and use of peak flow. Higher severity and higher healthcare utilization appeared to be requisites to access to preventative care. Primary care clinics should provide uniform and evidence-based care to all asthma patients, irrespective of asthma severity. The target population group is primary care providers who serve the high-risk population of uncontrolled asthma to improve patient outcomes in vulnerable communities and eliminate these stark healthcare disparities.

Problem Description

Nearly half of asthma patients do not collaborate with asthma specialists (Trevor & Chipps, 2018), so close and routine asthma control assessments in primary care clinics are essential. Asthma guidelines were released decades ago and have been recognized as the standard of care. However, there is suboptimal adherence to asthma guidelines in primary care (Akinbami et al., 2020; Cloutier et al., 2018; Gagné & Boulet, 2018; Price et al., 2018; Yawn et al., 2016). Primary care providers were impeded by internal and systemic barriers to abide by evidence-based recommendations. The lapse in adherence was predominantly attributed to time and resources (Bender et al., 2021; Gagné & Boulet, 2018; Miles et al., 2017). Pediatricians, referrals to asthma specialists, and strong self-efficacy were linked to higher adherence to asthma guidelines.

In 2019, there were 4.9 million office visits for asthma (CDC, 2023). The frequent office visits for asthma exacerbations in one of Northern California's Federally Qualified Health Centers (FQHC) prompted the pursuit of scholarly inquiry. Furthermore, the lack of use of lung function measures suggested inadequate asthma assessments in primary care practice, which was

reflected in primary care settings nationwide (Akinbami et al., 2020; Cloutier et al., 2018; Gagné & Boulet, 2018; Price et al., 2018; Yawn et al., 2016).

Setting

The setting for the Doctor of Nursing Practice (DNP) student-led evidence-based quality improvement project was the FQHC's adult primary care unit. Acute asthma symptoms were among the most recurrent and prominent presenting symptoms in the target primary care practice. The prevalence of unplanned asthma-specific visits incited the pursuit of scholarly inquiry to evaluate clinician adherence to asthma management guidelines.

Specific Aim

The primary aim of the DNP project was to implement clinician education and adopt the asthma toolkit based on NHLBI asthma guidelines. Noteworthy secondary outcomes were delineated through the following objectives: improve comfort level to abide by NHLBI asthma guidelines by at least 25% in the Likert Scale, promote elements of asthma guidelines with clinician education evidenced by at least 25% in the knowledge questions of the pre-and post-survey assessments, increase agreement on the vital instrument for ongoing asthma monitoring as manifested by at least 25% in the free response portion of the pre-and post-survey assessments, and improve adherence to peak flow from the NHLBI asthma guidelines by at least 25% in the binary (yes or no) portion of the pre-and post-survey assessments.

Available Knowledge

PICO(T) Question

Asthma guidelines were designed to direct primary care providers, specialists, and patients to make shared, informed, evidence-based decisions on asthma care (NAEPPCC, 2022). A literature search was performed to answer the PICO(T) question: In primary care, does the implementation of clinician education, compared to usual care without education, improve clinician adherence to asthma guidelines?

Search Methodology

In response to the PICOT question, the literature review retrieved current and relevant research articles published between 2016 and 2023. The combinations of search terms “asthma guidelines,” “adherence,” primary care,” “asthma toolkit,” “patients,” “perceptions,” “asthma control,” “gaps,” “asthma,” “management, “practice,” “implementation, “adherence with asthma guidelines,” “adults,” “children,” “asthma symptoms,” “views,” “barriers” and “facilitators” in PubMed and Academic Search Complete electronic databases yielded a total of 93 articles. The articles met the following inclusion criteria: (a) English, (b) full text, (c) academic journal, clinical trial, systematic review, and randomized controlled trial (RCT). The articles were excluded if they were duplicates and could not answer the PICO(T) question, which narrowed the search to ten articles.

Integrated Review of the Literature

The integrated review was comprised of ten articles published between 2016 to 2024 (see Appendix A). The articles underwent a meticulous appraisal process with the John Hopkins Evidence-Based Practice appraisal tools (Dang et al., 2022), which led to the evidence synthesis of high-quality and eight good-quality research articles. The three themes that were extracted

from this search were (1) poor adherence to asthma guidelines, (2) barriers and facilitators to asthma guidelines, and (3) interventions to improve adherence to asthma guidelines.

Poor Adherence to Asthma Guidelines

More than a quarter of healthcare providers with 13 to 25 years in family practice did not abide by asthma guidelines (Gagné & Boulet, 2018). Not all healthcare providers followed key elements of asthma guidelines, such as asthma education, use of asthma action plans, and referrals to asthma specialists. Only 61% of primary care providers implemented asthma control assessments, and less than half of asthma patients had scheduled follow-up visits. Furthermore, less than 40% of providers reported they confirmed asthma diagnosis with lung function tests and followed asthma guidelines for asthma control assessments in more than 75% of their patients. Seasoned and less-so-providers failed to implement evidence-based recommendations to all their asthma patients.

Adults and family practice were less likely to have documentation that attested to adherence to asthma guidelines (Yawn et al., 2016). There were asthma patients who never had asthma-specific visits. Approximately a quarter of patients with persistent asthma didn't have asthma-specific visits within one year, and all the asthma-specific visits recorded that year were for acute symptoms and were unplanned. Asthma control assessments, the basis of treatment decisions in NHLBI asthma guidelines, were implemented in only 15.0% of patients with more children than adults (22.1% vs. 11.6%). The adherence to non-pharmacological elements of asthma guidelines was never more than 33% and was as low as 3%. Validated tests were even more rare as they were implemented in only half of these asthma assessments. Furthermore, not all asthma patients had documentation for daily maintenance medications and short-acting beta-agonists (SABA). In Canada, whose sample was representative of primary care academic and

non-academic clinics, asthma control assessments were implemented in 4.6% of visits and 15.4% of patients (Price et al., 2018). The questions to screen for asthma control, such as daytime symptoms, use of rescue inhalers, nocturnal symptoms, limitations in physical activities, interference with work and/or school, and all five, did not have a constant presence in visits. Similarly to the NHLBI asthma guidelines, asthma control assessments are the basis of treatment decisions. Notably, adjustments in treatment were made in less than 3.3% of qualified visits.

Validated tests were seldom involved in asthma assessments (Cloutier et al., 2018). Less than 20% of primary care providers and asthma specialists asked for spirometry and peak flow results. Compared to asthma specialists, fewer primary care providers followed asthma impairment measures (asthma symptoms and control). Less than 60% asked about the use of systemic corticosteroids for asthma exacerbations, ED visits, and hospitalizations.

Family medicine trailed behind other areas of medicine in adherence to asthma guidelines (Akinbami et al., 2019). Compared to pediatricians, family medicine and general medicine providers were less likely to inquire about daytime symptoms, use of rescue inhalers, nocturnal symptoms, limitations in physical activities, and interference with work and/or school. Evidence-based recommendations that involved patient education, equipment, and expertise had lower adherence than other elements of asthma guidelines. Objective measures were less common than history-taking. Less than 20% of healthcare providers implemented spirometry, and less than 15% of them asked about peak flow results.

Barriers and Facilitators to Asthma Guidelines

Strong self-efficacy was associated with higher adherence to asthma guidelines in primary care providers (Cloutier et al., 2018). Compared to asthma specialists, primary care providers reported lower adherence, lower agreement, and lower self-efficacy to asthma

guidelines. Pediatricians, referrals to asthma specialists, and strong self-efficacy were associated with adherence to asthma guidelines (Akinbami et al., 2019). Less than a quarter of family medicine and general medicine providers reported strong self-efficacy. Compared to pediatricians, family medicine and general medicine providers reported a lower volume of asthma patients and lower agreement with asthma guidelines. Agreement was not associated with adherence to guidelines; however, agreement was low in all primary care providers. Only 11.6% of family medicine, general medicine, and pediatricians reported strong agreement with asthma guidelines. Strong agreement with inhaled corticosteroids (ICS), six-month follow-up visits, and asthma severity assessments in initial visits was divided in half.

The investigation on adherence to asthma guidelines also queried the investigation of the barriers and facilitators of adherence (Bender et al., 2021). Healthcare providers reported that they faced systemic barriers, such as lack of time, lack of human resources, attitudes, and resistance to change in workflow. Clinician education, asthma materials, and a single asthma champion to implement change in practice were reported to be facilitators. The lack of time, human resources, equipment, and knowledge as well as perceived low patient adherence invoked discrepancies between evidence-based recommendations and actual implementation (Gagné & Boulet, 2018). Only 65% of primary care providers reported strong motivation and agreement to implement asthma control assessments based on asthma guidelines, referrals to asthma specialists, and speaking about patient concerns about asthma and treatment.

There were systemic barriers, such as lack of time, teamwork, equipment, and internal beliefs that impeded evidence utilization (Miles et al., 2017). Some healthcare providers viewed asthma guidelines as only useful for new providers. However, some viewed asthma guidelines as empowering and useful for difficult/severe asthma patients. Healthcare providers and patients

had reservations about asthma guidelines and favored relying on their judgment on asthma management and treatment decisions.

