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Evidence-Based Guidelines and Protocol Implementation in a Primary Care Clinic to Improve Chronic Asthma Care

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Evidence-Based Guidelines and Protocol Implementation in a Primary Care Clinic to Improve Chronic Asthma Care

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Abstract

Background: Asthma is the most common chronic respiratory disease, with 14% of children and 8.6% of 18-45-year-old adults globally experiencing symptoms. Asthma is under-diagnosed and under-treated, resulting in significant burden of disease to the individual, their family, and society as a whole (Global Initiative for Asthma [GINA], 2016). Achieving asthma control requires collaborative care between the patient and family with the health care team.

Problem: Asthma is a significant issue in clinical practice in Oregon and Idaho. In 2009, prevalence of asthma was 11.4% in Oregon and 8.5% in Idaho (Centers for Disease Control and Prevention [CDC], 2011). Prevalence of asthma at the study site, a rural federally qualified health clinic system on the Oregon-Idaho border, was 3.5%, significantly lower than statewide statistics. Lack of evidence-based guidelines and protocols for diagnosis and management of asthma impair healthcare clinicians' ability to recognize, diagnosis, and treat asthma effectively.

Methods: This is a quality improvement project utilizing implementation science to address the gap between research and clinical practice. Normalization Process Theory was the theoretical model used in the project and RE-AIM Framework was the project framework. The NoMAD tool was used in the assessment process.

Interventions: Education on and copies of GINA Guidelines was provided to healthcare clinicians. One-on-one coaching sessions was provided to clinicians. Effectiveness of education sessions was measured with pre- and post-test questionnaires. Integration of changed workflow was measured

by administering the NoMAD tool mid- and post-intervention to healthcare clinicians at the project site. Retrospective chart reviews were conducted to assess frequency of Asthma Control Test administration, frequency of Asthma Control Test completion, Asthma Control Test scores, and if asthma management decisions reflected GINA guidelines.

Results: 107 clinic visits for asthma occurred during the project time frame. The Asthma Control Test was administered 76.75% of the time and completed 71% percent of the time after delivery of education sessions to clinicians. Mean Asthma Control Test scores improved from 18.11 in June to 20.29 in July, decreased to 15.95 in August and 17.41 in September, concurrent with worsening air quality. The NoMAD tool was administered mid- and post-intervention and showed healthcare clinicians became more familiar with the guidelines over the course of the intervention, with mean score improvement from 22.05 to 23.15. Identification of patients with asthma improved, reflected by increase of patients identified with asthma from 3.5% to 6.14% system-wide at completion of the project. Integration of evidence-based guidelines a

nd protocols was demonstrated by clinicians.

Recommendations/Conclusions: Results support expanding the project to the remaining five clinics in the clinic system. Implementation of evidence-based guidelines and protocols in a primary care clinic improves chronic asthma care for patients and families may improve quality of life for people with asthma and their families. More application of evidence-based assessment and management of asthma is needed to show correlation between improved quality of life for people with asthma and use of evidence-based guidelines and protocols in primary care.

Keywords: asthma, control, outcomes, test, quality improvement, Normalization Process Theory, RE-AIM, NoMAD.

Problem Description

Asthma is a chronic inflammatory disease of the airways that results in airway narrowing and remodeling. It is the most common chronic disease of childhood, with 14% of children having symptoms, and symptoms commonly persist in adulthood, affecting 8.6% of adults age 18-45, with burden of disease increasing with each decade of life (GINA, 2016).

Up to 23% of patients with asthma eventually develop decreased airflow, the hallmark sign of COPD (Yawn, 2009). COPD has significant morbidity and mortality, responsible for 700,000 hospitalizations annually, and the third leading cause of death in the United States (Chronic Obstructive Pulmonary Disease Foundation [COPD Foundation], 2016),

Asthma is a significant issue in clinical practice in Oregon and Idaho. In 2009, prevalence of asthma was 11.4% in Oregon and 8.5% in Idaho (CDC, 2011). However, when International Classification of Diagnosis (ICD) data for asthma from the project practice clinic system was retrieved and analyzed, prevalence of asthma was found to be 3.5% system-wide, indicating under-diagnosis of asthma (J. Fluke, personal communication, September, 2015).

Asthma is under-diagnosed and under-treated, resulting in significant burden of disease to the individual, their family, and society as a whole (GINA, 2016). This represents a substantial burden on health care resources, including direct health care costs (hospitalizations, medications, medical visits) as well as indirect costs such as lost work/school time, or death (GINA, 2016). This chronic respiratory disease has a significant socioeconomic impact on the individual patient as well as the patient's family. Utilization of health care resources, level of lifestyle impairment, and quality of life are strictly linked to level of asthma control, with less resource utilization, less

lifestyle impairment, and improved quality of life reported by patients with controlled asthma (Braido, 2013).

When asthma is identified, it may not be correctly assessed, resulting in inappropriate treatment and poor symptom control (Patino et al., 2008). This is most likely to occur in the context of poor clinician-patient communication about asthma during the clinical encounter (Patino et al., 2008). Use of evidence-based guidelines and validated assessment tools aids clinicians in assessing impact of asthma on the health status of patients and assists in collaborating with patients in making treatment decisions (GINA, 2016; Jones et al, 2009; NAEPP, 2007). Lack of evidence-based guidelines and protocols for diagnosis and management of asthma impair healthcare clinicians' ability to recognize, diagnosis, and treat asthma effectively. Evidence-based guidelines and tools for asthma assessment and management have not been utilized at the study site. This was a quality improvement project utilizing implementation science to address the gap between research and clinical practice, resulting in improved asthma care for patients.

Available Knowledge

Assessment Tools

The literature reviewed supports use of validated assessment tools by clinicians in assessing the impact of asthma on the health status of patients (Ko et al., 2009; Ko et al. 2012; GINA, 2016; NAEPP, 2007). Assessment tools assist in collaborative decision making with patients regarding treatment decisions (NAEPP, 2007). The Asthma Control Test (ACT) was chosen for this project and has been found to be valid, reliable, suitable for use in routine practice, correctly predicts level of asthma control, and responds to changes in clinical status (Bradio, 2013; GINA, 2016; Ko et al., 2012; Olaguibel et al., 2012; Melosini et al., 2012;

NAEPP, 2007; Schatz, Kosinski, Yarias, Hanlon, and Watson, 2009). It is available in multiple languages, with versions for children and adults. The ACT was found to be a more reliable measure of asthma control than spirometry, peak expiratory flow rate, and fractional exhaled nitric oxide (Chan, Sitaraman, and Dosanjh, 2009; Ko et al., 2009) The literature revealed deterioration in scores on the Asthma Control Test correlated with clinically significant deterioration (Bradio, 2013). Exacerbations are preventable because they rarely occur without warning, with signs of declining control occurring days to weeks before flare up. Exacerbations warrant immediate changes in treatment to avoid adverse outcomes (Nkoy et al. 2013).

Inaccurate assessment of disease status by the primary care provider is most likely to occur in the context of poor clinician-patient communication about asthma during the clinical encounter (Patino et al., 2008). Validated assessment tools can improve communication, and have been successfully implemented in other settings (Patino et al. 2008). Utilization of evidence-based tools to assess asthma has not been fully implemented in clinical practice (GINA, 2016; NAEPP, 2007). Options for assessing asthma control reviewed in GINA Guidelines include the Asthma Control Test, as well as a brief, four-question, yes/no assessment (GINA, 2016). The Asthma Control Test has been found to be responsive to changes in the patient's clinical status, improvement or deterioration, and preferable in clinical practice (Nkoy et al., 2013).

Rationale

Implementation Science

The National Heart, Lung, and Blood Institute (NHLBI) developed the National Asthma Education and Prevention Program (NAEPP) clinical practice guidelines with the goal to bridge the gap between current knowledge and practice. Their goal is to help all people who have

asthma, regardless of health disparities, receive quality asthma care (NAEPP, 2007). The NHLBI has collaborated with the World Health Organization to develop the Global Initiative for Asthma (GINA), to disseminate information about the care of patients with asthma, and to provide a mechanism to translate scientific evidence into improved asthma care. Multiple tools for use in clinical practice were utilized from these two programs for this Scholarly Project (see Logic Model, Appendix C) (GINA, 2016; NAEPP, 2007).

Theoretical Model

Implementation science was used in planning implementation of evidence-based guidelines and protocols in a primary care clinic. Implementation science is the study of methods that promote the translation of research findings into day-to-day clinical practice to improve quality and effectiveness of health care (National Institute of Health Fogarty International Center website, n.d.). It includes factors that influence patient, clinician, and organizational behavior in healthcare. The lack of implementation of research findings hinders productive change in healthcare.

Normalization process theory (NPT) is an applied theoretical model to assist researchers and real-world clinicians in understanding and evaluating factors that promote and inhibit incorporation of complex health care interventions into day-to-day practice. It is considered a middle range theory, integrating theory and empirical research into an implementation theory (May et al., 2011; Nilsen, 2015). This theory is concerned with three core problems: implementation, embedding, and integration of practice change. Incorporation of change, *normalization*, is affected by factors which promote or inhibit routine embedding (Finch et al., 2013; May et al., 2009; May et al., 2011)

Normalization process theory strives to move beyond understanding implementation science in order to address the gap between research and clinical practice by improving implementation outcomes in healthcare. Implementation failure may be due to personal agency of individuals, organizational context, attitudes, behaviors, diffusion and adoptions of innovations, and technology design interactions with humans (Finch et al., 2013). The Normalization Process Theory was used as the theoretical model for the Scholarly Project.

Project Framework

The RE-AIM framework is a model developed for planning, executing, and evaluating efforts to implement population level changes in the health and well-being of patients. This framework has been used to translate research into practice. RE-AIM stands for Reach, Effectiveness, Adoption, Implementation, and Maintenance (Gaglio, Shoup & Glasglow, 2013; King, Glasgow, Leeman-Gastillo, 2010). The RE-AM framework was used in planning, executing, and evaluating the project.

Additionally, the Kellogg Logic Model was utilized to plan the sequences of activities to bring about desired change. Using this model, the problem was defined, available resources identified, activities planned and executed, long term and short-term outcomes identified, and long-term impact on target population defined (see Appendix A). The foundational resources used in development of the Logic Model were The Global Initiative for Asthma Guidelines (2016) and the National Asthma Education and Prevention Program Expert Panel Report 3 (2007). Both of these guidelines were established to raise awareness about asthma among clinicians and to improve prevention and management through evidence-based practice. The practice guidelines reflect current evidence and can be adapted for local conditions and individual patients. Tools feasible for use in daily practice are included in the guidelines. These

included the Pocket Guide for Asthma Management and Prevention, Asthma Care Quick Reference, and the Asthma Control Test (GINA, 2016, NAEPP, 2007).

Specific Aims

The purpose of the Scholarly Project was to standardize asthma care protocols and practices by healthcare clinicians in a rural family practice on the Oregon-Idaho border. This was a quality improvement project utilizing implementation science to address the gap between research and clinical practice. The goal of the Scholarly Project is integration of GINA 2016 Guidelines into clinical practice at a pilot clinic site.

Health, economic, environmental, and societal impacts to be achieved as a result of the Scholarly Project are defined as:

1. Development of a self-sustaining program supporting efforts of clinicians in delivery of evidence-based asthma care.
2. Patients demonstrate an improved level of asthma management and decreased adverse outcomes related to inadequate asthma management.
3. Improved communication between provider-nursing regarding the patient's level of asthma control will result in improved outcomes for asthma patients and more accurate assessment of asthmatic status.
4. Improved asthma control results in decreased burden of disease, decreased health care costs, and improved quality of life for asthma patients, their families, and the community as a whole.

Context

The Scholarly Project was carried out at Valley Family Health Care (VFHC), a rural Federally Qualified Health Clinic primary care clinic with six sites on the Oregon-Idaho border.

The service area is located 60 miles west of Boise, Idaho in Eastern Oregon and Southwestern Idaho, spanning four counties, 14,773 square miles with a population of 136,728, or 9.25 persons per square mile. Median income in 2015 was $35,418.

In 2014, VFHC clinics had 45,722 visits, with 12,456 unique individual patients. The patient population is 69% non-Hispanic, 28% Hispanic, and 3% with other racial identification. They served 2,352 agricultural workers. Of these, 703 were migrant workers, and 1649 were seasonal workers. The payer mix is 30% uninsured, 29% private insurance, 28% Medicaid and 13% Medicare. Poverty is common with 30% of patients served by VFHC living below the federal poverty line (Valley Family Health Care [VFHC], 2015).

VFHC uses the Patient-Centered Medical Home (PCMH) model of disease management in the delivery of health care. The population VFHC serves are low-income individuals with economic/cultural/language barriers in a medically underserved geographic area. The PCMH model goals are to *get well, be well, stay well,* to prevent/manage chronic disease, improve quality of care, and reduce costs. This model puts more responsibility in the hands of the patient for their overall health status. It uses a team-based approach to care, primary care provider led with patient at the center of the team with nurses and other staff coming alongside the patient. Nurses provide education to patients regarding chronic disease management and help them in establishment of self-management goals. These goals are readdressed at clinic visits (Houde, Melillo, & Holmes, 2012).

