

Distribution Statement

Distribution A: Public Release.

The views presented here are those of the author and are not to be construed as official or reflecting the views of the Uniformed Services University of the Health Sciences, the Department of Defense or the U.S. Government.

Implementing an Evidence-Based Algorithm for the Diagnosis and Evaluation of Iron

Deficiency Anemia (IDA) in Female Basic Military Training Recruits

Melissa Everage, Virginia Frazier, Nicholas Robertson, and Matthew Simmons

Uniformed Services University of the Health Sciences

DISCLAIMER: Due to the impact of the COVID19 Pandemic, 2020 graduates of the Daniel K. Inouye Graduate School of Nursing were deemed critical to the mission of caring for the health of the nation and had an accelerated graduation. All phases of the DNP Project were complete, and met the standards and rigors of a quality DNP Project with an abbreviated dissemination timeframe

Table of Contents

Abstract.....	4
Introduction.....	6
Significance of the Problem.....	7
Clinical Question.....	9
Focus Areas.....	9
Project Short and Long Term Goals.....	9
Relevance to Military Nursing.....	9
Organizing Framework.....	10
Project Design.....	11
General Approach.....	11
Setting.....	16
Procedural Steps.....	16
Ethical and Legal Concerns.....	19
Project Results.....	20
Analysis of the Results.....	21
Organizational Impact.....	23
Future Directions for Research and Practice.....	25
Conclusion.....	25
References.....	27
Appendices.....	34
A-CITI Certificates.....	34
B-USU Form 3202N.....	35

C-MTF IRB/PI Letter of Determination.....	36
D-Other Project Documents.....	37
E-Audit and Feedback Form.....	47
F-RE-AIM Framework.....	49
G-PRISMA Diagram.....	50
H-Project Timeline.....	51
I-Evidence Appraisal.....	52
J-Synthesis of Interventions.....	62
K-Completion Verification Form.....	63

Abstract

Phase II Site: Joint Base San Antonio-Lackland (JBSA-L), Wilford Hall Medical Center

Project Title: Implementing an Evidence-Based Algorithm for the Diagnosis and Evaluation of Iron Deficiency Anemia (IDA) in Female Basic Military Training Recruits

Authors: Melissa Everage, Virginia Frazier, Nicholas Robertson, Matthew Simmons

Background: Approximately 25% of United States Air Force (USAF) Basic Military Training (BMT) female recruits entering BMT are anemic, mostly due to iron deficiency (ID) and iron deficiency anemia (IDA), with rates as high as 77% in other military female recruit cohorts. Currently, a standardized, evidence-based algorithm is not used at the Reid Medical Clinic (RMC) to diagnose and evaluate ID/IDA, contributing to an overuse of diagnostic studies, erroneous medical diagnosis, and poor follow-up.

Clinical Question: Can the use of an evidence-based educational platform to educate Reid Clinic Providers result in an 11% improved adherence rate to the American Academy of Family Physicians (AAFP) algorithm for the evaluation and diagnosis of IDA among reproductive-aged female BMT recruits compared with current practice?

Design: The RE-AIM framework guided a three-month retrospective chart review comparing providers' current evaluation and diagnostic practices to the AAFP IDA algorithm recommendations. An interactive, provider-centered educational class with case studies, pre/post-tests, handouts, monthly staff meetings, selected project champions, and three months of post-workshop biweekly chart audits were completed.

Analysis of the Results: Comparison of a three-month retrospective chart review containing 126 records with a three-month post-implementation chart review containing 170 records revealed a 43.75% increase in compliance to the AAFP algorithm. There was a reduction in

diagnostic studies post-implementation which resulted in an estimated savings of \$105,248.00 annually, if fully adopted.

Organizational Impact/Implications for Practice: The RMC shows increased compliance with algorithm utilization, with a continued rise anticipated. Sustainability is maintained by selecting a change champion as well as acquiring a mandated policy letter from the Medical Director, enforcing the AAFP algorithm. Globally, we propose a DHA/DOD-wide policy adoption for facilities managing healthcare for a similar target population enrolled in rigorous training programs that may lead to an estimated cost-savings approaching \$500,000.00 annually.

Keywords: [Clinical Practice Guideline (CPG), American Academy of Family Physicians (AAFP), Iron deficiency (ID), iron deficiency anemia (IDA), United States Air Force (USAF), Basic Military Training (BMT), female recruits, adherence rate]

Introduction

Iron deficiency (ID) and iron deficiency anemia (IDA) is a global health concern. Every year, 35,000-39,000 recruits enter Air Force Basic Military Training (BMT). (Terdiman, 2014; F. Tran, personal communication, December 10, 2019). According to the Air Force Personnel Center (AFPC) (2019), 20-26% of the Air Force is female (F. Tran, personal communication, December 10, 2019). Upon accession to BMT, recruits undergo increased physical and emotional stress during their eight weeks of training. These stressors may induce ID or IDA in females, especially among those who have borderline-low iron levels at the start of training. The consequences of ID may lead to negative downstream effects for both the individual recruits and the Air Force, to include: an interruption and prolongation in training, unfilled personnel positions, and a decrease in military mission readiness. Further, these negative outcomes cost the United States (U.S.) Government approximately \$22,000-\$25,000 per Airman failing to complete BMT (Table D-1) (Bartlett & Stankorb, 2017; F. Tran, personal communication, December 10, 2019).

Due to the health and military readiness implications, it is imperative that the Primary Care Providers (PCPs) at the JBSA-Lackland Reid Clinic where the recruits receive outpatient healthcare services are using a standardized, evidence-based method in evaluating and diagnosing IDA among this patient population. However, it has been noted that there is variation among the PCPs in their management of this condition. Clinical Practice Guidelines (CPGs) or algorithms developed by a panel of experts in their organizational field are intended to reduce clinical variation among providers, translate and promote current research into practice, decrease medical costs by omitting unnecessary orders, and improve patient outcomes (Fischer, Lange, Klose, Greiner, & Kraemer, 2016). Some of the barriers to provider adherence to CPGs or

algorithms may be they are unaware that one exists, they are unfamiliar with the guideline's content, they disagree with the recommendations, or the recommendations are too time-intensive (Graham, 2014).