Interventions to Improve Adherence to Asthma Guidelines

Clinician education and evidence-based asthma guidelines enhanced asthma adherence in one pediatric primary care practice (Pudasainee-Kapri, 2021). Before interventions, chart review revealed that providers asked about three or more asthma symptoms to only 4.9% of asthma patients and made follow-up visits with 48.8% of asthma patients. After interventions, adherence to asthma control assessments on three or more asthma symptoms increased to 39.5%, and adherence to scheduled follow-up visits increased to 76.3%. The prescriptions for daily maintenance medications and short-acting beta-agonists remained the same. However, there was more change in adherence to other elements of asthma guidelines, such as documentation of adherence to asthma medications, inhaler technique, asthma action plans, and environmental control.

NHLBI guidelines-based interventions amplified adherence in primary care clinics and patient outcomes (Bender et al., 2021). Spirometry increased from 22% to 86%, asthma assessments increased from 48% to 88%, and asthma action plans increased from 40% to 86%. Furthermore, one year after clinician education, ED visits decreased by 10%, hospitalizations dropped by 35%, and the use of systemic corticosteroids for asthma exacerbations decreased by 29%.

Asthma control tests based on asthma guidelines intensified adherence to the best standard of care in family and pediatric primary care clinics (Yawn et al., 2018). Adherence to three or more elements increased by 20.7% in the mediation group with asthma guidelines-grounded interventions, while adherence decreased by 1.9% in the usual care group. Similarly to

the relationship of adherence and interventions, the number of asthma-specific ED visits and hospitalizations decreased from 17.5% to 10.6% in the mediation group. In contrast, the number increased from 15.9% to 20.9% in the usual care group. After asthma management followed asthma guidelines-grounded interventions, the number of patients who reported asthma-specific ED visits and hospitalizations was 51% lower than patients in the usual care group. Furthermore, the number of well-controlled asthma patients was more than 50% in the mediation group but not in the usual care. The improvement in asthma control and asthma-specific quality of life scores were statistically significant.

Asthma management based on asthma guidelines rectified poor control and lung function (Tho et al., 2023). After asthma management followed the Global Initiative for Asthma (GINA) guidelines, well-controlled asthma patients increased from 2.6% to 59.5%. The improvement in asthma control was achieved as early as three months and sustained over five years. The number of patients with persistent airflow limitations ($FEV_1/FVC < 0.70$ and $FEV_1 < 80\%$ of predicted value) and the number of patients on high-dose ICS (fluticasone propionate > 100 mcg or budesonide > 800 mcg) decreased.

Summary/Synthesis of the Evidence

There were evident shortcomings in adherence to asthma guidelines in primary care clinics across North America. Primary care providers deviated from various elements of asthma guidelines, such as accurate subjective and objective measures of asthma control assessments. Primary care providers did not screen for all asthma symptoms in subjective measures. Furthermore, objective measures had lower adherence than subjective measures. The poor adherence rates for asthma control assessments and scheduled follow-up visits fell below the acceptable standard of care. The lack of scheduled follow-up visits indicated inadequate

preventative care. Compared to asthma specialists and pediatrics, primary care/family medicine had lower adherence to asthma guidelines, which indicated room for change in practice.

Family medicine and general medicine primary care providers reported lower self-efficacy and agreement with asthma guidelines. The poor adherence rates elicited discrepancies between evidence-based recommendations and actual implementation. Pediatricians, referrals to asthma specialists, and strong self-efficacy were linked to higher adherence, which indicated the importance of confidence and competence in implementation.

There was a vast landscape of internal and systemic factors that influenced adherence in primary care practice. The lack of time and resources were the top cited barriers. Healthcare providers and patients favored relying on their judgment rather than asthma control assessments, the basis of treatment decisions in NHLBI asthma guidelines. Strategies to combat these modifiable barriers and negative beliefs would promote adherence. Clinician education showed promise as more elements of asthma guidelines were followed by primary care providers. In response to the posed question, clinician education based on asthma guidelines enhanced adherence to asthma guidelines.

Rationale

Several evidence-based models exist to implement the best available evidence into practice. The Joanna Briggs Institute (JBI) Model of Evidence-Based Health framework was selected for its pluralistic approach to evidence generation, synthesis, transfer, and utilization. The framework defines evidence as “discourse (or narrative), experience and research as legitimate means of evidence or knowledge generation” (Pearson et al., 2005, p. 210). For evidence generation, the project lead conducted a needs analysis to detect a local and clinical problem, conducted a scholarly inquiry of effective, appropriate, meaningful, or feasible

approach for asthma care, and defined the scope of the integrated review (see Appendix B). The core of evidence synthesis was the search, synthesis, and appraisal of the evidence. For this component, the project lead procured related quantitative and qualitative research on asthma guidelines and assembled the evidence table of the literature. The three elements of evidence transfer were education, delivery, and transfer of evidence in the team system. For this component, the project lead developed a curriculum for clinician education and a comprehensive asthma toolkit to enable the seamless transfer of evidence to all members of the healthcare team, even those who missed the clinician education. The three elements of evidence utilization were implementation in practice, implementation in the team system, and analysis of the effectiveness of the interventions. For this component, the project lead implemented the multimodal interventions and distributed the pre-and post-survey assessments on the same day.

Asthma guidelines and assessments made patient outcomes breakthroughs (Bender et al., 2021; Pudasainee-Kapri, 2021; Tho et al., 2023; Yawn et al., 2018). The widespread deficiencies in the delivery of care contributed to varied patient outcomes. Suboptimal adherence to asthma guidelines creates suboptimal asthma care. After asthma guidelines-grounded interventions, the cases of well-controlled asthma patients increased while the cases of poor lung function decreased. The positive outcomes extended to the healthcare system. The number of ED visits and hospitalizations decreased with asthma guidelines-grounded interventions and increased with usual care, without change in practice. Therefore, initiatives based on asthma guidelines and against the barriers of adherence should be brought to the primary care practice.

Methods

Context

Asthma is a respiratory medical condition as well as a complex interaction of biological, environmental, socioeconomic, and psychosocial factors. Recent data from the Centers for Disease Control and Prevention (CDC) accentuates the alarming trend that 60% of Americans with current asthma have poor control (CDC, 2022). There were 70.1% of Hispanic adults and 58.0% of non-Hispanic White adults with poor asthma control, which highlights the unique challenges and hurdles of minorities (CDC, 2022). The disproportionate burden of uncontrolled asthma is the circumstance in which the target primary care practice operates. The patient population of the target primary care practice was the underprivileged community of Hispanic, Spanish-speaking patients. The target project site was the adult primary care unit in Northern California. The DNP project embraces the organization's commitment to equity and continuous quality improvement in patient-centered care.

Acute asthma symptoms were the recurrent chief concerns voiced by patients within the walls of the primary care practice, which became the catalyst for change in practice. The medical assistants (MAs), nurses, healthcare providers, medical directors, the second reader, the chairperson, and the project coordinator were the key stakeholders, who enthusiastically endorsed their support. Their feedback on the needs of the community, most afflicted by social injustices, sparked conversations that shaped the project's dedication to quality improvement efforts.

Interventions

All interventions were rooted in the NHBLI asthma guidelines. The stepwise approach to therapy of the NHLBI asthma guidelines was featured in clinician education and the asthma toolkit. Evidence utilization was complex, and multi-faceted interventions were more likely to be fruitful than single interventions, so clinician education was supplemented with the asthma

toolkit (Pearson et al., 2005). The multimodal interventions of clinician education and asthma toolkit were designed to mediate barriers to change in primary care practice, which were discerned to be time and resources (Bender et al., 2021; Gagné & Boulet, 2018; Miles et al., 2017). The asthma toolkit, which mirrored the stepwise approach to therapy, was developed to improve self-efficacy and productivity as it saves healthcare providers from looking up evidence-based recommendations online when they have the central piece of the NHLBI asthma guidelines in their hands. Clinician education was one of the resources, distilling the information in the NHLBI asthma guidelines for healthcare providers.

Chronologically, clinician education detailed the discoveries under evidence generation and evidence synthesis on asthma and adherence to asthma guidelines, the subjective measures of asthma that should warrant asthma assessments, the goals of asthma therapy, the fundamentals of asthma management, the use of objective measures in asthma assessments, and the stepwise approach to therapy. The toolkit was divided into two sections, which were the two parts of the stepwise approach. The first was for healthcare providers to refer to in initial visits for asthma severity and the second was for healthcare providers to refer to in follow-up visits for asthma control, empowering healthcare providers and patients to make shared, informed, evidence-based decisions on asthma care in all visits.

The subjective and objective measures in the stepwise approach present precise information to classify asthma severity in initial visits and evaluate asthma control in follow-up visits. The NHLBI asthma guidelines have named each severity “steps”, so healthcare providers can “step up” if required after 6 months and “step down” if possible, when asthma is well controlled for at least 3 consecutive months, paralleling the goals of asthma management. There were multiple evidence-based recommendations for each type of asthma severity and each type

of asthma control. Therefore, the toolkit emphasized the importance of peak flow and how healthcare providers can separate each of the steps and arrive at the appropriate course of therapy.

Clinician education and the asthma toolkit reminded healthcare providers about the importance of documentation, specifically the documentation of adherence to asthma guidelines. The toolkit contained steps to input ICD.10 codes for each asthma severity and peak flow under vitals to track the disease process and testify to evidence-based recommendations. All office visits should be viewed as opportunities to promote elements of asthma guidelines.

Gap Analysis

A gap analysis was performed to explore the current state of the community. The worrisome prevalence of poor asthma control nationwide and in the community called for reinforcement to improve asthma care (see Appendix C).