In order to achieve PCMH recognition, a medical practice must meet standards of care derived from evidence-based practice. Asthma management with appropriate use of medications is one of the quality measures to meet standards for Patient-Centered Medical Home (PCMH) certification. VFHC has implemented evidence-based chronic disease management for

hypertension, diabetes mellitus, heart disease, tobacco cessation, obesity, and alcohol/substance misuse. (*PCMH/PCPCH-VFHC,* 2015). VHFC's familiarity with evidence-based practice implementation is a strong organizational resource. Work flow practices are well established in current evidence-based chronic disease management. Staff has demonstrated resiliency in coping with practice management change during the implementation of the PCMH model.

Interventions

The study participants were healthcare clinicians who care for VFHC patients age 6 through 65 years of age with a diagnosis of asthma. The pilot project was carried out at the Payette site, one of six VFHC clinic sites over 16 weeks; June through September 2017. Healthcare clinicians included primary care providers (physician assistant and nurse practitioner) and nursing staff (Registered Nurse, Licensed Practical Nurse, Certified Nurses Aid, and two Certified Medical Assistants). All healthcare clinicians (N=7) assigned to the Payette site were included. Children younger than age 6 were excluded due to the difficulty of establishing an accurate diagnosis of asthma in this age group (GINA, 2016). Adults older than age 65 were excluded due to the difficulty in making an accurate diagnosis of asthma in the elderly (GINA, 2016). Kellogg Logic Model activities included development of a multidisciplinary working group to carry out planned outputs of assessing current asthma care, identifying barriers and facilitators to implementation, development of implementation plan, staff education, revision of current electronic health record asthma visit template, and development of asthma patient check in template in the electronic health record.

Staff member's readiness for change was assessed utilizing Normalization Process Theory. The NoMAD tool was administered midway through implementation of evidence-based asthma care guidelines and protocols. The tool was administered again, after completing

implementation to evaluate reach, effectiveness, adoption, implementation, and maintenance of the project.

Educational sessions covering ACT, GINA guidelines, and interventions based on ACT scores were delivered to healthcare clinicians prior to implementation of the project. Copies of *Asthma Care Quick Reference* with *Asthma Action Plan*, and *How to Control Things That Make Your Asthma Worse* (NAEPP, 2012), *Pocket Guide for Asthma Management and Prevention (GINA, 2016), Respiratory Inhalers At A Glance (AllergyAsthmaNetwork.org)* were provided. The DNP student provided one-on-one coaching sessions with healthcare clinicians during the project implementation. Effectiveness of education sessions was measured with pre- and post-test questionnaires, with goal of increasing knowledge by 50% above baseline.

Retrospective chart reviews were conducted through the project to assess ACT scores, frequency of ACT administration to patients with a diagnosis of asthma, frequency of ACT completion by patients, and if asthma management decisions reflected GINA guidelines. Diagnosis of asthma was confirmed based on results of lung function testing to assure patients were appropriately diagnosed with asthma. A total of 107 charts were reviewed.

Effectiveness of project planning, interventions, and sustainability was done by evaluating the following short-term outcomes (see Logic Model, Appendix A):

1a. A multidisciplinary working group focused on asthma-related policies and protocols was established by January 2017.

1b. A revised EHR asthma visit template was developed and approved by the start of the DNP Project implementation in June 2017.

1c. GINA guidelines was approved for use within clinics by April 2017

1d. Foundational documents were reviewed and approved by multidisciplinary working group by April 2017.

2a. Payette site Nursing and PCPs demonstrated 50% increase in knowledge of GINA guidelines after delivery of training by DNP student as measured by pre-test & post-test measurements in May 2017.

2b. At the end of Phase 1 implementation period, chart audits demonstrated that nursing staff and PCPs appropriately applied GINA guidelines 90% of the time.

3a. Payette site Nursing and PCPs demonstrated 50% increase in knowledge of ACT after delivery of training by DNP student as measured by pre-test & post-test measurements in May 2017.

3b. Chart reviews demonstrate that at least 60% of patients at a clinic visit with a diagnosis of asthma received the ACT from June 2017 through September 2017.

4a. Payette site Nursing and PCPs demonstrated 50% increase in knowledge of GINA guideline interventions after delivery of training by DNP student as measured by pre-test & post-test measurements in May 2017.

4b. Chart reviews demonstrated that Payette site patients with an ACT score of 19 or less received appropriate interventions per GINA guidelines to improve asthma control 90% of the time between from June 2017 through September 2017.

5. NoMAD tool for assessment and evaluation of reach, effectiveness, adoption, implementation, and maintenance of program was administered at Payette site in July, 2017 and September, 2017.

Timeline

Planning for the Scholarly Project was conducted from August 2015 through May 2017. Education of staff regarding GINA guidelines and use of the ACT occurred in May 2017 (see Appendix F) and implementation began June 2017 through September 2017. Data was collected from August 2017 through November 2017. Preliminary findings were reported to the multidisciplinary working group and the Quality Improvement Committee in November 2017. Dissemination of findings will occur in March 2018. Phase 2, implementation across all clinic sites, will occur in June 2018.

Measures

Measures chosen for studying processes and outcomes of the interventions included a checklist of observable actions, two pre- and post-test questionnaires administered to staff to assess knowledge change, the NoMAD tool to assess incorporation of change, and a review of electronic health records for quantitative data related to administration of the ACT and implementation of GINA guidelines based on ACT score (see Appendices H, I, J, K, L, M and N).

The Normalization Process Theory (NPT) is the framework for the NoMAD tool. The NoMAD tool (see Appendix O) is a public domain, 23-item questionnaire grounded in the theoretical constructs in the NPT, *Coherence, Cognitive Participation, Collective Action, and Reflexive Monitoring.* The questions were designed to measure the recipients' readiness for change and experience of the planned change. The NoMAD tool was administered to staff mid- and post-intervention to assess the project implementation process (Outcome 5).

A checklist of observable actions and behaviors with yes or no measures was constructed for the purpose of data collection and analysis (Outcomes 1a, 1b, 1c, 1d). Outcomes monitored included formation of multidisciplinary group, presence of revised electronic health record

template, foundational documents reviewed and approved by multidisciplinary working group by 2017, GINA guidelines approved for use by April 2017, distribution of the Pocket Guide of Asthma Care, and staff education (see Appendix H).

Administration of the pre- and post-test questionnaires to staff was conducted to assess knowledge of GINA guidelines and how to access the guidelines (Outcomes 2a, 3a, 4a). Questionnaires were constructed based on public domain tools. Chart reviews were conducted scoring aggregate administration rate of ACT to patients with diagnosis of asthma from June 2017 through September 2017 (Outcome 3b).

Review of electronic health records of patients with an asthma diagnosis was conducted to assess for total number of patients with asthma diagnosis seen during the project implementation, rates of administration of ACTs, and rates of execution of appropriate interventions per GINA guidelines for patients with ACT score of 19 or less (Outcomes 2b, 4b).

Analysis

The purpose of the evaluation was to determine whether the Scholarly Project was implemented as intended, outcomes were achieved, and if modifications are needed. Process evaluation was selected as the method to be utilized. This method focuses on the implementation process to determine how successful the project was in following the blueprint laid out in the logic model (CDC, n.d.).

Data collected were selected to show change in clinical practice after implementation of the Scholarly Project. Both formative and summative evaluation methods were utilized in evaluation of the Scholarly Project to provide feedback for program modifications as well as a snapshot of the progress toward implementation of evidence-based guidelines.

Triangulation of data was utilized in the evaluation of the Scholarly Project through the analysis of direct observation checklist results (Outcomes 1a, 1b, 1c, 1d), pre-and post-implementation questionnaires (Outcomes 2a, 3, 4a), chart audits with yes/no checklists (Outcomes 1a,1b, 1c, 1d), and mid-and post-implementation NoMAD tool administration (Outcome 5).

Descriptive statistics were used to describe data measuring outcomes related to the establishment of the Multidisciplinary Working Group, revision of electronic health record asthma visit template, and approval of GINA 2016 Guidelines by Quality Improvement Committee (Outcomes 1a, 1b, 1c,1d).

Analysis of the change in knowledge also utilized descriptive statistics. Pre- and post-educational session questionnaires were developed based on a tool from the *University of Wisconsin –Extension Collecting Evaluation Data*, which measured clinician's real and perceived changes in knowledge (Outcome 2a, 3a, 4a).

Descriptive statistics were also used to describe the results of the NoMAD pen and paper questionnaire which measured coherence, cognitive participation, collective action, and reflexive monitoring- measuring implementation processes from the perspective of staff directly involved in implementing change (Outcome 5). Results are reported utilizing aggregate data, displayed in tables that summarize the frequency of responses to items. This data analysis method also allowed for analysis of implementation failure and theory failure (see Appendix B).

Ethical Considerations

Data and human protection was addressed through multiple measures. Institutional Review Board approval for the Scholarly Project was submitted and the project was designated

exempt in March, 2017. The DNP student completed an educational program for Collaborative Institutional Training Institute for social and behavioral researchers in July, 2016.

Privacy, confidentiality, and security were maintained throughout data collection and analysis. Informed consent was obtained from participants. No personal health information of patients with asthma was collected during the chart review process. No personal identifying information of participants was collected during administration of participant questionnaires. Additionally, data analysis results were reported in aggregate format only.

Information security was maintained throughout data collection and analysis. All paper data collection instruments were stored in a locked drawer in a locked office within a secure building. All documents stored electronically were password/log-on ID protected on a computer with firewall protection and antivirus software protection.

Bias can be mitigated by the production of consistently reliable data with a minimum of errors. The NoMAD tool has documented reliability, validity, sensitivity, and precision which decreases bias. Additionally, bias can occur with use of questionnaires as respondents may provide answers they perceive are wanted instead of their own beliefs (Rouen, 2014). Collection of qualitative data was not done to avoid bias, as the author works at the project site.

Directive observation is noted to be an objective approach to data collection (Rouen, 2014). The checklist of observable actions and behaviors with “yes” or “no” measures, was utilized for data collection. This method may be vulnerable to bias from the observer’s personal interests in conducting the study (Rouen, 2014).

Extraction of data from electronic health records is a quantitative data collection method and may be limited by missing data points in the record (Rouen, 2014). Data were extracted from electronic health records of patients with an ICD-10 code of J45 asthma, utilizing a yes/no

checklist: Was the ACT administered? Was the ACT completed? Was the treatment decision consistent with GINA guidelines? Additionally, the ACT score was recorded (see Appendix P).

Results

The NoMAD tool was administered mid- and post-intervention to 6 out of 7 participants (85.7%). The tool showed healthcare clinicians became more familiar with the guidelines and incorporated the guidelines into their work over the course of the intervention, with mean score change from 22.05 to 23.15, on a scale of 0-30 (Outcome 5). Participants did not believe implementation of evidence-based guidelines would disrupt working relationships (Section C3, Question 1). They agreed that participating in GINA guidelines was an important part of their role (Section C2, Question 2) with mean score change from 24 to 25 (see Appendix P). One participant (16.7%) did not agree or disagree that they could easily integrate evidence-based guidelines into their existing work, the remaining five (83.3%) agreed that they could easily integrate evidence-based guidelines. One participant did not complete the NoMAD tool, thus data collected was not complete for all participants.

Clinicians received two education sessions with pre- and post-test assessments of knowledge gain, usability of information, and awareness. A 5-question quiz was utilized to assess baseline knowledge. Education Session 1 discussed GINA guidelines (see Appendix L), and pre- test/post-test scores showed an increase in baseline knowledge for the seven clinician participants, from 83% to 100% (see Appendix M). This was under the goal of demonstrating a 50% increase in knowledge (Outcome 2a). All seven participants (100%) rated knowledge gain of GINA guidelines at moderate on a 4-point scale and rated the information usable (81-100%).

All clinician participants (100%) attended Education Session 2, which discussed applying GINA guideline interventions based on ACT scores (see Appendix M). Pre- test/post-test scores

showed a change in knowledge for the seven clinician participants. On pre-testing, 71.4% of questions were answered correctly, improving to 100% on post-testing in 7 out of 7 clinicians, resulting a 28.6% change. This was under the goal of demonstrating a 50% increase in knowledge (Outcomes 3a & 4a). Six participants (85.7%) rated knowledge gain of GINA guidelines at moderate on a 4-point scale. One participant rated self-perceived knowledge gain at slight. All seven participants (100%) rated the information at 81-100% usable.

Chart reviews found a total of 107 patients with a verified ICD-10 code of J45 asthma were seen from June 1, 2017 through September 30, 2017. The charts were reviewed to determine ACT administration (Outcome 3b) and found that the ACT was administered 76.8% percent of the time and completed 71.0% of the time. Nursing work flow for pre-visit planning was changed and planning administration of ACT to patients with J45 asthma diagnosis was added. Nursing added a copy of the ACT to paperwork patients receive to complete prior to their visit. Other items in this paperwork include depression screening, and drug and alcohol misuse screening forms.