After performing a literature search of published algorithms for diagnosing IDA, there were a few recommended algorithms published by professional medical organizations. However, none of these algorithms appear to have been tested or determined to be the best for diagnosing and evaluating IDA. Therefore, given the target group of providers at the Reid Clinic are more closely identified as Primary Care Providers, the AAFP (2019), the main professional organization that is solely committed to 134,600 PCPs and medical students, was the most reasonable professional organization to follow. The AAFP published a proposed algorithm standardizing the evaluation and diagnosis of IDA (Short & Domagalski, 2013). The purpose of this project is to determine if the use of an evidence-based educational platform during the implementation of the AAFP's algorithm for diagnosing and evaluating IDA among reproductive-aged female BMT recruits leads to greater than 11% provider adherence to the CPG at the Reid Clinic. Authors of previous studies noted an improved provider adherence rate between 6 to 12% to CPGs with educational and/or local opinion leader interventions (Fischer et al., 2016; Flodgren et al., 2011; Forsetlund et al., 2009).

Significance of the Problem

The significance of ID in females is a global issue. Iron deficiency is not isolated to one geographic population like some diseases, but rather, it spans approximately half of the world's female population (Murray-Kolb & Beard, 2007). Reproductive-aged women are among the most affected, particularly if also experiencing poor nutrition, increased metabolic demands, and

heavy or abnormal menstruation. If ID is severe enough, it may lead to IDA and cause decreased cognitive or physical functioning (Murray-Kolb & Beard, 2007).

More than 25% of U.S. Air Force (USAF) BMT female recruits have anemia, mostly due to ID (Myhre et al., 2016). According to Murray-Kolb and Beard (2007), the exacerbation of ID and IDA in physically demanding environments is manifested through a decline in cognitive and physical functioning. This decline in functioning often results in injury, poorer physical fitness testing, and decreased task efficiency, resulting in increased attrition and decreased BMT graduation rate (Bartlett & Stankorb, 2017; Murray-Kolb & Beard, 2007; Myhre et al., 2016). When a single recruit does not complete BMT, there is an approximate net loss of \$22,000-\$25,000 (Bartlett & Stankorb, 2017; F. Tran, personal communication, December 10, 2019). Anemia contributes to the six percent or 2,100 recruits that are unable to complete training every year (Bartlett & Stankorb, 2017). Currently, the discharge rate for anemic BMT recruits is between 9.0% to 20%, depending on severity, with severely anemic recruits being three times more likely to be delayed from BMT graduation or discharge from military service (Myhre et al., 2016). Each trainee lost to attrition results in an unfilled position, thereby negatively impacting military mission readiness.

If PCPs are not adhering to recommended CPGs or algorithms in the evaluation and diagnosis of symptomatic female BMT recruits, they may be ordering more diagnostic studies than necessary, which increases costs, workload, and time to diagnosis and treatment (Fischer et al., 2016). The military is not exempt from the skyrocketing medical costs plaguing the U.S. healthcare system, seven percent of which is due to unnecessary diagnostics and treatment interventions (Trietsch et al., 2017). Additionally, clinicians managing the care of the female

BMT recruits have to be more efficient and mindful of the limited time BMT recruits have to spend with the PCPs as they have to adhere to a rigid BMT training schedule.

Clinical Question

Can the use of an evidence-based educational platform to educate Reid Clinic Providers result in an 11% improved adherence rate to the AAFP algorithm for the evaluation and diagnosis of IDA among reproductive-aged female BMT recruits compared with current practice?

Focus Areas

Initially, the focus was to identify the most effective evidence-based strategic tool shown to increase PCP adherence to CPGs implemented in outpatient clinical settings. Secondly, the focus was to implement the AAFP algorithm for evaluation and diagnosis of ID/IDA among female BMT recruits presenting to the JBSA-Lackland's Reid Clinic.

Project Short- & Long-Term Goals

Our short-term goal was to identify the most highly-effective, evidence-based strategy tool to increase adherence of CPGs among PCPs, reduce inappropriate variation in practice and health care costs, and ultimately improve safety and patient outcomes (Fisher et al., 2016). Through the evaluation of current practices and evidence-based literature, a long-term goal was to recommend that the PCPs located at the JBSA-Lackland's Reid Clinic adopt the AAFP algorithm for the diagnosing and appropriate management of ID/IDA in reproductive-aged female BMT recruits.

Relevance to Military Nursing

As Advanced Practice Registered Nurses (APRNs), early disease recognition is paramount to positive health outcomes. As healthcare providers, it is our duty to recognize presenting signs and symptoms of ID and IDA, order appropriate diagnostic studies, and deliver

timely interventions to prevent further sequelae (Wilson & Brothers, 2010). Patients with ID or IDA may be asymptomatic, but may present with repeated failed PT test scores, or have common signs and symptoms such as generalized fatigue, headaches, cognition or mood disturbances, and decreased exercise endurance (Murray-Kolb & Beard, 2007; Wilson & Brothers, 2010). Labs that confirm the diagnosis typically include a Complete Blood Count (CBC) with low hemoglobin and Mean Corpuscular Volume (MCV) and decreased iron stores, as indicated by low serum ferritin (SF), increased total iron-binding capacity (TIBC), and low transferrin saturation (Short & Domagalski, 2013). However, proper evaluation of IDA includes searching for potential causes of this condition, such as insufficient dietary iron intake or absorption, abnormal uterine bleeding or gastrointestinal bleeding (Short & Domagalski, 2013). Through the utilization and clinical practice-wide promotion of the proposed AAFP algorithm for the diagnosis of IDA by Short & Domagalski (2013), Nurse Practitioners can lead the way in encouraging their peers in proper evaluation and diagnosis of this population according to the most current evidence published by one of their top national practice organizations. Additional benefits will include reduced medical costs, decreased time to diagnosis, timely interventions, and optimal health and performance outcomes for our Air Force BMT female recruits (Fischer et al., 2016).