The evidence generation and evidence synthesis in the integrated review revealed suboptimal adherence to asthma guidelines and barriers to adherence in asthma management (Bender et al., 2021; Cloutier et al., 2018; Gagné & Boulet, 2018; Price et al., 2018; Yawn et al., 2016). The current state was the lack of validated asthma tests in asthma assessments, as manifested by the lack of documentation on peak flow, coupled with the lack of use in peak flow meters. The remedial actions of the DNP project were clinician education and the asthma toolkit to improve adherence to asthma guidelines and asthma management.

Gantt Chart

The Gantt chart displayed the major activities completed from September 2023 to May 2024 (see Appendix D). The project lead conducted a needs analysis and identified project stakeholders for the first two months. The project lead defined the scope of the integrated review,

conducted the integrated review, assembled the evidence table of the manuscript, completed the manuscript, added feedback from the second reader on the integrated review, and completed the prospectus paper from October 2023 to February 2024. Then, the project lead developed a curriculum, a comprehensive asthma toolkit, and pre-and post-surveys from February to March 2024. The month of April 2024 was devoted to the implementation and analysis of the effectiveness of the interventions. The project lead implemented the interventions and distributed the surveys on April 2, 2024. Then, the project lead examined the effectiveness of the interventions, completed the final paper, and completed the final presentation in May 2024.

Work Breakdown Structure

The project lead completed all the activities under the five phases of the work breakdown structure: initiation, planning, execution, control, and closeout (see Appendix E). The work breakdown structure coincided with the JBI framework. Initiation involved the needs analysis, the project's stakeholders, and the integrated review's scope. Planning involved the integrated review, the evidence table of the literature, the manuscript, the feedback from the second reader, and the prospectus paper. Execution involved the curriculum for clinician education and the asthma toolkit. Control involved the implementation of curriculum, asthma toolkit, and measures of project outcomes. Closeout involved the analysis, the final paper, and the final presentation for the dissemination of results.

Responsibility/Communication Matrix

The responsibility and communication matrix displayed the objectives, medium, frequency, and audience of communication (see Appendix F). The main communication objectives were to consult the stakeholders for feedback, clarification, and approval. The project lead had the task of providing communication with all the stakeholders. The primary medium

was in-person and Zoom meetings. The audience of the in-person meetings was the project coordinator in the primary care practice, who facilitated the evidence generation, evidence transfer, and evidence utilization of the project. The audience of the Zoom meetings and emails was the second reader and the chairperson. They were notified when activities were in progress and when activities were completed.

SWOT Analysis

The strengths, weaknesses, opportunities, and threats (SWOT) Analysis displayed how the project lead proactively tailored interventions to leverage the strengths and opportunities while mitigating the weaknesses and threats of the target project site (see Appendix G). The strengths were the team of seasoned and respected healthcare providers, institutional support for clinician education, supply of peak flow meters, pre-existing infrastructure, and pre-existing monthly clinician meetings for quality improvement efforts. The opportunities were free public access to asthma guidelines and growing awareness of peak flow. One of the four fundamentals of asthma management is objective measures of lung function, spirometry, and peak flow. The primary care practice already had a stock supply of peak flow meters. Still, there was a lack of use for peak flow meters, as denoted by unopened boxes of peak flow meters and their distance away from the hands of healthcare providers, so peak flow was emphasized in the DNP project.

The weaknesses were the incapacity to include new quality improvement efforts in the EMR and other patient comorbidities. The current EMR in the target project site authorizes healthcare providers to input ICD.10 and peak flow under vitals, so the toolkit stressed documentation in the EMR to streamline asthma assessments and adherence to asthma guidelines. Healthcare providers have multiple opportunities to promote elements of asthma guidelines, especially for patients with other comorbidities. One of the evidence-based

recommendations in the NHLBI asthma guidelines is scheduled follow-up visits. The visits every two to six weeks while patients were gaining control, every one to six months for ongoing asthma monitoring, and every three months if "step down" is anticipated in therapy were stressed in clinician education and the asthma toolkit. The threat was the lack of external financial resources. A cost-effective financial system was developed to allocate funds carefully and maximize every dollar spent.

Financial Analysis

The financial analysis scrutinized the cost implications of the interventions and the potential return on investment (ROI) based on the decline in ED visits for asthma exacerbations (see Appendix H). Three nurse practitioners and three medical doctors attended the clinician education. Despite that there were some nurse practitioners and medical doctors who missed the clinician education, all healthcare providers in the primary care clinic had access to the asthma toolkit. The hourly wage for family medicine physicians in California is $115.76 (U.S. Bureau of Labor Statistics, 2023), and the hourly wage for nurse practitioners in California is $76.02 (U.S. Bureau of Labor Statistics, 2023). The duration of the education was 30 minutes. Clinician education for one project lead, three family medicine physicians, and three nurse practitioners was $401. The total cost for printing and laminating 12 copies of the toolkit was $52.20. Asthma therapy intends to optimize asthma control, reduce the risk of asthma exacerbations, and minimize the side effects of pharmacotherapy (GINA, 2023; NHLBI, 2022). The anticipated decline in ED visits for asthma exacerbations was the key metric in the ROI. There were approximately 1.8 million asthma-specific ED visits each year, which was about nine visits for every 100 asthma patients (Wang et al., 2014). Furthermore, Hispanic people of all ages were twice as likely to go to the ED than their White, non-Hispanic equivalents for asthma (CDC,

2021). The cost of asthma-specific ED visits averaged around $1,502 (Wang et al., 2014), and the cost of clinician education and asthma toolkit was $453.9, so the ROI is $1,048.

Outcome Measures

Ongoing asthma control monitoring is a key performance indicator of high-quality asthma care. The primary aim of the DNP project was to implement clinician education and adopt the asthma toolkit based on NHLBI asthma guidelines. The secondary outcomes were to improve comfort level to abide by NHLBI asthma guidelines by at least 25% in the Likert scale, promote elements of asthma guidelines with clinician education evidenced by at least 25% in the knowledge questions of the pre-and post-survey assessments, increase agreement on the vital instrument for ongoing asthma monitoring as manifested by at least 25% in the free response portion of the pre-and post-survey assessments, and improve adherence to peak flow from the NHLBI asthma guidelines by at least 25% in the binary (yes or no) portion of the pre-and post-survey assessments. The pre-and post-survey assessments were distributed on April 2, 2022. They contained the same knowledge, comfort level, agreement, and adherence questions.

CQI Method and Data Collection Tool

A quantitative and qualitative approach was employed to evaluate outcome measures (see Appendix I). Quantitative data was obtained through multiple choice questions, a Likert scale, and a binary portion, while qualitative data was obtained through a free response portion. The multiple-choice questions had a “select all that apply” format, so participants could choose multiple correct answers with one deliberately incorrect option to evaluate knowledge and critical thinking skills. The Likert scale was from one to ten, and participants can cipher their comfort level on adherence to asthma guidelines, with one being very low and ten being very high. The binary portion invited clear-cut answers on change in practice, particularly the use of

peak flow in asthma assessments based on NHLBI asthma guidelines. On the other hand, the free-response portion invited open-ended comments on the vital instrument for ongoing asthma monitoring, capturing qualitative insights into their expertise and experience. The pre-and post-survey assessments offered data on immediate shifts in knowledge, comfort level, agreement, and practice pattern.

Analysis

A robust comparative analysis was employed to evaluate the effectiveness of the clinician education and the asthma toolkit. The pre-and post-survey assessments collected clinician knowledge and adherence, so immediate shifts in knowledge, comfort level, agreement, and practice pattern would be analyzed. Descriptive statistics depicted the distribution of answers, which allows comprehension of baseline status and comparisons with post-intervention outcomes. The paired t-test, suitable for analyzing paired data from the same group of participants, was employed to determine if the mean difference of continuous data between two time periods was statistically significant. The binomial test, suitable for analyzing results without normal distribution or variability, was employed to determine if adherence to asthma guidelines was statistically significant from what would be expected by chance alone.

Ethical considerations

The multimodal interventions were implemented in the FQHC primary care practice with their permission. Provision 4 of the American Nurses Association Code of Ethics for Nurses affirms nurses' authority, accountability, and responsibility for nursing practice to make decisions and take actions that promote health and provide optimal care (American Nurses Association, 2015). Research and scholarly inquiry revealed that not all patients were exposed to subjective and objective measures in asthma assessments. With clinician education and the

asthma toolkit, healthcare providers acquired new knowledge and skills to fulfill their ethical responsibility to the community's health and uphold the best standard of care in primary care practice.

The DNP project had a profound connection to the Jesuit principles of educating the whole person and being people for others (USF, 2024). Healthcare providers have firsthand patient encounters with asthma patients whose lives have been made more difficult due to this chronic condition. The DNP project delved into the broader context in which asthma overwhelms those affected and the inherent importance of every person in the community. The DNP project cultivated the ethos of lifetime service and empathy, irrespective of health or socioeconomic status. With social responsibility and compassion, the DNP project instilled a holistic approach and a deeper solidarity with people from diverse cultures.

The patients in the primary care practice were not participants in the project; the participants were healthcare providers who were on the frontline of asthma care. To uphold privacy, personal information, such as names, birth dates, phone numbers, fax numbers, and electronic mail addresses, was not solicited. Confidentiality and anonymity were reiterated before and after clinician education was deployed.