From Week 1 through Week 4, 23 out of the 43 (53.4%) patients with asthma seen were unscheduled, same day, work-in appointments. Administration of ACT to these patients was not routinely occurring as pre-visit planning had not occurred. Administration of ACT was missed in 37.2% of the unscheduled patients' office visits during Weeks 1-4. The work flow for identifying which patients were to receive an ACT was modified to allow capture of work-in patients, and copies of the ACT were placed in the nursing triage room for easy access. From Week 5 through Week 12, administration of ACT was missed in 12 out of 64 (18.75%) of unscheduled work in/same day office visits. The change from 37.2% to 18.75% represented a decrease of 50% in missed ACT administrations for patients with unscheduled appointments.

Chart reviews found that 38 out of 107 patients (35.5%) had an ACT score 19 or less. Of these 38 patients, only one (2.7%) did not receive a modification in their plan of care reflecting GINA guidelines (Outcome 4b). Use of the ACT- aided communication between clinicians and patients regarding the patient's level of asthma control resulted in improved symptom control for asthma patients and more accurate assessment of asthmatic status. One individual moved from ACT score of 9 at Week 1 to 25 at Week 4. Another individual moved from ACT score of 5 at Week 1 to 17 at week 2, and 23 at Week4. Mean Asthma Control Test (ACT) scores improved from 18.11 at Week 4 to 20.29 at the conclusion of Week 8, then dipped to 17.41 at Week 12.

One unintended consequence was use of ACT results as jargon for level of asthma control, as regular clinic staff developed the habit of using the ACT score as shorthand for level of asthma control when communicating with each other. Float staff were not aware of the project, had not attended any education sessions, were unaware of change in work flow, and *felt out of the loop* (C. Boswell, personal communication, 2017).

Another unintended consequence was change of some patient's diagnosis and treatment. Chart reviews revealed some patients with an asthma diagnosis in fact had COPD. Evidence-based treatment for COPD is similar but not exactly the same as asthma, thus treatment for these patients was modified. However, data were not collected on this change in diagnosis.

Interest in the project was widespread throughout the clinic system. Other clinicians started utilizing the tools used in the project in their own clinical practice. This may be why system-wide prevalence of asthma rose from 3.5% prior to implementation to 6.14% (S. Butte, personal communication, 2018) after implementation, another unintended consequence.

This quality improvement project has multiple opportunities for nursing staff to provide patient teaching and problem solving to address barriers to care. During the planning phase,

nursing staff were concerned they did not know enough about asthma management and medications to provide sound patient teaching (A. Moreno, personal communication, 2016). It appears that confidence has risen over time, evidenced by proficiency in coaching patients through spirometry, completing ACTs, educating on use of various types of inhalers, and scores on the two questionnaires assessing knowledge (A. Moreno, personal communication, 2016).

The rising confidence of nursing staff appears to have extended to other areas for patient teaching. The nurse manager has observed an increased proficiency in the nursing staff in educating patients in management of heart failure, diabetes, hypertension, and COPD (A. Moreno, personal communication, 2016). This illustrates self-efficacy theory (Bandura, 1994) in practice.

Spirometry visits totaled 30 from June to September 2017, with an estimated $233 for each visit, totaling $6,990. Asthma visits without spirometry totaled 77 during the same time frame, with estimated $175 for each visit, for a total of $13,475. Dedicated asthma visits with spirometry occur annually or bi-annually according to GINA guidelines, billing at $233 per visit. These dedicated visits are new to the practice

Expenses included copies of the *Pocket Guide of Asthma Management and Prevention*, laminated copies of the *Asthma Quick Care Reference*, copies of the *Respiratory Inhalers At A Glance*, copying expenses, wages for DNP project manager, wages for multidisciplinary working group, and delivery of two education sessions (See Appendices C, D, and E). Educational materials and copying expenses totaled $130. Wages for DNP project manager totaled $39,368, which was offset by an in-kind donation covering this expense. Expense for the multidisciplinary team came in at $275, well under the projected $1100 by keeping meetings short and to the point. Overall, the project generated $20,465.00 from June through September, 2017.

Summary

The purpose of this Scholarly Project was to standardize asthma care protocols and practices by healthcare clinicians in a rural family practice on the Oregon-Idaho border. Development of a self-sustaining program supporting efforts of clinicians in delivery of evidence-based asthma care was achieved as evidenced by education session pre-test/post test scores, NoMAD scores and chart reviews (Outcomes 1a, 1b, 1c, 1d, 2a, 2b, 3a, 3b, 4a, 4b, 5). Clinicians gained knowledge as a result of education sessions, with 17.14% improvement for Education Session 1 and 28.57% for Education Session 2 (Outcomes 2a, 3a, 4a).

The NoMAD tool was used to evaluate reach, effectiveness, adoption, implementation, and maintenance of the project. Clinicians became more familiar with the GINA guidelines and incorporated the guidelines into their work over the course of the intervention, with mean score changes from 22.05 to 23.15, on a scale of 0-30 (Outcome 5).

Patients demonstrated an improved level of asthma symptom control as evidenced by aggregate ACT score improvement for June and July, however dipped in August and September (see Appendix P), concurrent with decrease in air quality (Boise State Public Radio, 2017; Idaho Smoke Information, 2018). ACT scores improved in October and November. Data related to adverse outcomes of inadequate asthma management was not collected. However, improved asthma control results in decreased burden of disease, decreased health care costs, and improved quality of life for asthma patients, their families, and the community as a whole (Bradio, 2013; GINA, 2016; NAEPP, 2007). This project did not measure changes in burden of disease, health care costs, or quality of life. Use of the ACT aided in communication between provider-nursing-patient regarding the patient's level of asthma control, resulting in improved symptoms control

for asthma patients and more accurate assessment of asthmatic status (K. Rodriquez, personal communication, 2017). This observation is consistent with findings of Bradio (2013), GINA (2016), and NAEPP (2007).

Interpretation

Delivery of education, one-on-one coaching, provision of educational materials, use of validated assessment tools, implementation of work flow change has resulted in improved asthma control in patients with asthma as evidenced by improved ACT scores (See appendix P). This correlates with findings of Braido, (2013; GINA, 2016; Ko et al. (2012); Ko et al.; (2009); Melosini et al., (2012); NAEPP, 2007); Oza, Vural, & Ruiz (2014); Patino et al., 2008; and Schatz, Kosinski, Yarias, Hanlon, & Watson (2009).

Over the course of the 16-week project implementation, the Asthma Control Test was administered to patients with a diagnosis of asthma 76.75% percent of the time, completed 71% of the time, achieving the target of at least 60% administered and completed (Outcome 3b). Clinicians had developed the habit of identifying that a patient has asthma, administering the ACT, and assuring the patient completed the ACT. This reflects successful incorporation of asthma guidelines and protocols, *normalization* of a new work flow, reflecting the Normalization process theory.

Evaluation of Education Session 1 (see Appendix K) Questionnaire showed improvement in quiz sores, but below the goal of demonstrating a 50% increase in knowledge (Outcome 2a & 3a). Baseline aggregate score of pre-test quiz of 82.86% is consistent with participants having basic understanding of asthma. However, the education session was useful for participants, as 100% rated the information at 81-100% usable to them.

Evaluation of Education Session 2 (see Appendix M) Questionnaire results revealed no change in quiz question scores, at 91% correct pre-and post-intervention, showing clinicians had basic knowledge of the GINA guidelines and the ACT (Outcomes 2a,3a,4a). Knowledge gain was expected based on literature (GINA, 2016; NAEPP, 2007). However, the education session was useful for participants as 100% rated the information at 81-100% usable to them. Results of education session evaluations will be used to guide designing clinician education for clinic-wide roll out.

Chart reviews (107) found that 37 of the 38 patients (97.4%) with an ACT score 19 or less received a modification in their plan of care reflecting GINA guidelines, exceeding the target of 90% (Outcome 4b). This reflects successful incorporation of asthma guidelines and protocols, illustrating the Normalization process theory. Asthma Control Test (ACT) scores improved from June to July (see Appendix N). As an example, one patient's score improved from 5 to 23, and one patient's score improved from 9 to 25.

A side observation in this project was that nearly all of the patients with asthma changed over time with decline in lung function by age 55-65 to COPD. This was in excess of 23% reported by Yawn (2009). Data were not collected regarding reevaluation of patient's diagnosis for this project.

Aggregate NoMAD tool scores mid-intervention was 22.05, with post-intervention at 23.15, reflecting improvement. This shows healthcare clinicians became more familiar with the guidelines and incorporated the guidelines into their work over the course of the intervention, demonstrating normalization of change. In summary, clinicians had developed the habit of identifying that a patient has asthma, administering the ACT, assuring the patient completed the

ACT, and acting on the ACT score according to GINA guidelines, demonstrating integration of changed workflow, reflecting clinical application of Normalization process theory.

Policy Implications

This project is a quality improvement project addressing the gap between research and clinical practice. This project translates global World Health Organization health care policy into the nuts and bolts of actual clinical application at a local level, with the goal of improving the health of patients with asthma, consistent with the goals of the Triple Aim Initiative: improving the patient experience of care, improving the health of populations, and reducing the per capita cost of health care (Institute for Healthcare Improvement, 2017).

Quality asthma care is more than the initial diagnosis and treatment to achieve control of the disease process, but involves long-term, chronic disease follow-up care to maintain control. Asthma control has two objectives: reducing functional impairment – the frequency and intensity of asthma symptoms that a patient experiences; and reducing risk – risk of future asthma attacks, risk of progressive decline in lung function, and reducing risk of medication side effects (NAEPP, 2007).

Barriers to achieving asthma control include:

1. Generic barriers: poverty, poor education, and poor healthcare infrastructure.
2. Environmental barriers: indoor and outdoor air pollution, tobacco smoking, and occupational exposure.
3. Resource barriers: inadequate government resources dedicated to asthma care, and competition with other public health priorities.
4. Health care systems barriers: access, affordability, and tendency of care to be focused on *acute* rather than *chronic* management.

5. Patient barriers: cultural factors, lack of information, lack of self-management skills, and over-reliance on *acute* care.

The asthma management program as designed utilizes a team approach to address barriers patents face in achieving asthma control. Overall, patients achieved improved asthma control. The program has potential benefits of improving patient care, increasing population health, and reducing costs – the Triple Aim. Barriers to adoption include dedication of resources for clinician education. A potential unintended consequence of this would be lack of full implementation, embedding, and integration of the program by clinicians. Support of the program is evident by widespread interest of other clinicians in the program.

The Scholarly Project observed a correlation between worsening air quality from wildland fires and decreased level of asthma symptom control. Wildfires across the western United States have increased in total acres burned since 1970, and the average wildfire season has increased by 78 days (Center for Climate and Energy Solutions, n.d.). Changes in climate has led to earlier snowmelt in spring and summer, resulting in drought conditions in the western United States. Wildfire risk factors include temperature, soil moisture, and the presence of trees, shrubs, grasses, and other potential fuel (CCES, n.d.). All these factors have strong direct or indirect ties to climate variability and climate change (CCES, n.d.). Wildfire are expected to continue to be more destructive as drought conditions allow fires to start more easily, spread faster, and burn longer (Environmental Protection Agency, 2016). Wildfire smoke contains particulate matter, carbon monoxide, and other volatile organic compounds which can have a detrimental effect on air quality, locally and downwind of fires (CDC, 2014). Exposure to smoke increases medical visits, emergency department visits, hospitalizations, and prescriptions for asthma, bronchitis, chest pain, chronic obstructive pulmonary disease, pneumonia, and death from respiratory illness

(CDC, 2014). Health policy work to mitigate effects of climate change can result in decreased morbidity and mortality.

Limitations

This was a quality improvement project in a small, rural clinic and thus results are not meant to be generalizable. There was some missing data as one clinician participant did not complete the NoMAD tool at mid-intervention administration and one clinician participant did not complete the NoMAD tool at post-intervention administration.

The study site was located in a rural area, and many patients are employed directly or indirectly in agriculture. Additionally, the study site is located in an area plagued with range fires, which increased steadily in intensity from June through October 2017, with correlating decrease of air quality. Over the course of the project, wildfires burned over 5 million acres across Idaho, Washington, Oregon, Montana, and British Columbia Canada, with over 700,000 acres in Idaho alone. These fires released over 111,000 tons of direct fine particulate pollution into the air, equivalent to ten times the amount of particulate pollution that all the cars and trucks in Idaho emit over a three-year period (Idaho Smoke Information, 2018). Air quality data and range fire data was not collected during the project. Decrease in air quality due to fires likely impacted ACT scores. The Idaho Department of Environmental Quality issued an air quality red alert September 4, 2017 advising people with heart and lung conditions to avoid heavy exertion outdoors due to risk to health. Schools were advised to cancel outdoor exercise for students. Poor air quality was projected to persist through September (Boise State Public Radio, 2017; Brown & Blanchard, 2017; Idaho Smoke Information, 2018). The aggregate ACT scores in June was 18.11; July: 20.29; August: 15.95; September: 17.41; October 18.36; and November 18.56.

Nursing responsibilities for pre-visit planning, which includes identification of asthmatic patients, was moved from one member of nursing staff with time dedicated to pre-visit planning to two other nursing team members without dedicated time at the end of July. There is a correlating dip in ACT administration and completion in August and September, resulting in missing data. This problem was addressed with one-on-one coaching. Improvement of ACT administration and completion rates improved to 83% in October as a result of coaching.