Organizing Framework

The Reach Effectiveness Adoption Implementation Maintenance (RE-AIM) framework for planning and organization is the model that guided this project (Glasgow & Estabrook, 2018). During our literature review, authors of similar studies using an educational platform to implement a CPG employed the RE-AIM framework with positive and sustainable results (Quanbeck et al., 2018). Therefore, this model was found to be an effective, generalizable, and

evidence-based framework for translating research into practice, implementing an educational platform, optimizing provider adherence, and long-term sustainability.

The first component of the RE-AIM framework is Reach, which includes the intended population or audience (Gaglio, Shoup, & Glasgow, 2013). For our project, the intended population were the 18 Reid Clinic PCPs managing the healthcare of approximately 10,000 female BMT recruits. The Effectiveness (or efficacy) component is the impact of the intervention or program (Gaglio et al., 2013). By implementing the AAFP IDA algorithm, our project will establish a guideline for standardizing diagnosis and management of IDA among the PCPs; decrease inefficient, costly, and unnecessary diagnostic studies; lower provider and ancillary service workload; and reduce excessive follow-up appointments. The Adoption element is the proportion of the staff or population that agrees to initiate the intervention or changes (Gaglio et al., 2013). The percentage of Reid Clinic PCPs expected to adopt the AAFP algorithm is 11% or greater. The Implementation aspect relates to the actual adaptation of a policy or intervention (Gaglio et al., 2013; Glasgow & Estabrook, 2018). We garnered PCP and stakeholder support through an educational platform to include an evidence-based education platform composed of an interactive, provider-centered educational class, case studies, pre/post tests, handouts, staff meetings, project champions, and biweekly audit and feedback. Lastly, the Maintenance component is the sustainability of the policy or intervention (Gaglio et al., 2013). The identification of carefully selected permanent project champions, continuous audit and feedback, leadership and stakeholder engagement and support, local policy changes will bolster a sustainable culture of evidence-based practice and interventions (Appendix J).

Project Design

General Approach

PubMed, Embase, and Cumulative Index to Nursing and Allied Health Literature (CINAHL) were searched to identify articles or abstracts for inclusion in this literature review on research studies that studied tools that increased primary care provider adherence during the implementation of clinical practice guidelines or algorithms within an outpatient clinical setting. The PubMed search utilized the Medical Subject Heading (MeSH) terms: “clinical practice guideline” and “implementation” and “strategy” and “adherence.” The algorithm used to retrieve the PubMed articles was: (("practice guideline"[Publication Type] OR "practice guidelines as topic"[MeSH Terms] OR "clinical practice guideline"[All Fields]) OR ("guideline"[Publication Type] OR "guidelines as topic"[MeSH Terms] OR "guideline"[All Fields])) AND implementation[All Fields] AND (strategy[All Fields] OR strategies[All Fields]) AND adherence[All Fields] AND ((Review[ptyp] OR Randomized Controlled Trial[ptyp] OR Meta-Analysis[ptyp] OR systematic[sb]) AND "2014/09/13"[PDat] : "2019/09/11"[PDat]). The Embase and CINAHL searches mirrored the PubMed search with database specific strings. The search was limited to articles published in English, peer-reviewed, and published within the last five years based on articles added to the databases through 11 September 2019. As of 11 September 2019, the total articles identified were 239. After 31 duplicate records were removed utilizing EndNote software, the remaining articles to evaluate were 208.

Titles and abstracts of these 208 articles were evaluated against inclusion and exclusion criteria in this review of the literature. Inclusion criteria focused on articles that included humans, any ethnic origin, primary care or outpatient clinical practice providers, and articles where meta-analysis, randomized control trials (RCTs), and systematic reviews were performed. Exclusion criteria were articles that included inpatient settings, only had an abstract, no clinical guideline was reviewed, and where the study was non-generalizable. After a review of the titles

and abstracts, 154 articles were excluded based on the inclusion and exclusion criteria. A total of 54 full-text articles were reviewed against inclusion and exclusion criteria, and this led to 38 articles being excluded. The remaining 16 articles were appraised by applying the appropriate Johns Hopkins Nursing Evidence-Based Practice (JHNEBP) Quality of Evidence Appraisal Tool to each article (Newhouse, Dearholt, Poe, Pugh, & White, 2005). The articles were then categorized and entered into a spreadsheet to allow for efficient comparison of study population, sample size, implementation tools, findings, limitations, and levels of evidence (Appendices G, I, and J).

Quality.

The first step in analyzing the quality of articles included in a literature review is to determine the levels of evidence. The levels of evidence provide insight as to how a study may have been developed and conducted in order to prevent or decrease bias (LoBiondo-Wood & Haber, 2014). According to the Melnyk & Fineout-Overholt Hierarchy of Evidence Rating System (2011), 11 articles in the review are categorized as Level 1, Systematic Reviews or Meta-analysis of RCTs; three articles are considered Level 2, Well-designed RCTs; one article is Level 4, Well-designed Case Control or Cohort Studies, and one article is considered Level 5, Systematic Review of Descriptive and Qualitative Studies (Appendix I).