Results

The Likert scale from one to ten revealed impressive differences in comfort level to abide by NHLBI asthma guidelines (see Appendix J). The participants reported a range of comfort between five to eight pre-intervention, which increased to eight to ten post-intervention. The mean comfort level increased from 7.00 (SD = 1.265) to 9.17 (SD = 0.983) pre-and post-intervention respectively. The improvement in the mean comfort level post-intervention was not only statistically significant ($p = 0.041$, $p < 0.05$), but was substantiated by a large effect size

(Cohen's d = 1.941; 95% CI: -2.131 to -0.041).

The multiple-choice questions uncovered remarkable shifts in knowledge (see Appendix K). The number of participants who reported knowledge of all the correct symptoms that should warrant asthma assessments increased from 33% to 100% pre-and post-intervention respectively. The number of participants who reported knowledge on all the correct occurrences that peak flow should be incorporated in asthma assessments increased from 33.3% to 100% pre-and post-intervention respectively. The number of participants who reported knowledge of all the correct objective measures of lung function increased from 66.7% to 100% pre-and post-intervention respectively. Parametric and non-parametric statistical tests could not be computed since there was the absence of variability in post-intervention answers, specifically all the observed data post-intervention have the same value with 100% improvement across participants. However, the observed number of participants who had all the correct answers for the three knowledge questions post-intervention was statistically significant (binomial test, exact sig = 0.031, $p < 0.05$) from random guessing.

The free-response portion disclosed the imposing agreement on the vital instrument for ongoing asthma monitoring (see Appendix L). The observed number of participants who named inhalers as the vital instrument (17%) pre-intervention. This proportion was not statistically significant (binomial test, exact sig = 0.219, $p > 0.05$) from random guessing. The number of participants who concurred that peak flow is the vital instrument increased from 83.3% to 100% pre-and post-intervention respectively. The observed number of participants who named peak flow as the vital instrument (100%) post-intervention was statistically significant (binomial test, exact sig = 0.031, $p < 0.05$) from random guessing.

The binomial portion of the pre-and post-survey assessments displayed a pronounced adherence to change in practice pattern (see Appendix M). The number of participants who reported adherence to peak flow from the NHLBI asthma guidelines under the circumstances that new and effective information was provided before the introduction of clinician education and asthma toolkit was already 100% pre-intervention and remained 100% post-intervention.

Discussion

Summary

Usual asthma care does not echo the goals of asthma management or the sentiments of asthma guidelines. Primary care providers have pervasive inconsistencies in the delivery of care. Evidence-based interventions were implemented in a primary care practice. The clinician education and asthma toolkit increased comfort level, knowledge, and agreement and maintained the degree of advocacy and adherence to asthma guidelines.

The NHLBI asthma guidelines-based clinician education and asthma toolkit yielded the following results:

- The observed improvement in the comfort level to abide by asthma guidelines was statistically significant.
- The observed improvement in knowledge questions by more than 25%.
- The agreement on the importance of peak flow for ongoing asthma monitoring increased to 100% post-intervention.
- There was a notable predisposition towards change in practice, dependent on providing novel and evidence-based information.

Interpretation

The results of the DNP project defended a nursing change in practice to improve asthma guidelines. The quality improvement project was justified with institutional support, the supply of peak flow meters, pre-existing primary care infrastructure, and pre-existing monthly clinician meetings.

Extensive research and scholarly inquiry revealed the improvement in clinician adherence to abide by elements of asthma guidelines due to asthma guidelines-grounded interventions and screen for more asthma symptoms (Bender et al., 2021; Pudasainee-Kapri, 2021; Yawn et al., 2018). This improvement was conveyed in patient outcomes, particularly in the improvement of asthma control and lung function as well as the decline in ED visits and hospitalizations. The literature review illuminated the wide caliber of clinician education and asthma guidelines-grounded interventions. Consequently, education emerged as the cornerstone of the DNP project. The clinician education and asthma toolkit not only increased comfort level, knowledge, and agreement among healthcare providers but also maintained the degree of advocacy and adherence to asthma guidelines.

Limitations

The project was confronted with several limitations. First, there were time constraints post-intervention that restricted the long-term implications of the project. The primary aim of the DNP project was to implement clinician education and adopt the asthma toolkit based on NHLBI asthma guidelines. The short-term nature of the project hinders any ability to evaluate long-term nuanced outcomes and sustainability. The purview of the project was confined to immediate change in practice. The pre-and post-survey assessments offered data on immediate shifts in comfort level, knowledge, agreement, and practice pattern. Second, the relatively small number of healthcare providers who attended the clinician education diminishes the statistical

significance of outcomes. Most statistical tests could not be computed for analysis as they have strict parameters, specifically due to the small sample size and absence of variability in answers. Third, the sources of data collection were self-reported information, which allows social and recall bias. Self-reported data may not match real-life behavior due to perceived expectations. Future research could include multiple sources, such as complementary objective measures, to improve the validity and reliability of information.

Conclusion

The quality improvement project established the successful implementation of clinician education and the asthma toolkit based on NHLBI asthma guidelines. These multimodal interventions were indispensable solutions that contributed to transformative shifts in comfort level, knowledge, and agreement, which could ultimately elevate asthma care. Clinician education fostered a unanimous consensus on the importance of peak flow and established full advocacy and adherence to change in practice.

A chart review could be pertinent to demonstrate adherence to the asthma toolkit measured by documentation under vitals and the number of scheduled follow-up visits. Repeated clinician education could also be pertinent to expand the sample size and solidify concepts for those who already attended. Recommendations for future research include longitudinal studies to evaluate long-term implications and generalizability of the results. The DNP project is worth replicating to validate the result. Despite the limitations, the results added to the body of literature that bolsters adherence to asthma guidelines. The effectiveness of the interventions marks a turning point for asthma management in this primary care environment.

Funding

No financial assistance was received for these quality improvement efforts. This project

was implemented to ultimately benefit asthma patients. The healthcare providers in the primary care practice received clinician education and the asthma toolkit on peak flow in asthma assessments based on NHLBI asthma guidelines.

References

Akinbami, L. J., Salo, P. M., Cloutier, M. M., Wilkerson, J. C., Elward, K. S., Mazurek, J. M., Williams, S., & Zeldin, D. C. (2020). Primary care clinician adherence with asthma guidelines: the National Asthma Survey of Physicians. *The Journal of Asthma: Official Journal of the Association for the Care of Asthma*, *57*(5), 543–555.

Bender, B. G., Simmons, B., Konkoly, N., & Liu, A. H. (2021). The Asthma Toolkit Bootcamp To Improve Rural Primary Care for Pediatric Asthma. *The Journal of Allergy and Clinical Immunology. In practice*, *9*(8), 3091–3097.e1. https://doi.org/10.1016/j.jaip.2021.03.058

Castillo, J. R., Peters, S. P., & Busse, W. W. (2017). Asthma Exacerbations: Pathogenesis, Prevention and Treatment. *The Journal of Allergy and Clinical Immunology. In practice*, *5*(4), 918–927. https://doi.org/10.1016/j.jaip.2017.05.001

Centers for Disease Control and Prevention. (2023). *Asthma.* https://www.cdc.gov/nchs/fastats/asthma.htm

Centers for Disease Control and Prevention. (2021). *Asthma emergency department (ED) visits 2010-2018.* https://www.cdc.gov/asthma/asthma_stats/asthma-ed-visits_2010-2018.html

Centers for Disease Control and Prevention. (2023). *Most recent national asthma data.* https://www.cdc.gov/asthma/most_recent_national_asthma_data.htm

Centers for Disease Control and Prevention. (2023). *Most recent asthma state or territory data.* https://www.cdc.gov/asthma/most_recent_data_states.htm

Centers for Disease Control and Prevention (2022). *Uncontrolled asthma among adults, 2019.* https://www.cdc.gov/asthma/asthma_stats/uncontrolled-asthma-adults-2019.htm

Cloutier, M. M., Salo, P. M., Akinbami, L. J., Cohn, R. D., Wilkerson, J. C., Diette, G. B., Williams, S., Elward, K. S., Mazurek, J. M., Spinner, J. R., Mitchell, T. A., & Zeldin, D. C. (2018). Clinician agreement, self-efficacy, and adherence with the guidelines for the diagnosis and management of asthma. *The Journal of Allergy and Clinical Immunology. In practice*, *6*(3), 886–894.e4. https://doi.org/10.1016/j.jaip.2018.01.018

Dang, D., Dearholt, S., Bissett, K., Ascenzi, J., & Whalen, M. (2022). *Johns Hopkins Evidence-based Practice for Nurses and Healthcare Professionals: Model and guidelines.* Sigma Theta Tau

Dodd, K. E., & Mazurek, J. M. (2020). Asthma self-management education in persons with work-related asthma - United States, 2012-2014. *The Journal of Asthma: Official Journal of the Association for the Care of Asthma*, *57*(6), 593–600. https://doi.org/10.1080/02770903.2019.1594890

Gagné, M. E., & Boulet, L. P. (2018). Implementation of asthma clinical practice guidelines in primary care: A cross-sectional study based on the Knowledge-to-Action Cycle. *The Journal of Asthma: Official Journal of the Association for the Care of Asthma*, *55*(3), 310–317. https://doi.org/10.1080/02770903.2017.1323919

Healthy People 2030 (n.d.) *Reduce asthma attacks - RD-04.* https://health.gov/healthypeople/objectives-and-data/browse-objectives/respiratory-disease/reduce-asthma-attacks-rd-04

Miles, C., Arden-Close, E., Thomas, M., Bruton, A., Yardley, L., Hankins, M., & Kirby, S. E. (2017). Barriers and facilitators of effective self-management in asthma: Systematic review and thematic synthesis of patient and healthcare professional views. *NPJ primary care respiratory medicine*, *27*(1), 57. https://doi.org/10.1038/s41533-017-0056-4

National Asthma Education and Prevention Program Coordinating Committee (NAEPPCC), Cloutier, M. M., Baptist, A. P., Blake, K. V., Brooks, E. G., Bryant-Stephens, T., DiMango, E., Dixon, A. E., Elward, K. S., Hartert, T., Krishnan, J. A., Lemanske, R. F., Jr, Ouellette, D. R., Pace, W. D., Schatz, M., Skolnik, N. S., Stout, J. W., Teach, S. J., Umscheid, C. A., & Walsh, C. G. (2020). 2020 Focused Updates to the Asthma Management Guidelines: A Report from the National Asthma Education and Prevention Program Coordinating Committee Expert Panel Working Group. *The Journal of Allergy and Clinical Immunology*, *146*(6), 1217–1270. https://doi.org/10.1016/j.jaci.2020.10.003

National Asthma Education and Prevention Program Coordinating Committee (NAEPPCC) (2007). *Expert panel report 3: Guidelines for the diagnosis and management of asthma*. U.S. Dept. of Health and Human Services, National Institutes of Health, National Heart, Lung, and Blood Institute.