The patient's chief complaint for the appointment was not tracked in this study. Some patients were seen for chief complaints not related to respiratory disease, and clinicians voiced reluctance to administer ACT in these settings. For example, one patient was seen daily for wound care. This patient received ACT at the initial wound care visit, and score of 25 reflected excellent control of asthma. The ACT was not administered on the patient's subsequent four wound care visits, which impacts aggregate data of administration and completion rates of the ACT.

Several clinicians were away from clinic for vacation during the implementation phase, and staff floated in from other clinics to maintain safe staffing levels. Float staff was unfamiliar with the project. This led to a dip in administration of ACTs from 89% in July to 79% and 76% in August and September, which resulted in missing data. A brief report outlining the project at the beginning of the work day was insufficient to mitigate this problem area. This may be a problem encountered frequently through the organization, as this project is one of many currently being piloted throughout the clinic system. Posters outlining all studies underway in various clinic sites placed in clinician's work areas and breakroom may help mitigate this problem.

Currently, organizational leadership has slated education and roll-out system-wide to occur in June 2018. A standardized education session will occur at all six clinic sites at the June

2018 staff meetings. The DNP student will design the education, and it will be delivered by a PCP and nurse manager team, who will also serve as change champions at their respective clinic sites. The DNP student will provide support to the change champions. This system-wide rollout should mitigate issue of float staff unfamiliarity with the asthma guidelines and protocols.

Conclusions

The project was practical and useful for clinicians and patients. Workflow change to implement and sustain the project was utilitarian and embraced by clinicians. Sustainability was throughout implementation. The organization plans to spread the project throughout the remaining five other clinic sites June 2018.

This work built upon a previous similar scholarly project in which screening, brief intervention, and referral for problem drug and alcohol use was implemented (Barbot, 2016). Plans are underway for implementation of evidence-based guidelines and protocols for patients with chronic obstructive pulmonary disease based on the Global Initiative for Chronic Obstructive Lung Disease (2016). This will be executed in 2019 as a scholarly project utilizing the same approach as this project.

Dissemination of knowledge will be carried out within the organization with reports to clinic staff of the study site, the multidisciplinary group, the quality improvement committee, and to the entire organization at upcoming meetings. A brief written report will be included in the May 2018 VFHC employee newsletter. Further opportunities for dissemination include presentation at the annual fall conference of Nurse Practitioners of Idaho, and the National Conference of Nurse Practitioners.

Implementation of evidence-based guidelines and protocols in this primary care clinic improved chronic asthma care for patients. This project contributed to the clinic mission of better

health for the patients it serves. Intended consequences of increased clinician knowledge, improved communication between providers and nursing, and improved asthma control resulted from the project implementation.

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Appendix A: Logic Model

Resources/Inputs	Activities	Outputs	Outcomes: Short term	Outcomes: Long term	Impact
Includes the human, financial, organizational, and community resources a program has available to direct toward the work.	Includes the processes, tools, events, technology, and actions that are intended to bring changes or results.	Direct products of program activities and may include types, levels and targets of services to be delivered by the program.	Specific changes in program. SMART. Attainable in 1-3 years.	Specific changes in program. SMART. Attainable in 4-6 years.	Fundamental intended or unintended change occurring as a result of program activities in 7-10 years.
1. Quality Improvement Officer Medical Director Chief Nursing Officer DNP student Quality Improvement Committee Global Initiative for Asthma Guidelines 2016	1a. Develop multidisciplinary working group. 1b. Deliver drafts of foundational documents (GINA guidelines, AAP, ACT, Pocket Guide) to multidisciplinary working group. 1c. Assess current status of asthma care	1a. Report of multidisciplinary working group. 1b. Revised electronic health record (EHR) asthma visit template with incorporation of guidelines approved by Quality Improvement Committee.	1a. A multidisciplinary working group focused on asthma-related policies and protocols is established by January 2017. 1b. A revised EHR asthma visit template is developed and approved by the start of the DNP Project	N/A	1. Self-sustaining program supports efforts of providers and staff in delivery of evidence-based asthma care.

National Asthma Education and Prevention Program Expert Panel 3 – Guidelines for the Diagnosis and Management of Asthma 2007	delivery, gaps in care, current needs. 1d. Identify barriers to implementation. 1e. Identify facilitators to implementation. 1f. Develop implementation plan.	1c. Revised EHR asthma visit template in place before by beginning of study 1d. Foundational documents reviewed and approved by multidisciplinary working group before beginning of study 1e. Continuous review process in place to maintain sustainability.	implementation in June 2017. 1c. GINA guidelines approved for use within clinics by April 2017 1d. Foundational documents reviewed and approved by multidisciplinary working group by April 2017		
2. Quality Improvement Officer Medical Director Chief Nursing Officer DNP student Global Initiative for Asthma Guidelines 2016 National Asthma Education and	2a. DNP student will perform education on asthma guidelines during monthly staff meetings. 2b. Nursing staff trained on performing spirometry peak expiratory flow metering.	Distribution of pocket guide of asthma care for nurses and PCP by May 2017.	2a. Payette site Nursing and PCPs demonstrate 50% increase in knowledge of GINA guidelines after delivery of training by DNP student as measured by pre-test & post-test measurements in May 2017.	2a. Phase 2 sites Nursing and PCPs demonstrate 50% increase in knowledge of GINA guidelines after delivery of training by DNP student as measured by pre-test & post-test measurements in May 2018.	Patients demonstrate an improved level of asthma management and decreased adverse outcomes related to inadequate asthma management.

Prevention Program Expert Panel 3 – Guidelines for the Diagnosis and Management of Asthma 2007	2c. Development of pocket guide of asthma care to nurses and PCPs prior to beginning of study 2d. Revised EHR asthma visit template and associated health reminders: Inhaled corticosteroids for patients with persistent asthma Written Asthma Action Plan (AAP) Assessment of asthma severity Assessment of asthma control Assessment of inhaler skills and adherence Scheduled follow up visits		2b. By the end of Phase 1 implementation period, chart audits demonstrate that nursing staff and PCPs appropriately apply GINA guidelines 90% of the time.	2b. By the end of Phase Two implementation period (September 2018), chart reviews demonstrate that nursing staff and PCPs appropriately apply asthma guidelines 90% of the time.	

	Assessment of exposure to environmental triggers Assessment of immunization status 2g. AAP template in place by May 2017				
3. Quality Improvement Officer Medical Director Chief Nursing Officer DNP student Global Initiative for Asthma Guidelines 2016 National Asthma Education and Prevention Program Expert Panel 3 – Guidelines for the Diagnosis and Management of Asthma 2007	DNP student will perform initial training on ACT during monthly staff meetings.	Completion of training nursing and PCPs on ACT.	3a. Payette site Nursing and PCPs demonstrate 50% increase in knowledge of ACT after delivery of training by DNP student as measured by pre-test & post-test measurements in May 2017. 3b. Chart reviews demonstrate that at least 60% of patients at a clinic visit with a diagnosis of asthma receive the ACT from June 2017 through September 2017.	3a. Phase Two Sites Nursing and PCPs demonstrate 50% increase in knowledge of ACT after delivery of training as measured by pre-test & post-test measurements in May 2018. 3b. Phase Two rates of administration of the ACT to patients with diagnosis of asthma are 70% from June 2018 through September 2018.	Improved communication between provider-nursing regarding patient's level of asthma control will result in improved outcomes for asthma patients and more accurate assessment of asthmatic status.

4. Quality Improvement Officer Medical Director Chief Nursing Officer DNP student Global Initiative for Asthma Guidelines 2016 National Asthma Education and Prevention Program Expert Panel 3 – Guidelines for the Diagnosis and Management of Asthma 2007	4. DNP student will perform initial training on ACT and GINA Guideline interventions during monthly staff meetings	4. Completion of training nursing and PCPs on ACT and GINA Guideline interventions	4a. Payette site Nursing and PCPs demonstrate 50% increase in knowledge of GINA guideline interventions after delivery of training by DNP student as measured by pre-test & post-test measurements in May 2017. 4b. Chart reviews demonstrate that Payette site patients with an ACT score of 19 or less receive appropriate interventions per GINA guidelines to improve asthma control 90% of the time between from June 2017 through September 2017.	4a. Phase Two Sites Nursing and PCPs demonstrate 50% increase in knowledge of GINA Guideline interventions after delivery of training as measured by pre-test & post-test measurements in May 2018. 4b. In Phase Two, a patient with an ACT score of 19 or less, receives appropriate interventions per GINA guidelines to improve asthma control 90% of the time by September 2018.	4. Improved asthma control results in decreased burden of disease, decreased health care costs, and improved quality of life for asthma patients, their families, and the community as a whole.

5. Nursing and PCPs ACT GINA Guidelines NoMAD tool DNP student Chief Nursing Officer Medical Director	5. Develop questions for NoMAD tool. Administer tool in July, 2017 and September, 2017. Evaluate findings	5. Develop Phase 2 implementation plan based on findings and deliver to Quality Improvement Committee	5. NoMAD tool for assessment and evaluation of reach, effectiveness, adoption, implementation, and maintenance of program will be administered at Payette site in July, 2017 and September, 2017.	5. NoMAD tool for assessment and evaluation of reach, effectiveness, adoption, implementation, and maintenance of program will be administered at Phase Two sites in July, 2018 and September, 2018.	5. Improved asthma control results in decreased burden of disease, decreased health care costs, and improved quality of life for asthma patients, their families, and the community as a whole.

Appendix B: Outcome Evaluation Plan			
Outcome	Outcome Instrument Data	Analysis Goal	Analytic Technique
1a. A multidisciplinary working group focused on asthma-related policies and protocols is established by January 2017.	1a. Memorandum of Agreement	1a. Document creation of multidisciplinary working group	1a. N/A
1b. A revised EHR asthma visit template is developed and approved by the start of the DNP Project implementation in June 2017.	1b. Approved template document	1b. Document creation of template	1b. N/A
1c. GINA guidelines approved and adopted for	1c. Guidelines approved by Quality	1c. Document approval of GINA	1c. N/A

use within clinics by April 2017	Improvement Committee	Guidelines for clinic use	
1d. Foundational documents reviewed and approved by multidisciplinary working group by April 2017	1d. Self-created yes/no checklist with direct observation	1d. Document approval of foundational documents	1d. N/A
2a. Payette site Nursing and PCPs demonstrate 50% increase in knowledge of GINA guidelines after delivery of training by DNP student as measured by pre-test & post-test measurements in May 2017.	2a. Questionnaire on GINA Guidelines Education Pretest & Posttest developed by multidisciplinary working group based on tool from University of Wisconsin *Collecting evaluation data.*	2a. Document increase in knowledge of GINA Guidelines after delivery of training.	2a. Descriptive statistics: percentages.
2b. By the end of Phase 1 implementation period, chart audits demonstrate that nursing staff and PCPs	2b. Chart audits of patients with diagnosis of asthma with clinic visit occurring	2b. Document rate of application of GINA guidelines	2b. Descriptive statistics: percentages.

appropriately apply GINA guidelines 90% of the time.	June 2017 through September 2017.		
3a. Payette site Nursing and PCPs demonstrate 50% increase in knowledge of ACT after delivery of training by DNP student as measured by pre-test & post-test measurements in May 2017.	3a. Pre-test and post-test questionnaire Developed by multidisciplinary working group based on tool from the University of Wisconsin *Collecting evaluation data.*	3a. Document increase in knowledge of ACT after delivery of training	3a. Descriptive statistics: percentages.
3b. Chart audits demonstrate that at least 60% of patients at a clinic visit with a diagnosis of asthma receive the ACT from June 2017 through September 2017.	3b. Chart audits of patients with diagnosis of asthma with clinic visit occurring June 2017 through September 2017.	3b. Document rate of ACT administration	3b. Descriptive statistics: counts & percentage Chart audits: Number of patients seen with asthma diagnosis in time frame from June 2017 through September 2017. Number of patients seen with asthma diagnosis with ACT administered in time frame from June 2017 through September 2017.

			Aggregate administration rate of ACT to patients with diagnosis of asthma equal to/greater than 60% in time frame from June 2017 through September 2017.
4a. Payette site Nursing and PCPs demonstrate 50% increase in knowledge of GINA guideline interventions after delivery of training by DNP student as measured by pre-test & post-test measurements in May 2017.	4a. Pre-test and post-test questionnaire Developed by multidisciplinary working group based on tool from University of Wisconsin *Collecting evaluation data.*	4a. Describe & summarize the responses related to appropriate interventions per GINA guidelines	4a. Descriptive statistics: percentages.
4b. Chart reviews demonstrate that Payette site	4b. Chart audits of patients with	4b. Document rate of delivery of	4b. Descriptive statistics: percentages.

patients with an ACT score of 19 or less receive appropriate interventions per GINA guidelines to improve asthma control 90% of the time between from June 2017 through September 2017.	diagnosis of asthma with clinic visit occurring June 2017 through September 2017.	appropriate interventions	Chart audits: Number of patients seen with asthma diagnosis in time frame from June 2017 through September 2017. Number of patients seen with asthma diagnosis with ACT administered in time frame from June 2017 through September 2017. Aggregate administration rate of ACT to patients with diagnosis of asthma equal to/greater than 60% in time frame from June 2017 through September 2017.
5. NoMAD tool for assessment and evaluation of reach, effectiveness, adoption, implementation, and maintenance of program will be administered at Payette site in July, 2017 and September, 2017.	5. Mid- and post-implementation (July, 2017 & September, 2017) questionnaire developed by multidisciplinary working group based on NoMAD tool	5. Describe & summarize the responses	5. Descriptive statistics: counts and percentages NoMAD tool a 23-item survey for measuring implementation processes from the perspective of staff directly involved in implementing change in healthcare. It utilizes descriptive statistics with aggregate data, typically displayed in tables summarizing the frequency of responses to items.