After determining the levels of evidence, the articles were assessed using the Johns Hopkins Nursing Evidence-Based Practice (JHNEBP) Quality of Evidence Appraisal Tool to each article that matched the type of study performed in the article (Newhouse et al., 2005). There were nine articles that were “high quality” of evidence, five articles that were of “good quality” of evidence, and two articles that were of “low quality” of evidence. The “high quality” articles were composed of studies that included a large sample size, a well-defined control group,

and had consistent, generalizable results based on a robust amount of scientific evidence (Newhouse et al., 2005). The “good quality” articles included studies that mostly had consistent results, a smaller sample size, a control group, but one where the researchers were unable to mitigate the effects of other variables, and had fairly consistent results with generalizable recommendations (Newhouse et al., 2015). The “low quality” article failed to demonstrate strong scientific evidence, the sample size was not defined, the search strategy was not explained, and the results, recommendations, and conclusions were vague (Appendix I) (Newhouse et al., 2005).

Consistency.

The articles were consistent by addressing common barriers that prevent provider adherence to CPGs and simultaneously applied multiple implementation tools versus a single intervention. These tools often included an interactive, provider-centered educational class, case studies, pre/post-tests, handouts, staff meetings, project champions, and reoccurring individual audit and feedback (Appendices I and J). The inconsistencies among the articles were the difference in sample sizes, use of a well-defined control group, variety in interventions studied, and unclear results and recommendations (Appendix I).

Synthesis.

The 16 articles consistently utilized an evidence-based educational platform to increase provider adherence to the implemented CPG or algorithm. The majority of the studies showed the highest increase in provider adherence when using multifaceted implementation strategies versus a single intervention. However, there is a moderate amount of heterogeneity noted in the literature concerning which specific implementation strategy is best.

Through the evidence appraisal, we learned that a single method intervention to implement CPGs is usually unsuccessful, and increasing provider adherence is most effectively gained through multiple strategies. In addition, studies successful at enhancing provider adherence used a needs assessment to identify gaps in organizational change and a nursing theory framework to understand the current organizational climate before the implementation stage. By understanding the successful interventions portrayed throughout the studies, we were able to thoroughly plan and mitigate potential risk factors that may be encountered during the implementation and maintenance phases of our project that may affect provider and leadership buy-in and project sustainability.

A limitation among the literature is that there is a lack of studies that specifically address the implementation of an CPG or algorithm for anemia. Regardless of the disease process, we had to review studies that implemented a guideline specifically for providers in a primary care setting whose research study design, results, and recommendations could be generalizable to our project and focus population. Therefore, generalizability was added to our inclusion criteria.

The lack of a specific theoretical nursing framework for the implementation of a multifaceted intervention strategy was another limitation among the research studies. The lack of a superior framework resulted in the adoption of the RE-AIM framework. The RE-AIM framework provides simple, evidence-based principles for incorporating evidence into practice, increasing provider adherence, and optimizing project sustainability.

In synthesizing the literature review, a number of strengths were identified. Nine articles that answered the clinical question were appraised to be of excellent quality. Additionally, studies consistently used a multifactorial approach in implementing guidelines to enhance provider adherence.

In summary, the aforementioned findings have led to the conclusion that a multifaceted educational-platform that includes active provider education, audit and feedback methods, and the incorporation of the RE-AIM framework is the best approach for improving provider adherence with the implementation of a standardized CPG algorithm (Appendix F).

Setting

Healthcare operations and ancillary services associated with the project will occur at JBSA-Lackland's Reid Clinic, which is a Trainee Health Clinic that delivers outpatient healthcare services to over 86,000 USAF BMT recruits, as well as technical school, Defense Language, and international students (Air Force Medical Service, n.d.) in San Antonio, Texas. In addition to the Doctorate of Nursing Practice project members from the Uniformed Services University, the senior mentor, Dr. Janice Williams; the Phase II Site Director, Lieutenant Colonel Karla Dennard; the newly-recruited female Air Force Basic Trainees; the PCPs within the 559th Trainee Health Surveillance Flight; the Reid Clinic Medical Director, Dr. Francis Tran; the MTF administrative leadership within the 59th Medical Wing, and the 37th Training Wing leadership who oversee training operations at JBSA-Lackland (59th Medical Wing, n.d.).

Procedural Steps

Our team's project was derived from discussions among stakeholders indicating a lack of standardization among Reid Clinic providers in their approach to diagnosing and managing ID/IDA among female BMT recruits. To verify there was a lack of standardization and to allow for comparative data, a three-month, systematic, retrospective chart review was conducted. The electronic records retrieved were only those that met specific inclusion criteria. The inclusion criteria consisted of females of reproductive age who were new military recruits that were assigned to providers at the RMC. The record must have had one of the following ICD-10 codes

included in conjunction with the above inclusion criteria to narrow the amount of medical records to review that would meet the aim of this project. The included ICD-10 were: D50.9 - Iron Deficiency Anemia, D50.8 - Other Iron Deficiency Anemias, D64.9 - Anemia Unspecified, E61.1 - Iron Deficiency, R53 - Malaise and Fatigue, R53.1 - Weakness, R53.82 - Chronic Fatigue, R53-83 - Fatigue, and R79.9 - Abnormal Findings on Blood Chemistry. Each record identified by the means above were individually screened using a systematic approach by two individuals to help eliminate bias and reduce error. Additionally, the identified records that were included for data extrapolation had to be the first/initial encounter for one of the ICD-10 codes above to reflect the appropriate use of the AAFP IDA algorithm.

Through the use of an evidence-based educational platform, our focus was to implement the AAFP algorithm for diagnosing and managing ID/IDA, increase diagnostic accuracy, and ultimately improve provider adherence. As previously discussed, the RE-AIM model/framework as described by Glasgow and Estabrooks (2018) was used to organize the team; craft a clinical question; and review, appraise, and synthesize the literature. To ensure the most up-to-date evidence was utilized, periodic literature reviews were conducted throughout each phase of the project.