Pearson, A., Wiechula, R., Court, A., & Lockwood, C. (2005). The JBI model of evidence-based healthcare. *International journal of evidence-based healthcare*, *3*(8), 207–215. https://doi.org/10.1111/j.1479-6988.2005.00026.x

Pudasainee-Kapri S. (2021). Providers' Adherence to Evidence-Based Asthma Guidelines in Pediatric Primary Care. *Journal of Pediatric Nursing*, *57*, 18–24. https://doi.org/10.1016/j.pedn.2020.09.020

Price, C., Agarwal, G., Chan, D., Goel, S., Kaplan, A. G., Boulet, L. P., Mamdani, M. M., Straus, S. E., Lebovic, G., & Gupta, S. (2019). Large care gaps in primary care management of asthma: A longitudinal practice audit. *BMJ open*, *9*(1), e022506. https://doi.org/10.1136/bmjopen-2018-022506

Song, H. J., Blake, K. V., Wilson, D. L., Winterstein, A. G., & Park, H. (2020). Medical costs

and productivity loss due to mild, moderate, and severe asthma in the United States. *Journal of Asthma and Allergy, 13*, 545–555. https://doi.org/10.2147/JAA.S272681

Tho, N. V., Quan, V. T. T., Dung, D. V., Phu, N. H., Dinh-Xuan, A. T., & Lan, L. T. T. (2023). GINA implementation improves asthma symptoms control and lung function: A five-year real-world follow-up study. *Journal of Personalized Medicine*, *13*(5), 809. https://doi.org/10.3390/jpm13050809

Trevor, J. L., & Chipps, B. E. (2018). Severe asthma in primary care: Identification and management. *The American Journal of Medicine, 131*(5), 484–491. https://doi.org/10.1016/j.amjmed.2017.12.034

University of San Francisco. (2024). *Our mission and values.* https://www.usfca.edu/who-we-are/reinventing-education/our-mission-and-values

U.S. Bureau of Labor Statistics. (2023). *Occupational employment and wages, May 2022 29-1215 family medicine physicians*. https://www.bls.gov/oes/current/oes291215.htm

U.S. Bureau of Labor Statistics. (2023). *Occupational employment and wages, May 2022 29-1171 nurse practitioners*. https://www.bls.gov/oes/current/oes291171.htm

Wang, T., Srebotnjak, T., Brownell, J., & Hsia, R. Y. (2014). Emergency department charges for asthma-related outpatient visits by insurance status. *Journal of Health Care for the Poor and Underserved*, *25*(1), 396–405. https://doi.org/10.1353/hpu.2014.0051

Yawn, B. P., Rank, M. A., Cabana, M. D., Wollan, P. C., & Juhn, Y. J. (2016). Adherence with asthma guidelines in children, tweens, and adults in primary care settings: A practice-based network assessment. *Mayo Clinic Proceedings*, *91*(4), 411–421. https://doi.org/10.1016/j.mayocp.2016.01.010

Yawn, B. P., Wollan, P. C., Rank, M. A., Bertram, S. L., Juhn, Y., & Pace, W. (2018). Use of asthma APGAR tools in primary care practices: A cluster-randomized controlled trial. *Annals of Family Medicine, 16*(2), 100–110. https://doi.org/10.1370/afm.2179

Appendix A

Evaluation Table

Purpose of Article or Review	Design / Method / Conceptual Framework	Sample / Setting	Major Variables Studied (and their Definitions)	Measurement of Major Variables	Data Analysis	Study Findings	Level of Evidence (Critical Appraisal Score) / Worth to Practice / Strengths and Weaknesses / Feasibility / Conclusion(s) / Recommendation(s)
APA Reference: Akinbami, L. J., Salo, P. M., Cloutier, M. M., Wilkerson, J. C., Elward, K. S., Mazurek, J. M., Williams, S., & Zeldin, D. C. (2020). Primary care clinician adherence with asthma guidelines: the National Asthma Survey of Physicians. *The Journal of asthma: official Journal of the Association for the Care of Asthma*, *57*(5), 543–555.							
To evaluate clinician adherence in different fields of primary care	Observational study	Sample - 1355 healthcare providers Setting - National Asthma Survey of Physicians	Agreement, adherence, and self-efficacy (ability to implement elements of guidelines)	Questionnaire	Chi-squared, t-tests, and logistic regression models	Pediatricians, referrals to asthma specialists, and strong self-efficacy were associated with adherence to asthma guidelines. Compared to other primary care providers, pediatricians had higher adherence to monitoring asthma recommendations (e.g., 71.6% [SE 4.0] almost always asked about daytime symptoms versus 50.6% [SE 5.1] – 51.1% [SE 5.8], t-test $P<.05$). The number of healthcare providers who almost always performed spirometry was low (6.8% [SE 2.0] to 16.8% [SE 4.7]). Less than a quarter of family medicine and general medicine	Level of Evidence – III Critical Appraisal Score – B Worth to practice – There is room for improvement in primary care/family medicine Strengths – Nationwide Weaknesses – Self-reported behaviors were at risk for social and recall bias Conclusions – Compared to pediatricians, clinician adherence was lower in primary care Recommendations – Interventions to improve adherence, self-efficacy, and referrals

Purpose of Article or Review	Design / Method / Conceptual Framework	Sample / Setting	Major Variables Studied (and their Definitions)	Measurement of Major Variables	Data Analysis	Study Findings	Level of Evidence (Critical Appraisal Score) / Worth to Practice / Strengths and Weaknesses / Feasibility / Conclusion(s) / Recommendation(s)
						providers reported strong self-efficacy. Compared to pediatricians, family medicine and general medicine providers reported a lower volume of asthma patients and lower agreement with asthma guidelines. Agreement was not associated with adherence to guidelines; however, agreement was low in all primary care providers. Only 11.6% of family medicine, general medicine, and pediatricians reported strong agreement with asthma guidelines. Strong agreement with inhaled corticosteroids (ICS), six-month follow-up visits, and asthma severity assessments in initial visits was divided in half.	

Purpose of Article or Review	Design / Method / Conceptual Framework	Sample / Setting	Major Variables Studied (and their Definitions)	Measurement of Major Variables	Data Analysis	Study Findings	Level of Evidence (Critical Appraisal Score) / Worth to Practice / Strengths and Weaknesses / Feasibility / Conclusion(s) / Recommendation(s) /
APA Reference: Bender, B. G., Simmons, B., Konkoly, N., & Liu, A. H. (2021). The Asthma Toolkit Bootcamp To Improve Rural Primary Care for Pediatric Asthma. *The Journal of Allergy and Clinical Immunology. In practice*, *9*(8), 3091–3097.e1. https://doi.org/10.1016/j.jaip.2021.03.058							
To evaluate the effectiveness of asthma guidelines-grounded interventions on clinician adherence to asthma guidelines	Qualitative study	Sample - 18 physicians, six nurses, six MAs	Adherence to guidelines	Self-reported chart audits and surveys, Regional Care Collaborative Organization Medicaid data	Descriptive analysis, qualitative analysis, Wilcoxon signed-rank, incidence rate proportion, and c2 tests of independence	Reach - All healthcare providers from 5 sites attended the 1-day workshop Adoption – Adherence to spirometry, asthma action plans, and asthma severity assessments increased after the workshop Effectiveness – The number of ED visits, hospitalizations, and prescriptions for oral corticosteroids decreased after the workshop Barriers were lack of time, human resources, standardization of visits, patient adherence, and access to embed asthma control tests and asthma action plans into the EMR. Facilitators were	Level of Evidence – II Critical Appraisal Score – B Worth to practice – The value of asthma guidelines-grounded interventions to improve adherence Strengths – Medicaid date to include patient outcomes Weaknesses – Potential bias Conclusions – There were internal and systemic barriers to adherence in primary care Recommendations – Interactive and repeated education on asthma guidelines

Purpose of Article or Review	Design / Method / Conceptual Framework	Sample / Setting	Major Variables Studied (and their Definitions)	Measurement of Major Variables	Data Analysis	Study Findings	Level of Evidence (Critical Appraisal Score) / Worth to Practice / Strengths and Weaknesses / Feasibility / Conclusion(s) / Recommendation(s) /
						training, education, and asthma materials.	