Appendix C Scholarly Project State of Operations

Asthma Care Improvement Project

Scholarly Project Statement of Operations

For the Year Ended December 31, 2017

Revenues	
In-kind donations	
DNP project manager wages	39,368.00
VFHC associated staff wages	275.00
VFHC educational materials & supplies	130.00
Asthma office visits	13,475.00
Asthma office visits with spirometry	6,990.00
Total	***$60,238.00***
Expenses	
Salaries	
DNP project manager	39,368.00
VFHC associated staff wages	275.00
Educational Materials	130.00
Total	***$39,773.00***
Operating Income	***$20,465.00***

Appendix D Scholarly Project Expense Report

Source of Expense	Expense Description	Dollar Value	Type of Cost (fixed or variable)	Description of Cost	Volume	Expense Per Unit
Multidisciplinary Working Group		**Cost ($)**				
Materials/ Supplies	Copy paper, toner for educational materials: GINA Guidelines 2016, Asthma Control Test, Asthma Action Plan, Pocket Guide of Asthma Care, Asthma Visit Template for Electronic Health Record	$40.00	Variable	Cost to provide foundational documents	4	$10
Wages for group members per meeting	Wages for members of working group $275 (including fringe benefits at 31.5%)	$275.00	Variable	Wages	1	$275
Meeting space	Clinic conference room at project site is available at no cost	$0.00	Fixed	Use of available meeting space	4	$0
	Total	***$315.00***				
Education Initial Training		**Cost ($)**				
Training provided by project coordinator to staff at monthly staff meetings leading into implementation	Salary for Jo Buhr Cote, $64.75hr (including fringe benefits at 31.5%) for 2 hours per monthly staff meeting x 4 meetings,	$518.00	Fixed	Wages	4	$129.50

	includes preparation time and training delivery					
Materials/Supplies for staff education at monthly staff meetings leading into implementation	Copy paper, toner for educational materials: GINA Guidelines 2017, Asthma Control Test, Asthma Action Plan, Pocket Guide of Asthma Care, Asthma Visit Template for Electronic Health Record	$100.00	Variable	Cost to provide education materials	4	$25
	Total:	***$618.00***				
Evaluation/Assessment		**Cost ($)**				
Evaluation & Assessment Salary	Salary for Jo Buhr Cote for development & administration of Asthma Improvement Project Surveys, Chart Reviews, evaluation and assessment of results at $64.75hr (including fringe benefits at 31.5%)	$12,950.00	Fixed	Wages	200	$64.75
Materials/supplies	Copy paper, toner for evaluation & assessment materials: checklists, questionnaires	$10.00	Variable			

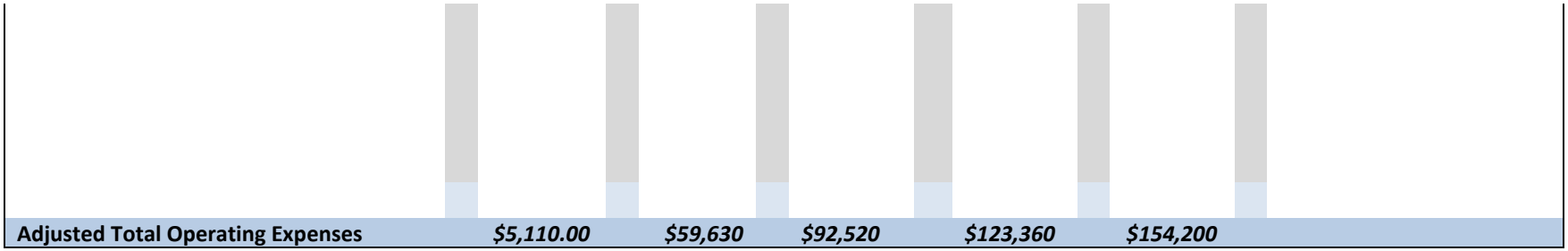
	Total	***$12,960.00***				
Management & Operations Salary						
Project Manager	Project operations salary at $64.75hr (including fringe benefits at 31.5%) for entire project	$25,900.00	Fixed	Operations salaries x hours	400	$64.75
	Total	**$25,900.00**				
	Grand Total	***$39,793.00***				
Revenue						
In Kind Donations:						
DNP student donation-		$518.00				
Educational Initial Training		$12,950.00				
Evaluation & Assessment		$25,900.00				

Marketing & Operations	Value of DNP student labor	$39,368.00				
VFHC donations						
Multidisciplinary working group		$40.00 $275.00				
Materials/supplies		$0				
Wages		$100.00				
Meeting space		$10.00				
Evaluation materials/supplies	Value of VFHC donations to	$30.00				
Education Initial Training Materials/supplies	Scholarly Project	$455.00				
Asthma office visits		$13,475.00				
Spirometry office visits		$6,990.00				
		$20,447.00				
	Total	***$60,270.00***				
Adjusted Grand Total		***$20,477***				

Appendix E Scholarly Project 3-5 Year Budget Plan

Asthma Care Improvement Project						
Projected Revenues	**Budget Year 1**	**Budget Year 2**	**Budget Year 3**	**Budget Year 4**	**Budget Year 5**	**Rationale**
Spirometry: $233 estimated reimbursement per test x projected number of patients tested Y1=20 x 1 clinic site Y2=40 x 6 clinic sites Y3=60 x 6 clinic sites Y4=80 x 6 clinic sites Y5=100 x 6 clinic sites	$4,660	$55,920	$83,880	$111,840	$139,800	Year 1 at Payette clinic site Years 2-5 at all 6 clinic sites
Asthma dedicated office visits: $175 estimated reimbursement per office visit with dedicated asthma visit Y1=20 x 1 clinic site Y2=40 x 6 clinic sites Y3=60 x 6 clinic sites Y4=80 x 6 clinic sites Y5=100 x 6 clinic sites	$3,500	$42,000	$63,000	$84,000	$105,000	Year 1 at Payette clinic site Years 2-5 at all 6 clinic sites
In Kind Donations:						
Value of DNP student wages	$39,368					
VFHC associated staff wages	$1,100					
VFHC materials/supplies	$130	0	0	0	0	
Total	***$48,758***	***$97,920***	***$146,880***	***$195,840***	***$150,300***	
Expenses						
	$518	0	0	0	0	Salary for DNP student: 8 hours at $64.75/hr.
Education Initial Training (1st year)	$100	0	0	0	0	Supplies for training
Materials and supplies	0	$270	0	0	0	
Education Initial Training (years 2-5)	0	$500	0	0	0	Salary for VFHC Change Champion $27/hr. x10 hrs.
Materials and supplies						

Evaluation Assessment Salaries (1st year)	$12,950	0	0	0	0	Supplies for training for 5 clinics
Materials and supplies	$10	0	0	0	0	Salary for DNP student: 200 hours @ $64.75
Management & Operations Salary (1st year)	$25,900	0	0	0	0	Salary for DNP student: 400 hours @ $64.75
Multidisciplinary Working Group	$275	0	0	0	0	Wages for members of working group $275
Materials & supplies	$40	0	0	0	0	$40 for materials & supplies
Quality Improvement Committee -project management years 2-5	0	$1,100	0	0	0	Wages for members of Quality Improvement Committee which will assume responsibility of project after Year 1
Marketing & Advertising	0	$180	0	0	0	Informational flyers: 1 set for each month during project implementation. Year 1 at pilot clinic, Year 2 at all 6 clinics
Total Operating Expenses	***$40,618***	$2,050	0	0	0	



Adjusted Total Operating Expenses	***$5,110.00***	***$59,630***	***$92,520***	***$123,360***	***$154,200***

Appendix F: Timeline Project: Asthma care improvement in rural primary care									
Activity	**Mo/Yr.**	**Mo/Yr.**	**Mo/Yr.**	**Mo/Yr.**	**Mo/Yr.**	**Mo/Yr.**	**Mo/Yr.**	**Mo/Yr.**	**Mo/Yr.**
Mission statement	**Nov '15**								
Vision statement	**Nov '15**								
Problem statement	**Nov '15**								
Literature review		**Mar '16**							
Needs assessment		**Mar '16**							
SWOT analysis			**Apr '16**						
Integrative review			**Apr '16**						
Timeline			**Apr '16**						
Logic Model			**July '16**						
Budget			**July '16**						
CITI			**July '16**						
Form Multidisciplinary working group				**Jan '17**					
Project Goals and Objectives				**Jan '17**					
Multidisciplinary working group meet monthly				**Feb '17**	**To**	**Sept '17**			
Develop education modules & research survey tools.				**Feb '17**					

IRB approval				**Mar '17**					
Develop information campaign				**April '17**					
Education PCPs and nursing staff				**May '17**	**June '17**				
Deliver intervention				**June '17**	**July '17**	**Aug '17**	**Sep '17**		
NoMAD tool					**July '17**		**Sept '17**		
Chart audits						**Aug '17**	**Sep '17**	**Oct '17**	
Gather data									**Oct-Feb '18**
Preliminary reports									**Oct '17**
Dissemination									**Mar '18**
Final Report									**Mar '18**

Appendix G: Memorandum of Understanding from Organization

Memorandum of Understanding

Memorandum of Understanding

Between

Jo Buhr Cote

and

Valley Family Health Care

This Memorandum of Understanding (MOU) sets for the terms and understanding between Valley Family Health Care and Jo Buhr Cote to undertake Scholarly Project for completion of Doctorate of Nursing Practice degree.

Background
The Scholarly Project is a quality improvement project utilizing implementation science to address the gap between research and clinical practice.

The Scholarly Project plans to implement evidence-based guidelines and protocols at Valley Family Health Care -Payette clinic to improve chronic asthma care for patients and families, thus improve quality of life for people with asthma and their families.

Asthma management with appropriate use of medications is one of the quality measures to meet standards for Patient Centered Medical Home (PCMH) certification. This certification may lead to increased funding from state agencies which would then contribute to sustaining the primary care practice. Use of evidence-based guidelines and protocols for chronic asthma care is in alignment with quality measures for PCMH certification.

Purpose
This MOU defines the purpose/goals of partnership between Valley Family Health Care and Jo Buhr Cote for the execution of the Scholarly Project: Evaluation of implementation of evidence-based guidelines and protocols in a primary care clinic to improve chronic asthma care for patients and families using Normalization Process Theory and Re-AIM.

Planning for the Scholarly Project will be conducted August, 2015 through May, 2017 by Jo Buhr Cote, the Multidisciplinary Working Group, and the Quality Improvement Committee.
Education of staff regarding the Scholarly Project will occur in May, 2017 and be conducted by Jo Buhr Cote.
Implementation will occur June, 2017 through September, 2017 at the Payette Clinic.
Data collection will occur through August, 2017 through November, 2017 and will be conducted by Jo Buhr Cote.
Preliminary findings will be reported by Jo Buhr Cote to the Multidisciplinary Working Group and Quality Improvement Committee in November, 2017.
Dissemination of findings (Final Report) will occur in March, 2018 and will be conducted by Jo Buhr Cote.

Reporting
The Valley Family Health Care Quality Improvement Committee will evaluate effectiveness and adherence to the agreement at the completion of the dissemination of findings phase, March 2018.

Funding

This MOU is not a commitment of funds for the Scholarly Project.

Duration

This MOU is at-will and may be modified by mutual consent of Tim Heinze, CEO, Valley Family Health Care and Jo Buhr Cote, Boise State University.

This MOU shall become effective upon signature by Tim Heinze, CEO, Valley Family Health Care and Jo Buhr Cote, Boise State University, and will remain in effect until modified or terminated by any one of the partners by mutual consent.

In the absence of mutual agreement by Tim Heinze, CEO, Valley Family Health Care and Jo Buhr Cote, Boise State University, this MOU shall end on May 10, 2018.

Contact Information
Partner representative
Tim Heinze
Chief Executive Officer
Valley Family Health Care
1141 NE 10th Avenue, Payette ID 83661
Fax
E-mail theinze@vfhc.org

Jo Buhr Cote
Doctorate of Nursing Practice student
Boise State University
503 Peterson Road, Ontario OR 97914
541-889-2047
jocote@u.boisestate.edu

_____Date:
(Partner signature)
(Tim Heinze, CEO, VFHC)

_____Date:
(Partner signature)
(Jo Buhr Cote, Boise State University, DNP student)

Appendix H: Pre-Intervention Outcome Measure Checklist

Outcome completed yes/no	Outcome measure	Description & summary of observation
Yes/no	A multidisciplinary working group focused on asthma-related policies and protocols is established by January 2017.	Executed by due date.
Yes/no	A revised EHR asthma visit template is developed and approved by the start of the DNP Project implementation in June 2017.	In process at due date June 2017, completed by September, 2017.
Yes/no	GINA guidelines approved for use within clinics by April 2017	Executed by due date.
Yes/no	Foundational documents reviewed and approved by multidisciplinary working group by April 2017	Executed by due date.
Yes/no	Nursing and PCPs demonstrate knowledge of how to access asthma guidelines during follow up 1:1 post educational session coaching 90% of the time by September 2017.	Observation shows 7 out of 7 clinicians know how to access asthma guidelines by due date.