According to White, Dudley-Brown, and Terhaar (2016), research shows that barriers traditionally result in a delay in daily application of evidence-based practices in healthcare. Prior to the project interventions, a three-month retrospective chart review and a needs assessment were performed to gather quantitative and qualitative data as well as confirm stakeholders' concerns on the PCPs' current practices, identify organizational limitations and barriers to change, developed mitigation strategies, and select change champions to bolster guideline adoption (Fischer et al., 2016). Overall, we were able to draw comparisons to the AAFP

algorithm, and developed an educational strategy to implement the AAFP algorithm guidance and improve provider adherence.

Next and somewhat concurrent with the previous step, we developed a provider-centered, interactive educational platform through the combination of literature review and coordination with the Reid Clinic Medical Director as to what would be most effective for gaining provider buy-in and receptive audit and feedback. In addition to previously identified barriers such as increased cost and time to educated providers, BMT recruit scheduling constraints, limited resources, lack of access to care, and lack of a standardized ID/IDA algorithm, we later found that the Reid clinic providers were operating under the assumption that there was a Command-level policy for diagnosing and managing anemia that did not exist. Through this failure in communication and misconception, there were unnecessary diagnostic studies, patients were not being adequately followed up or treated, patients were being placed in Medical Hold for an indeterminate amount of time affecting BMT mission and readiness. There continues to be a discrepancy among the guard and reserve BMT recruits based on guidance mandated from their respective leadership channels.

Following the implementation of our educational strategy, we obtained bi-weekly electronic record reports from the Group Practice Managers using the same inclusion criteria utilized for the retrospective chart review to compare and contrast the differences from pre/post-implementation and determine improvement in provider compliance. This data was used to audit providers' practice in relation to our project, provide appropriate feedback, and maintain an open line of communication with providers and leadership. Throughout the project, key stakeholders were given monthly briefings on adherence status, goal reinforcement, project start and end dates, ameliorated specific concerns and barriers, and maintaining an open line of

communication with the selected change-champions ensured buy-in and continued acceptance of the end goal (Appendix E).

Ethical and Legal Concerns

Ethical principles of respect, beneficence, nonmaleficence, and justice will be maintained throughout our interaction with BMT recruits for the IDA Project at JBSA-Lackland (Dudley-Brown & Rushton, 2016). Respect for persons will occur by ensuring the privacy and confidentiality of medical information obtained from our recruits and adhering to the Health Insurance Portability and Accountability Act (HIPAA) regulations. Properly evaluating and diagnosing recruits with IDA according to an evidence-based guideline demonstrates the principle of beneficence, as early identification of the condition will allow for increased time for treatment and improved physical training results. We will promote nonmaleficence by avoiding unnecessary lab work and delays in diagnosis. Justice will be maintained, as all female recruits who present with signs and symptoms of anemia will be properly managed.

HIPAA Concerns

The HIPAA Privacy Rule enacted as Public Law in 1996 was designed to enforce personnel who are involved in patient care or have access to patient records to maintain the privacy and security of patient information (Krager & Krager, 2018). HIPAA compliance is relevant to the IDA project, as our project involves reviewing medical records for the BMT recruits who are being evaluated for IDA. In order to prevent potential HIPAA breaches, personnel involved in the project have been mandated to complete HIPAA training through Joint Knowledge Online (JKO). Also, the Uniformed Services University students involved in the project have been involved in repeated discussions regarding best practices to prevent HIPAA infractions when dealing with physical and electronic health records. One practice to safeguard patient privacy

and confidentiality includes utilizing the Armed Forces Health Longitudinal Technology Application (AHLTA) and Composite Health Care System (CHCS) electronic health record systems to record information, as it requires a Common Access Card (CAC) and/or password for access to the government's network. Other interventions include the use of password-protected electronic folders to store data, HIPAA-approved procedural and drug code sets, HIPAA cover sheets and storing physical records in a locked containers when not in use, shredding unneeded physical records in federally-approved machines on site, and de-identifying personally identifiable information (PII) for data analysis through the use of DoD Identification Numbers (Blackman, 2018; Krager & Krager, 2018).

Level of Review - Privacy Review Board

According to the Department of Defense Instruction (DoDI) 3216.02, if human subjects are incorporated into research, a full Institutional Review Board (IRB) approval is mandatory (DoD, 2011). Our project is not considered research, and we were not in direct contact with patient care. Rather, we conducted an evidence-based implementation project to evaluate how a provider-centered educational platform affects provider adherence to an IDA CPG algorithm for diagnosing and evaluating IDA. The individuals in the study were already being evaluated for anemia, and we were present to ensure they were diagnosed and managed according to the most up-to-date, evidence-based literature available. Overall, our project would require a Privacy Review Board as exempt research; to which, we will maintain HIPAA standards and de-identify all patient-data collected throughout the project (Appendix B and C).

Project Results

After filtering electronic health records of reproductive-aged female BMTs with encounters for ICD-10 codes associated with a diagnosis or symptoms of anemia and/or ID, a

total of 170 charts were reviewed. Of the 170 charts, 127 met the inclusion criteria for data collection. Of the records that met inclusion criteria, there were 61 encounters that records could not be located based on original search methods and 66 encounters that were able to be fully reviewed. To date, the MTF system team was unable to determine why these records could not be identified with their record locator number; however, statistical analysis of the available records is enough to give adequate estimation of those encounters' data. Of the 66 reviewable encounters, 48 were Active Duty members and 18 were Guard or Reserve members. In comparing the three-month retrospective chart review data with three months' worth of post-implementation chart-audit data for diagnosing IDA among female BMT recruits, there was a 43.75% improved adherence rate with the AAFP algorithm among Reid Clinic providers. This surpassed our original goal of improving provider adherence by 11%.

Other noteworthy data are post-implementation hematologic study utilization rates. The largest change in laboratory studies was 43.75% as indicated by a decrease in orders for Reticulocyte Count and Occult Stool samples post the educational workshop. Additionally, there was a decrease in orders for Hemoglobin Electrophoresis by 37.5%, the most expensive lab among the available studies, costing \$135 per order. We noted a very small, 4% decrease in the use of serum iron and total iron binding capacity (TIBC) studies (Table D1-D3).