Purpose of Article or Review	Design / Method / Conceptual Framework	Sample / Setting	Major Variables Studied (and their Definitions)	Measurement of Major Variables	Data Analysis	Study Findings	Level of Evidence (Critical Appraisal Score) / Worth to Practice / Strengths and Weaknesses / Feasibility / Conclusion(s) / Recommendation(s) /
APA Reference: Cloutier, M. M., Salo, P. M., Akinbami, L. J., Cohn, R. D., Wilkerson, J. C., Diette, G. B., Williams, S., Elward, K. S., Mazurek, J. M., Spinner, J. R., Mitchell, T. A., & Zeldin, D. C. (2018). Clinician agreement, self-efficacy, and adherence with the guidelines for the diagnosis and management of asthma. *The Journal of Allergy and Clinical Immunology. In practice*, *6*(3), 886–894.e4. https://doi.org/10.1016/j.jaip.2018.01.018							
To evaluate clinician agreement, self-efficacy, and adherence to asthma guidelines	Observational study	Sample - 1412 primary care providers and 233 asthma specialists Setting - National Asthma Survey of Physicians	Agreement, adherence, and self-efficacy (ability to implement elements of guidelines)	Likert scale	Descriptive statistics, chi-squared, and logistic regression models	Compared to asthma specialists, fewer primary care providers asked about interference with work and/or school (84.5% vs. 48.4%), daily daytime symptoms (91.1% vs. 56.0%), nocturnal awakenings (81.7% vs. 53.4%), use of rescue inhalers (72.3% vs. 90.6%), use of daily inhalers (91.7% vs. 59.5%), repeated inhaler technique assessments (39.7% vs. 16.8%), perceived patient beliefs of asthma control (70.7% vs. 50.7%), peak flow (12.8% vs. 11.2%), and spirometry (44.7% vs. 10.8%). Overall agreement with asthma guidelines (12.1% vs. 27.9%) and overall self-	Level of Evidence – III Critical Appraisal Score – B Worth to practice - There is room for improvement in primary care/family medicine Strengths – Nationwide Weaknesses – Self-reported behaviors were at risk for social and recall bias Conclusions – Compared to asthma specialists, clinician adherence was lower in primary care Recommendations – Tailored interventions to improve adherence in primary care

Purpose of Article or Review	Design / Method / Conceptual Framework	Sample / Setting	Major Variables Studied (and their Definitions)	Measurement of Major Variables	Data Analysis	Study Findings	Level of Evidence (Critical Appraisal Score) / Worth to Practice / Strengths and Weaknesses / Feasibility / Conclusion(s) / Recommendation(s) /
						efficacy (21.5% vs. 72.3%) to implement elements of asthma guidelines were lower in primary care providers.	

Purpose of Article or Review	Design / Method / Conceptual Framework	Sample / Setting	Major Variables Studied (and their Definitions)	Measurement of Major Variables	Data Analysis	Study Findings	Level of Evidence (Critical Appraisal Score) / Worth to Practice / Strengths and Weaknesses / Feasibility / Conclusion(s) / Recommendation(s) /
APA Reference: Gagné, M. E., & Boulet, L. P. (2018). Implementation of asthma clinical practice guidelines in primary care: A cross-sectional study based on the Knowledge-to-Action Cycle. *The Journal of asthma: official Journal of the Association for the Care of Asthma*, *55*(3), 310–317. https://doi.org/10.1080/02770903.2017.1323919							
To evaluate clinician adherence in primary care, and barriers and facilitators to adherence	Cross-sectional study	Sample - 43 family physicians Setting - Medical meeting	Knowledge, agreement, perceived effectiveness, and motivation to adherence as well as barriers and facilitators	Questionnaire	Descriptive statistics	Only 61% of primary care providers implemented asthma control assessments, and less than half of asthma patients had scheduled follow-up visits. Furthermore, less than 40% of providers reported they confirmed asthma diagnosis with lung function tests and followed asthma guidelines for asthma control assessments in more than 75% of their patients. Seasoned and less-so-providers failed to implement evidence-based recommendations to all their asthma patients. There were barriers that invoked discrepancies between evidence-	Level of Evidence – III Critical Appraisal Score – B Worth to practice – There was suboptimal adherence to asthma guidelines in primary care Strengths – Knowledge-to-Action Cycle, generalizability Weaknesses – Self-reported behaviors were at risk for social and recall bias, Canadian asthma guidelines Conclusions – Strong motivation and agreement have a role in adherence Recommendations – Ongoing education on asthma guidelines

Purpose of Article or Review	Design / Method / Conceptual Framework	Sample / Setting	Major Variables Studied (and their Definitions)	Measurement of Major Variables	Data Analysis	Study Findings	Level of Evidence (Critical Appraisal Score) / Worth to Practice / Strengths and Weaknesses / Feasibility / Conclusion(s) / Recommendation(s) /
						based recommendations and actual implementation. Only 65% of primary care providers reported strong motivation and agreement to implement asthma control assessments based on asthma guidelines, referrals to asthma specialists, and speaking about patient concerns about asthma and treatment.	

Purpose of Article or Review	Design / Method / Conceptual Framework	Sample / Setting	Major Variables Studied (and their Definitions)	Measurement of Major Variables	Data Analysis	Study Findings	Level of Evidence (Critical Appraisal Score) / Worth to Practice / Strengths and Weaknesses / Feasibility / Conclusion(s) / Recommendation(s) /
APA Reference: Miles, C., Arden-Close, E., Thomas, M., Bruton, A., Yardley, L., Hankins, M., & Kirby, S. E. (2017). Barriers and facilitators of effective self-management in asthma: Systematic review and thematic synthesis of patient and healthcare professional views. *NPJ primary care respiratory medicine*, *27*(1), 57. https://doi.org/10.1038/s41533-017-0056-4							
To evaluate perceived barriers and facilitators to asthma self-management	Systematic review	Sample - 56 qualitative studies Setting - US (23), UK (12), Australia (6), Canada (3), Taiwan (3), Denmark (2), Singapore (2), Netherlands (2), Germany (1), New Zealand (1), Thailand (1)	Clinician and patient barriers and facilitators	Interviews (35) and focus groups (21)	Thematic analysis	Some healthcare providers viewed asthma guidelines as only useful for new providers. However, some viewed asthma guidelines as empowering and useful for difficult/severe asthma patients. Healthcare providers and patients had reservations about asthma guidelines and favored relying on their judgment on asthma management and treatment decisions.	Level of Evidence – III Critical Appraisal Score – A Worth to practice – Barriers and facilitators complicate adherence Strengths – High-quality studies Weaknesses – The sample size was not from diverse cultures Conclusions – Clinician education was named one of the facilitators to combat modifiable, perceived beliefs on asthma guidelines Recommendations – Clinician education and asthma materials to improve adherence

Purpose of Article or Review	Design / Method / Conceptual Framework	Sample / Setting	Major Variables Studied (and their Definitions)	Measurement of Major Variables	Data Analysis	Study Findings	Level of Evidence (Critical Appraisal Score) / Worth to Practice / Strengths and Weaknesses / Feasibility / Conclusion(s) / Recommendation(s) /
APA Reference: Price, C., Agarwal, G., Chan, D., Goel, S., Kaplan, A. G., Boulet, L. P., Mamdani, M. M., Straus, S. E., Lebovic, G., & Gupta, S. (2019). Large care gaps in primary care asthma management: a longitudinal practice audit. *BMJ open*, *9*(1), e022506. https://doi.org/10.1136/bmjopen-2018-022506							
To evaluate clinician adherence in primary care	Prospective cohort study	Sample - 884 patients, 23 providers Setting - Academic and community-based family outpatient sites in Ontario, Canada	The number of asthma visits with asthma control assessments, and the number of patients with assessments, subsequent adjustments in medications and asthma action plans	Chart review	Chi-squared, Fisher's exact tests, and logistic regression models	Asthma control assessments were implemented in 4.6% of visits and 15.4% of patients The questions to screen for asthma control, such as daytime symptoms, use of rescue inhalers, nocturnal symptoms, limitations in physical activities, interference with work and/or school, and all five, did not have a constant presence in visits. Similarly to the NHLBI asthma guidelines, asthma control assessments are the basis of treatment decisions. Notably, adjustments in treatment were made in less than 3.3% of qualified visits.	Level of Evidence – III Critical Appraisal Score - B Worth to practice – There was suboptimal adherence to asthma guidelines in primary care Strengths – Large prospective study, real-world academic and community primary care settings Weaknesses – Poor chart documentation, potential bias Conclusions – There was a lack of routine asthma control assessments in primary care Recommendations – Tailored knowledge interventions to improve adherence