Appendix I: Chart Audit Checklist

Chart audit outcome achieved yes/no	**Outcome measure**	**Description and summary of observations**
yes/no	At least 60% of patients at a clinic visit with a diagnosis of asthma receive the ACT from June 2017 through September 2017.	Total number of individual patient charts of patients with asthma diagnosis reviewed = 107 Of these patients, total number who received ACT = 79 Total ACT distribution rate = 74%
yes/no	A patient with an ACT score of 19 or less, receives appropriate interventions per GINA guidelines to improve asthma control 90% of the time from June 2017 through September 2017.	Total number of patients with ACT score or 19 or less = 31 Of these patients, total number who received appropriate interventions per GINA guidelines = 31 Total number of patients with ACT score of 19 or less receiving intervention = 100%

Appendix J

Questionnaire GINA Guidelines Education Pretest & Posttest

1. When asthma is under good control, patients can:
   a. Avoid troublesome symptoms during daytime and nighttime
   b. Need little to no reliever/rescue medication
   c. Have normal or near normal lung function
   d. All of the above
   e. None of the above
   f. My answer after the program is: ___

2. Factors that may trigger or worsen asthma symptoms include:
   a. Viral infections, tobacco smoke
   b. House dust mites, pollens, cockroaches
   c. Exercise
   d. All of the above
   e. None of the above
   f. My answer after the program is: ___

3. Risk factors for poor asthma outcomes include
   a. Major psychological problems
   b. Major socioeconomic problems
   c. Pregnancy
   d. All of the above
   e. None of the above
   f. My answer after the program is: ___

4. Ways to assess asthma symptom control include:
   a. Asking the patient about coughing, wheezing, and shortness of breath
   b. Asking the patient how often they are using their controller medication
   c. Asking the patient how satisfied they are with their asthma management
   d. All of the above
   e. None of the above
   f. My answer after the program is: ___

5. Typical asthma symptoms include:
   a. Wheeze, shortness of breath, chest tightness, cough
   b. Changing in intensity over time
   c. Changing in frequency over time
   d. All of the above
   e. None of the above
   f. My answer after the program is: ___

6. Rate your knowledge of GINA Guidelines

Before the program	After the program
( ) Great	( ) Great
( ) Moderate	( ) Moderate

( ) Slight	( ) Slight
( ) None	( ) None

7. Of the information presented at the meeting, how much was useable to you?
   a. 0-20%
   b. 21-40%
   c. 41-60%
   d. 61-80%
   e. 81-100%

8. To what extent did you learn more about GINA Guidelines for Asthma Management? Was it:
   a. To a great extent
   b. To a moderate extent
   c. To a slight extent
   d. Not at all

9. To what extent did you get an answer to your question(s)? Would you say it was:
   a. To a great extent
   b. To a moderate extent
   c. To a slight extent
   d. Not at all

10. To what extent has your awareness increased on GINA Guidelines for Asthma Management? Was it:
    a. To a great extent
    b. To a moderate extent
    c. To a slight extent
    d. Not at all

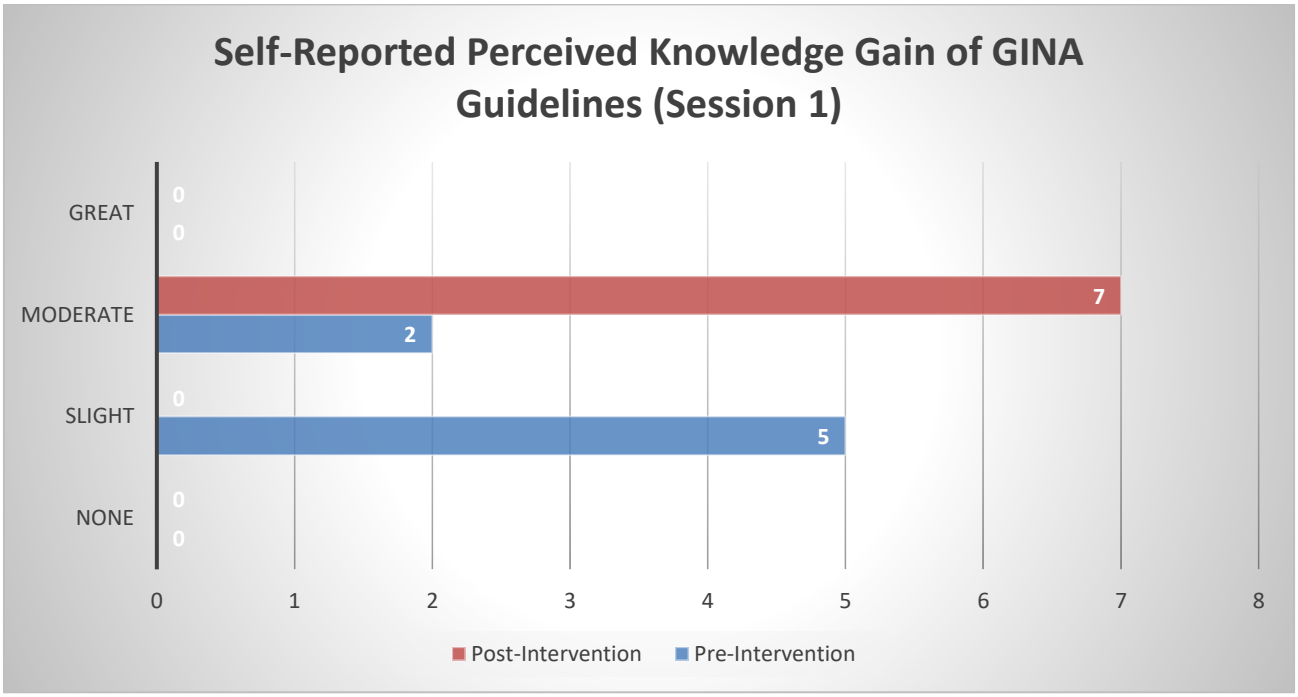
11. I know where to find GINA Guidelines:
    a. Yes
    b. Not sure
    c. Not at all

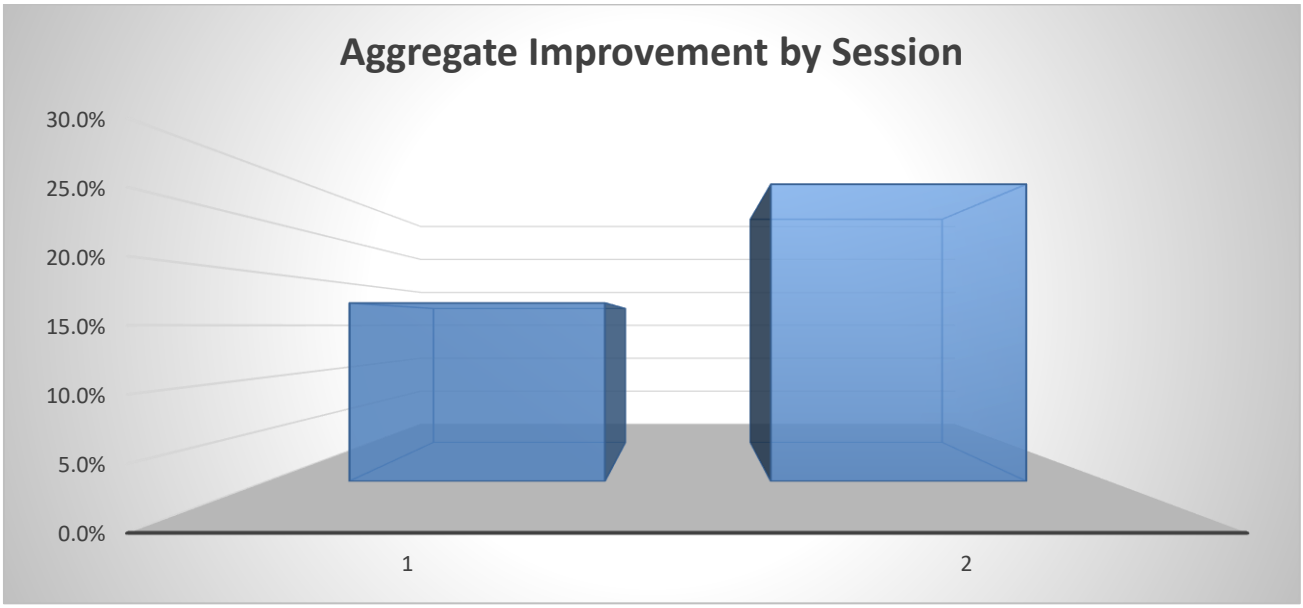
12. I know where to find the ACT:
    d. Yes
    e. Not sure
    f. Not at all

Developed by multidisciplinary working group based on public domain tool from University of Wisconsin *Collecting evaluation data.,* Asthma Care Quick Reference and GINA Pocket Guidelines for Asthma Management and Prevention.

Appendix K Education Session 1 Results

Session 1	Q1.	Q.2	Q.3	Q.4	Q.5	Totals	Percent Improvement
Original Correct Answers	7	7	2	7	6	29	82.86%
Post Intervention Correct Answers	7	7	7	7	7	35	100.00%
Wrong Answers	0	0	5	0	1	6	17.14%
Improvement Score	0	0	5	0	1	6	17.14%





Appendix L

Questionnaire: Applying GINA Guideline Interventions Based on ACT Scores

1. A patient with asthma is here for follow up and reports they are feeling worse.
   They are not on any daily treatment.
   On assessment, they are talking in phrases, sitting up, not agitated, with increased pulse rate, increased respiratory rate, and oxygen saturations 90-95%
   Intervention options are:
   a. Albuterol
   b. Steroids
   c. Oxygen
   d. All of the above
   e. None of the above
   f. My answer after the program is:___

2. A patient with asthma is here for follow up. Assessment of symptom control over the last four weeks with ACT score of 19. The patient is on daily inhaled corticosteroid.
   Intervention options are
   a. Assess inhaler technique and adherence
   b. Step up therapy by adding long acting beta agonist (LABA) to daily inhaled corticosteroid (ICS)
   c. Identify and treat comorbidities
   d. All of the above
   e. None of the above
   f. My answer after the program is:___

3. A patient with asthma is here for asthma follow up visit. Nonpharmacological interventions are:
   a. Exercise
   b. Avoiding dairy products
   c. Rub Vick's Vapo-Rub on soles of feet twice a day
   d. All of the above
   e. None of the above
   f. My answer after the program is:___

4. A patient with asthma is here for follow up. They are on low dose inhaled corticosteroid (ICS) and long acting bronchodilator (LABA). Asthma Control Test score is 23. Intervention options are:
   a. Assess inhaler technique and adherence
   b. Add Leukotriene receptor agonist (LTRA)
   c. Add low dose theophylline
   d. All of the above
   e. None of the above
   f. My answer after the program is:___

5. A patient with asthma is here for follow up. They are on medium dose inhaled corticosteroids and long acting beta agonists. Asthma Control Test is 18.
   Intervention options are:
   a. Tiotropium
   b. Theophylline
   c. Return for reassessment in 2-6 weeks
   d. All of the above
   e. None of the above

f. My answer after the program is:___

6. Rate your knowledge of GINA Guideline based interventions

Before the program	After the program
( ) Great	( ) Great
( ) Moderate	( ) Moderate
( ) Slight	( ) Slight
( ) None	( ) None

7. Rate your knowledge of the Asthma Control Test

Before the program	After the program
( ) Great	( ) Great
( ) Moderate	( ) Moderate
( ) Slight	( ) Slight
( ) None	( ) None

8. Of the information presented at the meeting, how much was useable to you?
   a. 0-20%
   b. 21-40%
   c. 41-60%
   d. 61-80%
   e. 81-100%

9. To what extent did you learn more about GINA Guideline based interventions? Was it:
   a. To a great extent
   b. To a moderate extent
   c. To a slight extent
   d. Not at all