Analysis of Results

This project was developed to determine if the use of an evidenced-based educational platform could improve provider adherence to the implementation of an evidence-based algorithm. After analyzing our results, the post-implementation provider improved adherence rate of 43.75%, exceeding the previously anticipated provider adherence rate of 11% found among similar studies during our literature review. Since there was a notable improvement in

provider adherence rate and a decrease in orders for hematologic studies not aligned with the AAFP algorithm, our clinical question was answered.

Based on budget analysis, this project revealed an estimated \$47,910.00 savings in diagnostic studies annually with the potential to save the clinic \$105,248.00 annually, if the AAFP algorithm is utilized appropriately by all providers for female AD, Guard, and Reserve trainees. These estimates are based on a comparison of diagnostic test usage during the three-month retrospective chart review prior to our implementation and data collected on the same diagnostic studies and utilization rates post-implementation. Cost for the studies was based on current pricing from LabCorp at the time this project implementation, as LabCorp is a primary laboratory utilized by the Air Force and their costs include some aspects of manpower and equipment to give a more accurate estimate.

There were several limitations noted for our project. First, our project was limited to three months of audit and feedback. At the one-month post educational workshop, we noted little change in provider adherence rate. Providers struggled with ordering only a serum ferritin level versus ordering an iron panel which consisted of serum iron, serum ferritin, and TIBC, as they were unaware they had the ability to order the single serum ferritin through the Electronic Health Record (EHR) when first evaluating for IDA as recommended by the algorithm. Even after receiving audits with feedback, providers still ordered an “Iron Panel” that consisted of a serum Iron, a TIBC, and a serum ferritin. There was a delay in data collection due to the time required to gather the charts that met criteria for our provider audits and in offering provider feedback due to the holiday season. Additionally, there was skepticism among the Reid Clinic providers in following the AAFP algorithm as they were initially under the assumption there was a Command-level policy mandating a specific set of orders for the evaluation and diagnosis of all

active duty anemic patients (H. Ortega, personal communication, January 9, 2020). Around two months post project implementation and open communication with the stakeholders and Reid Clinic providers confirming non-existence of a Command-level policy, there was a gradual rise in provider adherence rate, which strongly corresponds to the number of audit and feedbacks each provider received.

There were some important lessons learned throughout this project. In garnering support and eventual adoption of the AAFP algorithm by the Reid Clinic providers, individualized audit and feedback, Change Champions, and clinic leadership buy-in were crucial. Provider misconceptions were addressed, there were frequent reminders available, and providers felt more confident and supported in following the AAFP algorithm. Another lesson learned is that we failed to notice an improvement in provider adherence for those managing Guard and Reserve female trainees as they are governed under a policy mandating a specific set of diagnostic studies completed on any trainee diagnosed with anemia, unlike the active duty component. With an increased provider adherence rate to the AAFP algorithm versus previous clinical practice, we are confident that there was a decrease in misdiagnosis or delayed diagnosis for anemia among the target population.

Organizational Impact

The implementation of CPGs is integral in the execution of evidenced-based practice and are effective at creating a benchmark for audits, which is an essential part of continuous quality improvement (Fischer et al., 2016). According to Fischer et al. (2016), guidelines meet multiple purposes, such as to increase efficiency and quality of care, to decrease wide variation in clinical practice and prevent mistakes. Even with guidelines and clinical pathways readily available, about 30%-40% of patients receive treatment not based on scientific evidence, and 20%–25%

receive treatments that are either not needed or potentially harmful (Fisher et al., 2016). By implementing an effective strategic tool that increases adherence to the CPG, we can positively affect patient outcomes, and reduce unnecessary laboratory costs and unnecessary or harmful treatments.

One of the most obvious organizational impacts our project revealed is cost savings to the medical clinic and the DoD as a whole by reducing excess diagnostic studies while achieving the same outcomes for patients. We estimate a possible cost savings of up to \$105,248.00 for the clinic if they continue to follow the AAFP IDA algorithm. Additionally, the clinic should benefit from a decrease in provider workload. Although we did not collect data on the specific time savings or qualitative information from providers on how they felt about their workload post-implementation, it is assumed that with a reduction in diagnostic studies ordered, there will be a decrease in time required to review the results.

At a macro-organizational level, a critical concept from our project that applies to the future practice in the DHA healthcare system is that our project and results are very generalizable within military healthcare settings. Additionally, at the micro-organizational level, the educational workshop/platform in conjunction with an audit and feedback method involves little burden to a clinic to initiate, has a low-maintenance cost for a clinic, and can be individualized to almost any military primary care clinic setting. If DHA and/or other service branches adopt a similar method for educating and using the AAFP IDA algorithm for their BMT medical clinics, then hypothetically, there could be a potential annual savings to the entire healthcare system of nearly \$500,000.00 annually. The savings amount is a simple estimate based strictly off the values we discovered in our project and applying them liberally to the total number of female recruits across all services who are of childbearing age (Military OneSource,

2018). This is especially important as trends have statistically shown more and more women are entering the military and the ratio of women to men has continued to increase (Barroso, 2019).

This is why we give a strong recommendation that this EBP project be utilized and applied across other military services' training environments, to include the National Guard and Reserves.

Future Directions for Research and Practice

We recommend that more projects utilize the same or similar educational workshop and audit-feedback method in implementing CPGs or algorithms to benefit from an estimated annual cost savings of up to \$105,248.00, as shown in our project. Our first initiative is to update the active duty policy for managing IDA among the Air Force female BMT recruits. Next, we will engage the local guard and reserve leadership, streamlining the new policy and operational standardization with the active duty management of IDA. Additionally, the results and lessons learned from our project should be utilized and applied across other military training environments in all branches of service. Also, clinics should identify and maintain a Change-champion for sustainability of practice. Finally, as noted in our literature review demonstrating few diagnostic and evaluation algorithms available or tested, there is a strong need for researchers to conduct further studies into the effectiveness of various diagnostic algorithms and their associated outcomes.