Purpose of Article or Review	Design / Method / Conceptual Framework	Sample / Setting	Major Variables Studied (and their Definitions)	Measurement of Major Variables	Data Analysis	Study Findings	Level of Evidence (Critical Appraisal Score) / Worth to Practice / Strengths and Weaknesses / Feasibility / Conclusion(s) / Recommendation(s) /
APA Reference: Pudasainee-Kapri S. (2021). Providers' Adherence to Evidence-Based Asthma Guidelines in Pediatric Primary Care. *Journal of Pediatric Nursing*, *57*, 18–24. https://doi.org/10.1016/j.pedn.2020.09.020							
To implement asthma guidelines and asthma materials	Qualitative study	Sample - 38 patients younger than 18 years diagnosed with asthma, with asthma medications, and follow-up visits Setting - Pediatric primary care practice in Southern New Jersey	Adherence to elements of NAEPP's EPR-3 guidelines	Chart review	Descriptive analysis and chi-squared tests	Before interventions, chart review revealed that providers asked about three or more asthma symptoms to only 4.9% of asthma patients and made follow-up visits with 48.8% of asthma patients. After interventions, adherence to asthma control assessments on three or more asthma symptoms increased to 39.5%, and adherence to scheduled follow-up visits increased to 76.3%. The prescriptions for daily maintenance medications and short-acting beta-agonists remained the same. However, there was more change in adherence to other elements of asthma guidelines, such as documentation of adherence to asthma medications, inhaler technique, asthma action plans, and environmental control.	Level of Evidence – II Critical Appraisal Score - B Worth to practice – The value of asthma guidelines-grounded interventions to improve adherence Strengths – High-quality studies Weaknesses – Time constraints post-intervention, one primary care practice Conclusions – Clinician education and asthma materials enhanced adherence to asthma guidelines Recommendations - Evaluate patient outcomes post-intervention

Purpose of Article or Review	Design / Method / Conceptual Framework	Sample / Setting	Major Variables Studied (and their Definitions)	Measurement of Major Variables	Data Analysis	Study Findings	Level of Evidence (Critical Appraisal Score) / Worth to Practice / Strengths and Weaknesses / Feasibility / Conclusion(s) / Recommendation(s) /
APA Reference: Tho, N. V., Quan, V. T. T., Dung, D. V., Phu, N. H., Dinh-Xuan, A. T., & Lan, L. T. T. (2023). GINA implementation improves asthma symptoms control and lung function: A five-year real-world follow-up study. *Journal of personalized medicine*, *13*(5), 809. https://doi.org/10.3390/jpm13050809							
To evaluate the effectiveness of clinician adherence to asthma guidelines on patient outcomes	Observational, retrospective study	Sample - 1388 asthma patients Setting - hospital-based outpatient unit in Vietnam	Asthma control (GINA criteria) and persistent airflow (both FEV1/FVC < 0.70 and FEV1 < 80% predicted)	Electronic and paper-based medical records	McNemar's, Wilcoxon, student t, and chi-squared tests	After asthma management followed the Global Initiative for Asthma (GINA) guidelines, well-controlled asthma patients increased from 2.6% to 59.5%. The improvement in asthma control was achieved as early as three months and sustained over five years. The number of patients with persistent airflow limitations (FEV_1/FVC < 0.70 and FEV_1 < 80% of predicted value) and the number of patients on high-dose ICS (fluticasone propionate > 100 mcg or budesonide > 800 mcg) decreased.	Level of Evidence – III Critical Appraisal Score – B Worth to practice – The value of asthma guidelines Strengths – Long-term implications of adherence to asthma guidelines Weaknesses – Retrospective and data-based extraction study Conclusions – Interventions rectified poor asthma control and lung function Recommendations – Asthma guidelines-grounded interventions to improve asthma control

Purpose of Article or Review	Design / Method / Conceptual Framework	Sample / Setting	Major Variables Studied (and their Definitions)	Measurement of Major Variables	Data Analysis	Study Findings	Level of Evidence (Critical Appraisal Score) / Worth to Practice / Strengths and Weaknesses / Feasibility / Conclusion(s) / Recommendation(s) /

Purpose of Article or Review	Design / Method / Conceptual Framework	Sample / Setting	Major Variables Studied (and their Definitions)	Measurement of Major Variables	Data Analysis	Study Findings	Level of Evidence (Critical Appraisal Score) / Worth to Practice / Strengths and Weaknesses / Feasibility / Conclusion(s) / Recommendation(s) /
APA Reference: Yawn, B. P., Rank, M. A., Cabana, M. D., Wollan, P. C., & Juhn, Y. J. (2016). Adherence to asthma guidelines in children, tweens, and adults in primary care settings: A practice-based network assessment. *Mayo Clinic Proceedings*, *91*(4), 411–421. https://doi.org/10.1016/j.mayocp.2016.01.010							
To evaluate clinician adherence to asthma guidelines	Retrospective study	Sample - 1176 asthma patients Setting - 16 family and 6 pediatric sites in the United States	Documentation of asthma control assessments, asthma education, asthma action plans, and asthma medications	Medical records	Logistic regression models	There were asthma patients who never had asthma-specific visits. Approximately a quarter of patients with persistent asthma didn't have asthma-specific visits within one year, and all the asthma-specific visits recorded that year were for acute symptoms and were unplanned. Asthma control assessments, the basis of treatment decisions in NHLBI asthma guidelines, were implemented in only 15.0% of patients with more children than adults (22.1% vs. 11.6%). The adherence to non-pharmacological elements of asthma guidelines was never more than 33% and was as low as 3%. Validated tests were even more rare as they were implemented in only half	Level of Evidence – III Critical Appraisal Score – B Worth to practice – There was suboptimal adherence to asthma guidelines in primary care Strengths – Large sample size, primary care clinics across the United States Weaknesses – Early in the diffusion of asthma guidelines Conclusions – There was a lack of scheduled follow-up visits in primary care Recommendations – Interventions to improve adherence to asthma guidelines

Purpose of Article or Review	Design / Method / Conceptual Framework	Sample / Setting	Major Variables Studied (and their Definitions)	Measurement of Major Variables	Data Analysis	Study Findings	Level of Evidence (Critical Appraisal Score) / Worth to Practice / Strengths and Weaknesses / Feasibility / Conclusion(s) / Recommendation(s) /
						of these asthma assessments.	

Purpose of Article or Review	Design / Method / Conceptual Framework	Sample / Setting	Major Variables Studied (and their Definitions)	Measurement of Major Variables	Data Analysis	Study Findings	Level of Evidence (Critical Appraisal Score) / Worth to Practice / Strengths and Weaknesses / Feasibility / Conclusion(s) / Recommendation(s) /
APA Reference: Yawn, B. P., Wollan, P. C., Rank, M. A., Bertram, S. L., Juhn, Y., & Pace, W. (2018). Use of asthma APGAR tools in primary care practices: A cluster-randomized controlled trial. *Annals of Family Medicine*, *16*(2), 100–110. https://doi.org/10.1370/afm.2179							
To evaluate the effectiveness of asthma guidelines-grounded interventions on clinical and patient outcomes	RCT	Sample - 1066 asthma patients Setting - 18 family and pediatric sites in the US	Asthma control, quality of life, emergency department, urgent care, and inpatient visits	Medical records	Logistic regression models	Adherence to three or more elements increased by 20.7% in the mediation group with asthma guidelines-grounded interventions, while adherence decreased by 1.9% in the usual care group. Similarly to the relationship of adherence and interventions, the number of asthma-specific ED visits and hospitalizations decreased from 17.5% to 10.6% in the mediation group. In contrast, the number increased from 15.9% to 20.9% in the usual care group. After asthma management followed asthma guidelines-grounded interventions, the number of patients who reported asthma-specific ED visits and hospitalizations was 51% lower than patients in the usual care group. Furthermore, the number of well-controlled asthma patients was more than 50%	Level of Evidence – I Critical Appraisal Score – A Worth to practice – Asthma guidelines-grounded interventions were feasible and effective Strengths – Diverse sample size, quality of life scores Weaknesses – Recall bias Conclusions – Asthma control tests based on asthma guidelines increased asthma control and adherence and decreased ED visits, urgent care, and inpatient visits Recommendations – Tools that integrate asthma guidelines

Purpose of Article or Review	Design / Method / Conceptual Framework	Sample / Setting	Major Variables Studied (and their Definitions)	Measurement of Major Variables	Data Analysis	Study Findings	Level of Evidence (Critical Appraisal Score) / Worth to Practice / Strengths and Weaknesses / Feasibility / Conclusion(s) / Recommendation(s) /
						in the mediation group but not in the usual care. The improvement in asthma control and asthma-specific quality of life scores was statistically significant.	