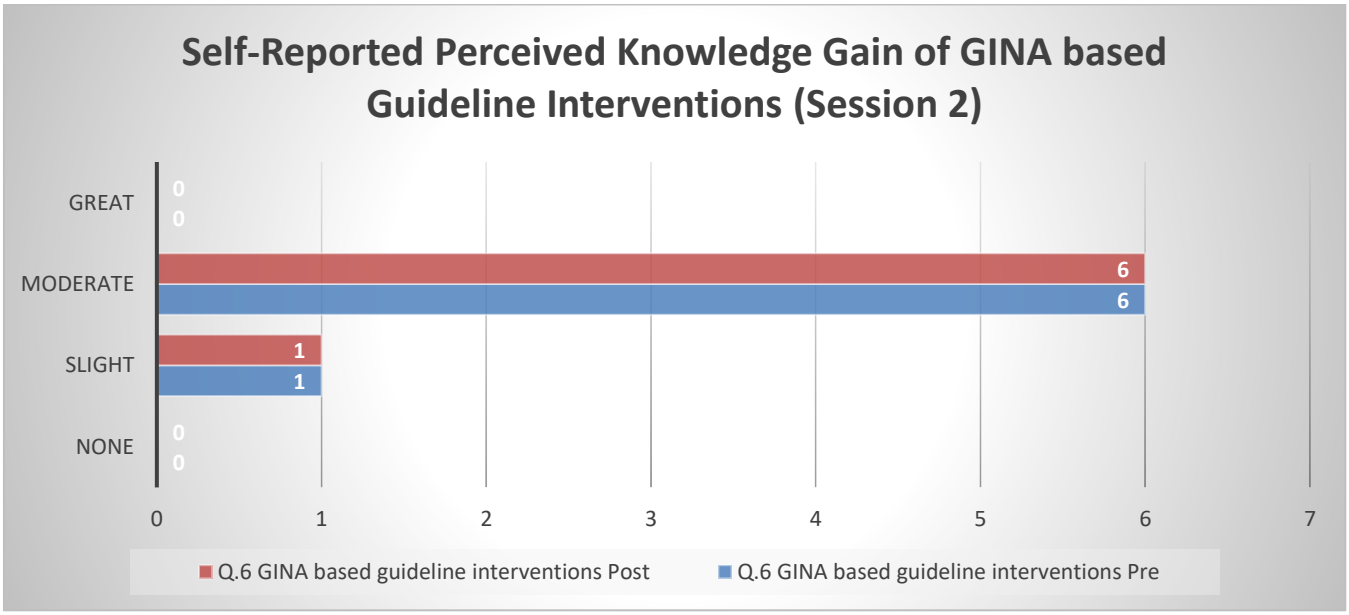
10. To what extent did you get an answer to your question(s)? Would you say it was:
    a. To a great extent
    b. To a moderate extent
    c. To a slight extent
    d. Not at all

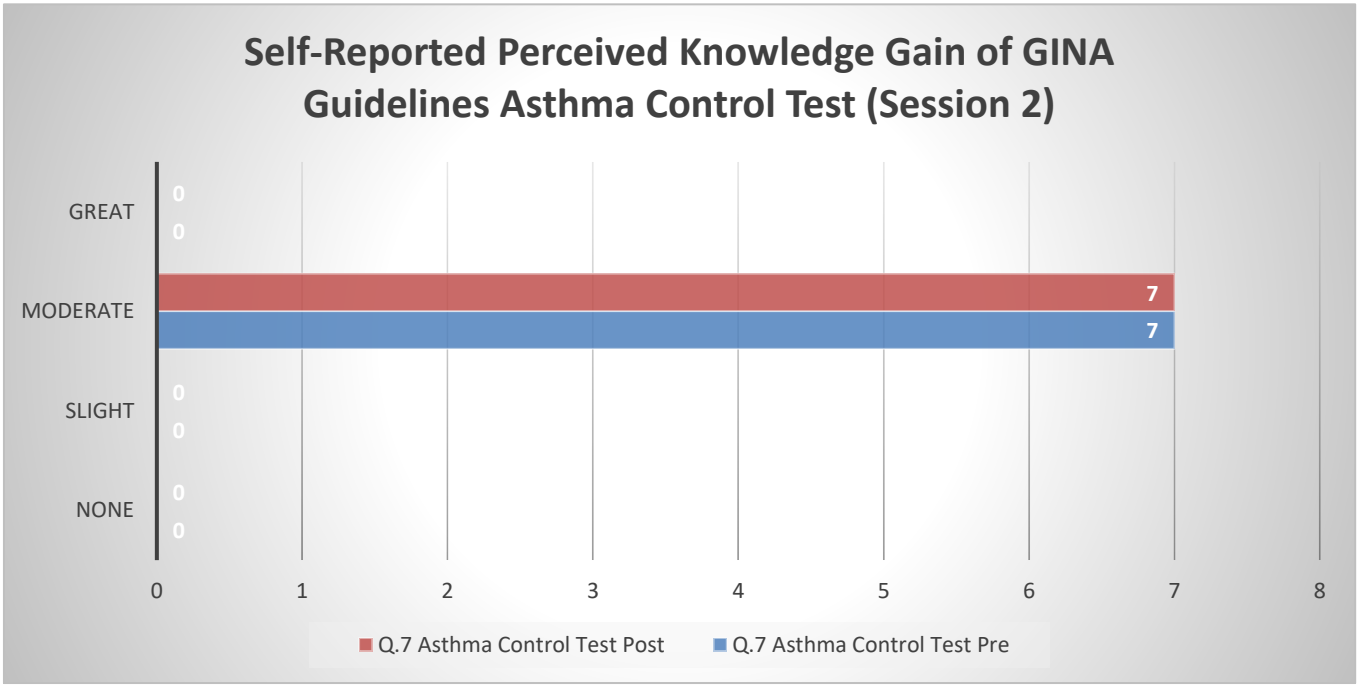
11. To what extent has your awareness increased on GINA Guideline based interventions? Was it:
    a. To a great extent
    b. To a moderate extent
    c. To a slight extent
    d. Not at all
12. To what extent has your awareness increased on how the ACT works in assessing asthma control? Was it:
    e. To a great extent
    f. To a moderate extent
    g. To a slight extent
    h. Not at all

Developed by multidisciplinary working group based on public domain tool from University of Wisconsin *Collecting evaluation data*, Asthma Care Quick Reference and GINA Pocket Guidelines for Asthma Management and Prevention.

Appendix M: Education Session 2 Results

Session 2	Q1.	Q.2	Q.3	Q.4	Q.5	Totals	Percent Improvement
Original Correct Answers	6	7	4	1	7	25	71.43%
Post Intervention Correct Answers	7	7	7	7	7	35	100.00%
Wrong Answers	1	0	3	6	0	10	28.57%
Improvement Score	1	0	3	6	0	10	28.57%





Appendix N Chart Audits

Chart Audits

Date	Patient with asthma dx	ACT given	ACT completed	Score	GINA intervention done	Work in patient	Provider
6/1/2017	Y	Y	Y	9	Y	Y	K
6/1/2017	Y	Y	Y	5	Y	N	K
6/2/2017	Y	Y	Y	19	Y	N	K
6/2/2017	Y	Y	Y	11	Y	N	K
6/2/2017	Y	N	N		Y	N	K
6/2/2017	Y	N	N		N	N	K
6/2/2017	Y	N	N		Y	N	J
6/2/2017	Y	N	N		Y	Y	J
6/5/2017	Y	Y	Y	16	N	N	J
6/6/2017	Y	N	N		Y	Y	K
6/6/2017	Y	N	N		Y	N	K
6/7/2017	Y	N	N		N	N	K
6/7/2017	Y	Y	Y	18	Y	Y	J
6/7/2017	Y	Y	Y	23	Y	N	K
6/7/2017	Y	N	N		N	Y	K
6/6/2017	Y	Y	Y	17	Y	Y	K
6/5/2017	Y	Y	Y	25	Y	N	J
6/12/2017	Y	Y	Y	10	Y	Y	J
6/15/2017	Y	Y	Y	18	Y	Y	J
6/8/2017	Y	N	N		N	Y	K
6/9/2017	Y	Y	Y	14	Y	N	J

6/8/2017	Y	Y	Y	17	Y	Y	J
6/9/2017	Y	Y	Y	21	Y	N	J
6/23/2017	Y	Y	Y	11	Y	N	J
6/20/2017	Y	N	N		N	Y	K
6/20/2017	Y	Y	Y	25	Y	N	K
6/20/2017	Y	N	N		Y	Y	J
6/21/2017	Y	N	N		Y	Y	J
6/23/2017	Y	N	N		Y	Y	J
6/20/2017	Y	Y	Y	12	Y	Y	J
6/20/2017	Y	N	N		Y	Y	J
6/20/2017	Y	Y	Y	24	Y	Y	J
6/20/2017	Y	N	N		N	Y	K
6/23/2017	Y	Y	Y	24	Y	N	K
6/27/2017	Y	Y	Y	25	Y	Y	K
6/27/2017	Y	N	N		N	Y	K
6/30/2017	Y	Y	Y	23	Y	Y	K
6/30/2017	Y	Y	Y	25	Y	N	K
6/26/2017	Y	Y	Y	20	Y	Y	K
6/23/2017	Y	Y	Y	9	Y	N	J
6/27/2017	Y	Y	Y	23	Y	N	J
6/30/2017	Y	Y	Y	22	Y	N	J
6/30/2017	Y	Y	Y	23	Y	Y	J
7/10/2017	Y	Y	Y	22	Y	Y	J
7/11/2017	Y	Y	Y	25	Y	Y	J
7/3/2017	Y	Y	Y	24	Y	N	K
7/6/2017	Y	Y	Y	24	Y	Y	K
7/10/2017	Y	N	N		Y	N	K
7/11/2017	Y	Y	Y	9	Y	Y	K

7/12/2017	Y	Y	Y	15	Y	Y	K
7/13/2017	Y	Y	N		Y	Y	J
7/18/2017	Y	Y	Y	24	Y	N	J
7/18/2017	Y	Y	N		Y	Y	J
7/19/2017	Y	Y	Y	10	Y	Y	J
7/19/2017	Y	Y	Y	24	Y	N	J
7/19/2017	Y	Y	Y	22	Y	N	J
21-Jul	Y	Y	N		Y	Y	J
7/24/2017	Y	Y	Y	24	Y	N	K
7/25/2017	Y	Y	Y	24	N	N	K
7/25/2017	Y	Y	Y	13	Y	N	K
7/26/2017	Y	N	N		Y	Y	K
7/26/2017	Y	Y	Y	24	Y	N	K
8/1/2017	Y	Y	Y	22	Y	N	K
8/2/2017	Y	Y	Y	20	Y	N	K
8/3/2017	Y	Y	Y	21	Y	N	K
8/10/2017	Y	Y	Y	15	Y	Y	K
8/11/2017	Y	Y	Y	18	Y	Y	K
8/14/2017	Y	Y	Y	9	Y	Y	K
8/16/2017	Y	Y	Y	10	Y	Y	K
8/17/2017	Y	Y	Y	7	Y	Y	K
8/17/2017	Y	Y	Y	6	Y	Y	K
8/15/2017	Y	Y	Y	22	Y	N	K
8/23/2017	Y	Y	Y	6	Y		K
8/24/2017	Y	N	N		Y	Y	K
8/25/2017	Y	Y	Y	8	Y	N	K
8/28/2017	Y	Y	Y	21	Y	N	K
8/29/2017	Y	Y	Y	21	Y	N	K

8/30/2017	Y	N	N		Y	Y	K
8/8/2017	Y	N	N		Y	N	J
8/9/2017	Y	Y	Y	24	Y	N	J
8/9/2017	Y	Y	Y	16	Y	N	J
8/16/2017	Y	N	N		Y	Y	J
8/16/2017	Y	N	N		Y	Y	J
8/23/2017	Y	Y	Y	25	Y	N	J
8/24/2017	Y	Y	Y	11	Y	Y	J
8/24/2017	Y	Y	Y	21	Y	Y	J
9/1/2017	Y	N	N		Y	Y	J
9/5/2017	Y	Y	Y	19	Y	Y	J
9/7/2017	Y	Y	Y	11	Y	N	J
9/18/2017	Y	Y	Y	25	Y	N	J
9/20/2017	Y	Y	Y	18	Y	Y	J
9/21/2017	Y	Y	Y	9	Y	Y	J
9/22/2017	Y	Y	Y	25	Y	Y	J
9/27/2017	Y	Y	Y	20	Y	Y	J
9/28/2017	Y	Y	Y	13	Y	N	J
9/1/2017	Y	Y	Y	13		Y	K
9/1/2017	Y	Y	Y	13		N	K
9/5/2017	Y	Y	Y	21		Y	K
9/6/2017	Y	N	N			Y	K
9/8/2017	Y	Y	Y	23		Y	K
9/12/2017	Y	Y	Y	11		Y	K
9/19/2017	Y	Y	Y	17		N	K
9/19/2017	Y	N	N			Y	K
9/19/2017	Y	N	N	17		Y	K
9/19/2017	Y	Y	Y	20		Y	K

9/29/2017	Y	Y	Y	21	Y	K
9/29/2017	Y	N	N		Y	K

Date	ACT Given	ACT Not Given	Percentage of ACTs Given	ACT Completed	ACT Not Completed	Average ACT Score	GINA Intervention Done	GINA Intervention Not Done	Percentage of GINA Intervention Executed	Work In Patient	Scheduled Patient	Total Patients Seen
June	27	16	63%	27	16	18.11	35	8	81%	23	20	43
July	17	2	89%	14	5	20.29	18	1	95%	10	9	19
August	19	5	79%	19	5	15.95	24	0	100%	12	12	24
September	16	5	76%	16	5	17.41	17	4	81%	16	5	21
October	22	3	83%	22	3	18.36	25	0	100%	10	15	25
November	8	2	80%	8	2	18.56	10	0	100%	5	5	10

Appendix O NoMAD Instrument

NoMAD Instrument - Public Domain

Please cite as: Finch, T.L., Girling, M., May, C.R., Mair, F.S., Murray, E., Treweek, S., Steen, I.N., McColl, E.M., Dickinson, C., Rapley, T. (2015). NoMad: Implementation measure based on Normalization Process Theory. [Measurement instrument]. Retrieved from http://www.normalizationprocess.org.