Conclusion

After reviewing and appraising the evidence-based research available, the data supported our PICOT question. Through the utilization of the RE-AIM framework, an educational platform was utilized to implement an evidence-based algorithm for the standardization of diagnosing and evaluating ID/IDA among female BMT recruits at the Reid Clinic. Throughout

the project, key stakeholders were given monthly briefings on adherence status; goals were reinforced; the project timeline was maintained; specific concerns, barriers, and limitations were addressed; and an open line of communication with the selected change-champions were continuously maintained for sustainability. Our results showed a 43.75% improved provider adherence rate to the AAFP algorithm, decreased lab utilization and provider workload, reduction in time to diagnosis and follow-up, and annual cost savings that may benefit the Reid Clinic and future military clinics globally.

References

- Aakhus, E., Oxman, A. D., Flottorp, S. A. (2014). Determinants of adherence to recommendations for depressed elderly patients in primary care: A multi-methods study. *Scandinavian Journal of Primary Health Care*, 32(4): 170-179. doi: 10.3109/02813432.2014.984961
- Air Force Medical Service (AFMS). (n.d.). *Reid Clinic: 59th Medical Wing, Joint Base San Antonio, Texas*. Retrieved from <https://www.airforcemedicine.af.mil/MTF/Reid/About-Us/>
- Air Force Personnel Center (AFPC). (2019, July 2). *Military demographics*. Retrieved from https://www.afpc.af.mil/Portals/70/documents/03_ABOUT/Military%20Demographics%20Jul%2019.pdf?ver=2019-07-02-152806-947
- American Academy of Family Physicians. (2019). *Become a member*. Retrieved from <https://www.aafp.org/membership/join.html>
- Barroso, A. (2019, September 10). *The Changing Profile of the U.S. Military: Smaller in Size, More Diverse, More Women in Leadership*. Retrieved March 22, 2020, from Pew Research Center: <https://www.pewresearch.org/fact-tank/2019/09/10/the-changing-profile-of-the-u-s-military/>
- Bartlett, C. G. & Stankorb, S. (2017). Physical performance and attrition among U.S. air force trainees participating in basic military training fueling initiative. *Military Medicine*, Vol 182, 1063-1069.
- Baynes, A., McArthur, A. (2014). Adherence to recommended australian sexually transmitted

- infections screening guidelines among asymptomatic men who have sex with men: A best practice implementation project. *Joanna Briggs Institute Database of Systematic Reviews and Implementation Reports*, 12(12): 210-226. doi: 10.11124/jbisrir-2014-1989
- Blackman, V. (2018). Evidence-based practice, HIPAA, and privacy boards [PowerPoint slides]. Retrieved from <https://learning.usuhs.edu/portal/site/d2c6b4da-4882-4ca8-9519-d55a16e2c1d6/tool/5c8d2f70-4604-4467-9acd-e1a44811eec6>
- Chan, W. V., Pearson, T. A., Bennett, G. C., Cushman, W. C., Gaziano, T. A., Gorman, P. N., . . . Wells, B. L. (2017). ACC/AHA special report: Clinical practice guideline implementation strategies: A summary of systematic reviews by the NHLBI implementation science work group: A report of the american college of cardiology/American heart association task force on clinical practice guidelines. *Journal of the American College of Cardiology*, 69(8), 1076-1092. doi:10.1016/j.jacc.2016.11.004
- Clenin, G., Cordes, M., Huber, A., Schumacher, Y., Noack, P., Scales, J., & Kriemler, S. (2015). Iron deficiency in sports - definition, influence on performance and therapy consensus statement of the swiss society of sports medicine. *Swiss Medical Weekly*, 145 doi:10.4414/smw.2015.14196
- Constantini, N., Dubnov, G., Foldes, A. J., Mann, G., Magazanik, A., & Siderer, M. (2006). High prevalence of iron deficiency and anemia in female military recruits. *Military Medicine*, 171(9), 866-869. doi:10.7205/MILMED.171.9.866
- Craig, L. E., Taylor, N., Grimley, R., Cadilhac, D. A., McInnes, E., Phillips, R., ... Middleton, S. (2017). Development of a theory-informed implementation intervention to improve the triage, treatment and transfer of stroke patients in emergency departments using the

- Theoretical Domains Framework (TDF): the T3 Trial. *Implementation science: IS*, 12(1), 88. doi:10.1186/s13012-017-0616-6
- Department of Defense (DoD). (2011, November 8). Protection of human subjects and adherence to ethical standards in DoD-supported research. (DODI 3216.02). Retrieved from <http://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/321602p.pdf>
- Dudley-Brown, S. & Rushton, C.H. (2016). Legal and ethical issues in translation. In K.M. White, S. Dudley-Brown, & M.F. Terhaar (2nd ed), *Translation of evidence into nursing and health care* (313-322). New York, NY: Springer.
- Etxeberria, A., Alcorta, I., Perez, I., Emparanza, J., de Velasco, E., Iglesias, M., & Rotaecche, R. (2018). Results from the CLUES study: A cluster randomized trial for the evaluation of cardiovascular guideline implementation in primary care in Spain. *BMC Health Services Research*, 18(1), 93-93. doi:10.1186/s12913-018-2863-x
- Fischer, F., Lange, K., Klose, K., Greiner, W., & Kraemer, A. (2016). Barriers and strategies in guideline implementation-A scoping review. *Healthcare (Basel, Switzerland)*, 4(3), 36. doi:10.3390/healthcare4030036
- Flodgren, G., Parmelli, E., Doumit, G., Gattellari, M., O'Brien, M. A., Grimshaw, J., & Eccles, M. P. (2011). Local opinion leaders. Effects on professional practice and health care outcomes. *Cochrane Database Syst.*, 8, 1-66. doi: 10.1002/14651858.CD000125.pub4
- Forman-Hoffman, V., Middleton, J., McKeeman, J., Stambaugh, L., Christian, R., Gaynes, B., . . . Viswanathan, M. (2017). Quality improvement, implementation, and dissemination strategies to improve mental health care for children and adolescents: A systematic review. *Implementation Science*, 12(1), 93-93. doi:10.1186/s13012-017-0626-4
- Forsetlund, L., Bjorndal, A., Rashidian, A., Jamtvedt, G., O'Brien, M. A., Wolf, F., . . . Oxman,