Appendix B

JBI Framework

Concepts	Activities
Evidence generation	1. Conducted needs analysis and scholarly inquiry of effective, appropriate, meaningful, or feasible practice for asthma care 2. Defined scope of integrated review
Evidence synthesis	1. Conducted search, synthesis, and appraisal of the evidence 2. Assembled evidence table
Evidence transfer	1. Developed curriculum for clinician education 2. Developed asthma toolkit
Evidence utilization	1. Implemented clinician education and asthma toolkit 2. Distributed pre-and post-survey assessments

Pearson, A., Wiechula, R., Court, A., & Lockwood, C. (2005). The JBI model of evidence-based healthcare. *International journal of evidence-based healthcare*, *3*(8), 207–215. https://doi.org/10.1111/j.1479-6988.2005.00026.x

Appendix C

Needs Analysis

Current State	Desired State	Gap Identification	Gap Description	Remedial Actions
There were 70.1% of Hispanic adults and 58.0% of non-Hispanic White adults with poor asthma control (CDC, 2021). Lack of objective measures in asthma assessments	Improve adherence to asthma guidelines and increase effective asthma assessments Increase the use of peak flow meters in asthma assessments	Yes	There was suboptimal adherence to asthma guidelines and barriers to its application in asthma management (Bender et al., 2021; Cloutier et al., 2018; Gagné, & Boulet, 2018; Price et al., 2018; Yawn et al., 2016).	Clinician education and asthma toolkit to combat barriers to adherence

Appendix D

Gantt Chart

	09/24	10/23	11/23	12/23	01/24	02/24	03/24	04/24	05/24
Conducted needs analysis									
Identified stakeholders									
Defined scope of integrated review									
Conducted integrated review									
Assembled evidence table									
Completed manuscript paper									
Obtained feedback from the second reader									
Completed prospectus paper									
Developed curriculum									
Developed asthma toolkit									
Developed pre-and post-survey assessments									
Distributed pre-survey									
Implemented clinician education									
Implemented asthma toolkit									
Distributed post-survey									
Analysis									

Completed final paper									
Completed final presentation									

Appendix E

Work Breakdown Structure

Level 1	**Level 2**	**Level 3**
Peak Flow in Asthma Assessments Based on NHLBI Asthma Guidelines	1.1 Initiation	1.1.1 Conducted needs analysis 1.1.2 Identified stakeholders 1.1.3 Defined scope of integrated review
	1.2 Planning	1.2.1 Conducted integrated review 1.2.2 Obtained feedback from the second reader 1.2.3 Completed prospectus paper
	1.3 Execution	1.3.1 Developed curriculum 1.3.2 Developed asthma toolkit 1.3.3 Developed pre-and post-survey assessments
	1.4 Control	1.4.1 Implemented clinician education 1.4.2 Implemented asthma toolkit 1.4.3 Distributed post-survey
	1.5 Closeout	1.5.1 Analysis 1.5.2 Completed final paper 1.5.3 Completed final presentation

Appendix F

Communication Matrix

Communication	Purpose	Medium	Frequency	Audience
Virtual meetings	1. Obtained feedback on the integrated review 2. Obtained feedback on the prospectus paper 3. Obtained feedback on the curriculum for clinician education 4. Obtained feedback on the toolkit 5. Obtained feedback on the pre-and post-survey assessments 6. Obtained feedback on the final paper	Zoom	Approximately three times per week	Second reader
Virtual meetings	1. Obtained feedback on the needs analysis 2. Obtained clarification on the scope of the integrated review 3. Obtained approval on the manuscript 4. Obtained approval on the prospectus paper 5. Obtained clarification on the scope of the analysis, the final paper, and the final presentation 6. Obtained feedback on the final paper and the final presentation	Zoom	Monthly	Chairperson
Announcements	1. Notified when activities were in progress and when activities were complete for next steps and feedback	Emails	Monthly	Second reader Chairperson

In-person meetings	1. Obtained feedback on the needs analysis 2. Obtained approval for evidence utilization in the target project site 3. Obtained feedback on the curriculum for clinician education 4. Obtained feedback on the toolkit 5. Obtained feedback for the pre-and post-survey assessments	Target project site	First Tuesdays of the month	Project Coordinator

Appendix G

SWOT Analysis

	Favorable/Helpful	Unfavorable/Harmful
Internal (attributes of the organization)	**Strengths** • Clinician expertise • Institutional support • Pre-existing supply of peak flow meters • Pre-existing infrastructure • Pre-existing monthly clinician meetings	**Weaknesses** • Access to embed new measures in the EMR • Other patient comorbidities
External (attributes of the organization)	**Opportunities** • Access to asthma guidelines from the NHLBI website • Growing awareness of peak flow	**Threats** • Lack of external financial resources

Appendix H

Financial Analysis

Non-personnel	**Cost**
Printing and laminating asthma toolkit	$52.20 ($4.35/piece at FedEx)
Microsoft presentation	$0 (free at the University of San Francisco)
Zoom	$0 (free at the University of San Francisco)
Journal databases	$0 (free at the University of San Francisco)
SPSS version 29.0.2.0	$0 (free trial for 30 days)
Personnel	**Cost**
3 family medicine physicians	$173.64 ($115.76/hour)
4 nurse practitioners (with project lead)	$228.06 ($76.02/hour)
Total	$453.9

Appendix I

Survey

Comfort level to abide by the National Heart, Lung, and Blood Institute (NHLBI) asthma guidelines (On a scale from 1 (very low) to 10 (very high))...									
1	2	3	4	5	6	7	8	9	10

What symptoms should warrant asthma assessments? (Choose all that apply)

- ○ Daytime wheezing
- ○ Daytime coughing
- ○ Daytime chest tightness
- ○ Daytime shortness of breath
- ○ Nocturnal awakenings
- ○ Daytime crackles

What do you think is a vital instrument for ongoing asthma monitoring?

_____

What are objective measures of lung function? (Choose all that apply)

- ○ FEV1 (% predicted)
- ○ Peak flow (% personal best)
- ○ Daytime coughing

How often should you utilize peak flow meters in asthma assessments? (Choose all that apply)

- ○ Initial visits
- ○ Every 2 to 6 weeks while gaining control
- ○ Every 1 to 6 months to monitor control
- ○ Every 3 months if a step down in therapy is anticipated
- ○ Never

If you learn new and effective information, would you change your practice pattern and include peak flow in asthma assessments?

- ○ Yes
- ○ No

Appendix J

Comfort Level

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pre-intervention Comfort level to abide by NHLBI asthma guidelines	6	5	8	7.00	1.265
Post-intervention Comfort level to abide by NHLBI asthma guidelines	6	8	10	9.17	.983
Valid N (listwise)	6				

Pre-intervention Comfort level to abide by NHLBI asthma guidelines

	N	%
5 comfort level	1	16.7%
6 comfort level	1	16.7%
7 comfort level	1	16.7%
8 comfort level	3	50.0%

Post-intervention Comfort level to abide by NHLBI asthma guidelines

	N	%
8 comfort level	2	33.3%
9 comfort level	1	16.7%
10 comfort level	3	50.0%

Appendix K

Knowledge Questions

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pre-intervention What symptoms should warrant asthma assessments?	6	1	6	4.67	1.862
Post-intervention What symptoms should warrant asthma assessments?	6	6	6	6.00	.000
Valid N (listwise)	6				

Pre-intervention What symptoms should warrant asthma assessments?

	N	%
1 answer correct	1	16.7%
5 answers correct	3	50.0%
All 6 answers correct	2	33.3%

Post-intervention What symptoms should warrant asthma assessments?

	N	%
All 6 answers correct	6	100.0%

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pre-intervention How often should you utilize peak flow meters in asthma assessments?	6	2	5	3.67	1.211
Post-intervention How often should you utilize peak flow meters in asthma assessments?	6	5	5	5.00	.000
Valid N (listwise)	6				

Pre-intervention How often should you utilize peak flow meters in asthma assessments?

	N	%
2 answers correct	1	16.7%
3 answers correct	2	33.3%

4 answers correct	1	16.7%
All 5 answers correct	2	33.3%

Post-intervention How often should you utilize peak flow meters in asthma assessments?

	N	%
All 5 answers correct	6	100.0%

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pre-intervention What are objective measures of lung function?	6	0	3	2.33	1.211
Post-intervention What are objective measures of lung function?	6	3	3	3.00	.000
Valid N (listwise)	6				

Pre-intervention What are objective measures of lung function?

	N	%
0 answers correct	1	16.7%
2 answers correct	1	16.7%
All 3 answers correct	4	66.7%

Post-intervention What are objective measures of lung function?

	N	%
All 3 answers correct	6	100.0%

Appendix L

Agreement with Peak Flow

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pre-intervention What do you think is a vital instrument for ongoing asthma monitoring?	6	0	1	.83	.408
Post-intervention What do you think is a vital instrument for ongoing asthma monitoring?	6	1	1	1.00	.000
Valid N (listwise)	6				

Pre-intervention What do you think is a vital instrument for ongoing asthma monitoring?

	N	%
inhalers	1	16.7%
peak flow	5	83.3%

Post-intervention What do you think is a vital instrument for ongoing asthma monitoring?

	N	%
peak flow	6	100.0%

Appendix M

Adherence to Change in Practice Pattern

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Pre-intervention If you learn new and effective information, would you change your practice pattern and include peak flow in asthma assessments?	6	1	1	1.00	.000
Post-intervention If you learn new and effective information, would you change your practice pattern and include peak flow in asthma assessments?	6	1	1	1.00	.000
Valid N (listwise)	6				

Pre-intervention If you learn new and effective information, would you change your practice pattern and include peak flow in asthma assessments?

	N	%
Yes	6	100.0%

Post-intervention If you learn new and effective information, would you change your practice pattern and include peak flow in asthma assessments?

	N	%
Yes	6	100.0%

Appendix N

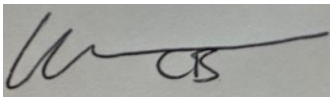
To whom it may concern,

I am writing this letter to express my wholehearted approval for Julia Regalado, a Doctorate of Nursing Practice student currently enrolled in your program, to initiate a Quality Improvement Project within our department at Fair Oaks Health Center. I have carefully reviewed Julia's proposal, and I am confident that this project will contribute positively to the enhancement of patient care and the overall quality of services provided by our department.

I am committed to providing any necessary support and resources to assist Julia during the execution of this Quality Improvement Project. I trust that this initiative will be a valuable learning experience for Julia and will contribute to the continuous improvement of our department's services.

If you have any concerns about the permission being granted by this letter, please contact me at the phone number or email listed below. I look forward to seeing the positive impact that this work will have on our department and, ultimately, on the quality of patient care we deliver.

Sincerely,



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