Survey Instructions

This survey is designed to help get a better understanding of how to apply and integrate new technologies and complex interventions in health care.
This survey asks questions about the Implementation of Global Initiative for Asthma (GINA) Guidelines for Asthma Management and Prevention. We understand that people involved with Implementation of GINA Guidelines for Asthma Management have different roles, and that people may have more than one role.

From the statements below please choose an option that best describes ***your main role*** in relation to Implementation of GINA Guidelines for Asthma Management***:***

- **I am involved in managing or overseeing asthma care**
- **I am involved in delivering asthma care**
- **I am involved in another way**

For this survey, please answer all the statements from the perspective of this role. Depending on your role or responsibilities in [the intervention], some statements may be more relevant than others.

The survey is in 3 parts. Part A asks some brief questions about yourself and your role. Part B includes three general questions about Implementation of GINA Guidelines for Asthma Management. Part C contains a set of more detailed questions about Implementation of GINA Guidelines for Asthma Management. For each statement in Part C, there is the option to agree or disagree with what is being asked **(OPTION A).** However, if you feel that the statement is not relevant to you, there are also options to tell us why **(OPTION B).**

Please take the time to decide which answer **best suits your experience for each statement and tick the appropriate circle**

Part A: About Yourself

1. How Many years have you worked for Valley Family Health Care?

◯ Less than one year ◯ 1-2 years ◯ 3-5 years ◯ 6-10 Years ◯ 11-15 years ◯ 15+ Years

2.How would you describe <u>your professional job category?</u>

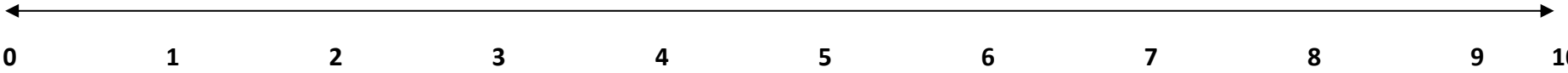
- **a.** Medical Provider: physician, nurse practitioner, physician assistant
- **b.** Registered Nurse
- **c.** Licensed Practical Nurse
- **d.** Medical Assistant
- **e.** Certified Nursing Assistant
- **f.** Student
- **g.** Other

Development of this survey was funded by the Economic and Social Research Council; Study Grant RES-062-23-3274. The core NPT items (20 construct items & 3 normalisation items) are Copyright © Newcastle University 2015.

Part B: General Questions about the Intervention

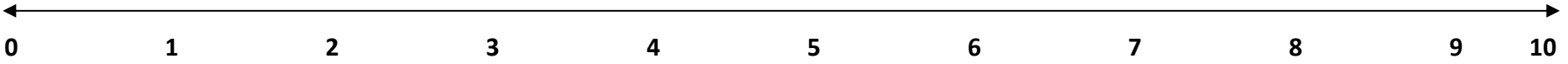
When you use implementation of GINA Guidelines for Asthma Management, how familiar does it feel?

Still feels very new — Feels completely familiar



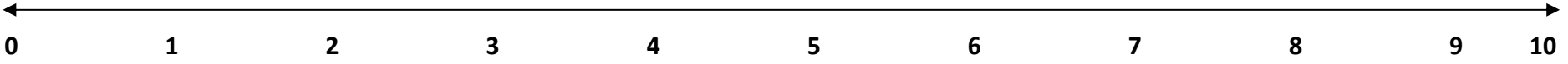
Do you feel using GINA Guidelines is currently a normal part of your work?

Not at all — Somewhat — Completely



Do you feel using GINA Guidelines will become a normal part of your work?

Not at all — Somewhat — Completely



Part C: Detailed Questions about Implementation of GINA Guidelines for Asthma Management and Prevention

For each statement please select an answer that best suits your experience using Option A. If the statement is not relevant to you please select an answer from Option B.

Section C1	Option A					Option B		
	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Not relevant to my role	Not relevant at this stage	Not relevant to the intervention
1. I can see how GINA Guidelines differs from usual ways of working	◯	◯	◯	◯	◯	◯	◯	◯
2. Staff in this organization have shared an understanding of the purpose of GINA guidelines	◯	◯	◯	◯	◯	◯	◯	◯
3. I understand how GINA Guidelines affects the nature of my own work	◯	◯	◯	◯	◯	◯	◯	◯
4. I can see the potential value of GINA Guidelines for my work	◯	◯	◯	◯	◯	◯	◯	◯

For each statement please select an answer that best suits your experience using Option A. If the statement is not relevant to you please select an answer from Option B.

	Option A					Option B		
Section C2	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Not relevant to my role	Not relevant at this stage	Not relevant to the intervention
1. There are key people who drive GINA Guidelines forward and get others involved	◯	◯	◯	◯	◯	◯	◯	◯
2. I believe that participating in GINA Guidelines is a legitimate part of my role	◯	◯	◯	◯	◯	◯	◯	◯
3. I'm open to working with colleagues in new ways to use GINA Guidelines	◯	◯	◯	◯	◯	◯	◯	◯
4. I will continue to support GINA Guidelines	◯	◯	◯	◯	◯	◯	◯	◯

For each statement please select an answer that best suits your experience using Option A. If the statement is not relevant to you please select an answer from Option B.

Section C3	Option A					Option B		
	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Not relevant to my role	Not relevant at this stage	Not relevant to the intervention
1. I can easily integrate GINA Guidelines into my existing work	◯	◯	◯	◯	◯	◯	◯	◯
2. Implementation of GINA Guidelines disrupts working relationships	◯	◯	◯	◯	◯	◯	◯	◯
3. I have confidence in other people's ability to use GINA Guidelines	◯	◯	◯	◯	◯	◯	◯	◯
4. Work is assigned to those with skills appropriate to GINA Guidelines	◯	◯	◯	◯	◯	◯	◯	◯
5. Sufficient training is provided to enable staff to implement GINA Guidelines	◯	◯	◯	◯	◯	◯	◯	◯
6.Sufficent resources are available to support GINA Guidelines	◯	◯	◯	◯	◯	◯	◯	◯
7. Management adequately supports GINA Guidelines	◯	◯	◯	◯	◯	◯	◯	◯

For each statement please select an answer that best suits your experience using Option A. If the statement is not relevant to you please select an answer from Option B.

Section C4	Option A					Option B		
	Strongly Agree	Agree	Neither Agree nor Disagree	Disagree	Strongly Disagree	Not relevant to my role	Not relevant at this stage	Not relevant to the intervention
1. I am aware of reports about the effects of GINA Guidelines	◯	◯	◯	◯	◯	◯	◯	◯
2. The staff agree that GINA Guidelines is worthwhile	◯	◯	◯	◯	◯	◯	◯	◯
3. I value the effects that GINA Guidelines has had on my work	◯	◯	◯	◯	◯	◯	◯	◯
4. Feedback about GINA Guidelines can be used to improve it in the future	◯	◯	◯	◯	◯	◯	◯	◯
5. I can modify how I work with GINA Guidelines	◯	◯	◯	◯	◯	◯	◯	◯

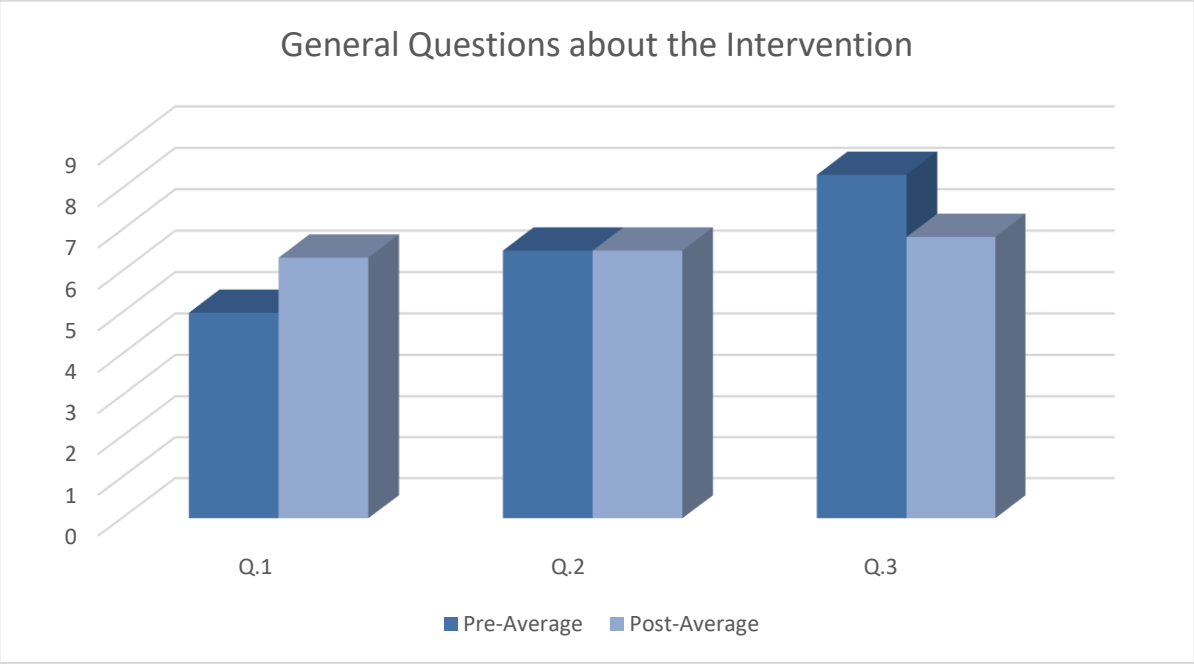
SURVEY CONCLUSION

Thank you for completing this survey!

Appendix P NoMAD Tool Results

Q.1	less than Year	1 to 2	3 to 5	6 to 10	11 to 15	15+
Pre	0	1	3	1	0	1
Post	0	1	4	0	0	2

Q. 2	Provider	RN	LPN	MA	CNA	Student	Other
Pre	2	1	1	2	1	0	0
Post	2	0	1	1	1	0	0



Part C1	Detailed Questions about Implementation of GINA Guidelines for Asthma Management and Prevention							
Q.1		Strongly Agree (5)	Agree (4)	Neither Agree or Disagree (3)	Disagree (2)	Strongly Disagree (1)	Not Relevant	Score
	Pre	2	2	2	0	0	0	22
	Post	2	3	1	0	0	0	25
Q.2								
	Pre	1	2	2	1	0	0	21
	Post	2	1	1	2	0	0	21
Q.3								
	Pre	2	2	2	0	0	0	28
	Post	2	3	0	1	0	0	24
Q.4								
	Pre	4	1	1	0	0	0	27
	Post	4	1	1	0	0	0	27

Part C2	Detailed Questions about Implementation of GINA Guidelines for Asthma Management and Prevention							
Q.1		Strongly Agree (5)	Agree (4)	Neither Agree or Disagree (3)	Disagree (2)	Strongly Disagree (1)	Not Relevant	Score
	Pre	3	2	1	0	0	0	26
	Post	3	3	0	0	0	0	27
Q.2								
	Pre	2	3	0	1	0	0	24
	Post	2	3	1	0	0	0	25
Q.3								
	Pre	2	3	1	0	0	0	25
	Post	2	3	1	0	0	0	25
Q.4								
	Pre	2	3	1	0	0	0	25
	Post	2	3	1	0	0	0	25

Part C3	Detailed Questions about Implementation of GINA Guidelines for Asthma Management and Prevention							
Q.1		Strongly Agree (5)	Agree (4)	Neither Agree or Disagree (3)	Disagree (2)	Strongly Disagree (1)	Not Relevant	Score
	Pre	2	3	1	0	0	0	25
	Post	1	3	1	1	0	0	22
Q.2								
	Pre	1	0	1	4	0	0	15
	Post	0	0	3	2	1	0	14
Q.3								
	Pre	2	2	2	0	0	0	24
	Post	2	3	1	0	0	0	25
Q.4								
	Pre	0	1	4	0	1	0	17
	Post	1	2	3	0	0	0	16
Q.5								
	Pre	0	2	3	1	0	0	19
	Post	1	3	2	0	0	0	23
Q.6								
	Pre	0	3	2	1	0	0	20
	Post	1	3	1	1	0	0	22
Q.7								
	Pre	0	2	2	2	0	0	14
	Post	1	3	1	1	0	0	22

Part C4	Detailed Questions about Implementation of GINA Guidelines for Asthma Management and Prevention							
Q.1		Strongly Agree (5)	Agree (4)	Neither Agree or Disagree (3)	Disagree (2)	Strongly Disagree (1)	Not Relevant	Score
	Pre	1	3	1	1	0	0	22
	Post	1	2	3	0	0	0	22
Q.2								
	Pre	0	2	3	1	0	0	19
	Post	1	3	2	0	0	0	23
Q.3								
	Pre	2	1	2	1	0	0	22
	Post	1	2	2	0	0	1	29
Q.4								
	Pre	2	2	1	0	0	0	21
	Post	1	5	0	0	0	0	25
Q.5								
	Pre	2	3	1	0	0	0	25
	Post	1	4	0	0	0	1	21