- A., D. (2009). Continuing education meetings and workshops: Effects on professional practice and health care outcomes. *Cochrane Database Syst.*, 2, 1-87. doi: 10.1002/14651858.CD003030.pub2
- Gaglio, B., Shoup, J.A., & Glasgow, R. (2013). The RE-AIM framework: A systematic review of use over time. *American Journal of Public Health*, 103 (6): e38-46. doi <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3698732/pdf/AJPH.2013.301299.pdf>
- Glasgow, R. E., & Emmons, K. M. (2007). How can we increase translation of research into practice? types of evidence needed. *Annual Review of Public Health*, 28(1), 413-433. doi:10.1146/annurev.publhealth.28.021406.144145
- Glasgow, R. E., & Estabrooks, P. E. (2018). Pragmatic Applications of RE-AIM for Health Care Initiatives in Community and Clinical Settings. *Preventing Chronic Disease*, 15, 1–7. doi: 0.5888/pcd15.170271
- Goodfellow, J., Agarwal, S., Harrad, F., Shepherd, D., Morris, T., Ring, A., . . . Baker, R. (2016). Cluster randomised trial of a tailored intervention to improve the management of overweight and obesity in primary care in england. *Implementation Science*, 11(1), 77-77. doi:10.1186/s13012-016-0441-3
- Graham, B. (2014). Clinical practice guidelines: What are they and how should they be disseminated? *Hand clinic*, 30(3), 361-365. doi:10.1016/j.hcl.2014.04.007
- Hashmi, N. R., & Khan, S. A. (2016). Adherence to diabetes mellitus treatment guidelines from theory to practice: The missing link. *Journal of Ayub Medical College, Abbottabad: JAMC*, 28(4), 802-808.
- Kovacs, E., Strobl, R., Phillips, A., Stephan, A., Müller, M., Gensichen, J., & Grill, E. (2018).

- Systematic review and meta-analysis of the effectiveness of implementation strategies for non-communicable disease guidelines in primary health care. *Journal of General Internal Medicine*, 33(7), 1142-1154. doi:10.1007/s11606-018-4435-5
- Krager, D. & Krager, C. (2018). *HIPAA for healthcare professionals* (2nd ed.). Delmar Cengage Learning.
- Lin, I. B., Coffin, J., & O'Sullivan, P. B. (2016). Using theory to improve low back pain care in australian aboriginal primary care: A mixed method single cohort pilot study. *BMC Family Practice*, 17(44), 1–14. doi: 10.1186/s12875-016-0441-z
- LoBiondo-Wood, G. & Haber, J. (2014). *Nursing research: Methods and critical appraisal for evidence-based practice* (8th ed.). St. Louis, MO: Saunders Elsevier.
- Melnyk, B. M., & Fineout-Overholt, E. (2011). *Implementing evidence-based practice: Real-life success stories* (1st ed.). Indianapolis: Sigma Theta Tau International Honor Society of Nursing
- Military OneSource. (2018, January 1). *2018 Demographics Profile*. Retrieved March 22, 2020, from Military OneSource: <https://download.militaryonesource.mil/12038/MOS/Infographic/2018-demographics-active-duty-members.pdf>
- Murray-Kolb, L. E., & Beard, J. L. (2007). Iron treatment normalizes cognitive functioning in young women. *American Journal of Clinical Nutrition*, 85(3), 778-787.
- Myhre, K. E., Webber, B. J., Cropper, T. L., Tchandja, J. N., Ahrendt, D. M., Dillon, C. A., ... Federinko, S. P. (2016). Prevalence and impact of anemia on basic trainees in the U.S. air force. *Sports Medicine - Open*, 2, 23. <http://doi.org/10.1186/s40798-016-0047-y>
- Newhouse R, Dearholt S, Poe S, Pugh LC, White K. (2005). The Johns Hopkins Nursing

- Evidence-based Practice Rating Scale. Baltimore, MD, The Johns Hopkins Hospital; Johns Hopkins University School of Nursing.
- Pedersen, E. R., Rubenstein, L., Kandrack, R., Danz, M., Belsher, B., Motala, A., ... Hempel, S. (2018). Elusive search for effective provider interventions: a systematic review of provider interventions to increase adherence to evidence-based treatment for depression. *Implementation Science*, 13(1), 1–30. doi: 10.1186/s13012-018-0788-8
- Quanbeck, A., Brown, R. T., Zgierska, A. E., Jacobson, N., Robinson, J. M., Johnson, R. A., ... Alagoz, E. (2018). A randomized matched-pairs study of feasibility, acceptability, and effectiveness of systems consultation: a novel implementation strategy for adopting clinical guidelines for Opioid prescribing in primary care. *Implementation Science*, 13(1), 1–13. doi: 10.1186/s13012-018-0713-1
- Short, M.W., & Domagalski, J. E. (2013). Iron deficiency anemia: Evaluation and management. *American Family Physician*, 87(2), 98-104.
- Suman, A., Schaafsma, F. G., van de Ven, P. M., Slottje, P., Buchbinder, R., van Tulder, M. W., & Anema, J. R. (2018). Effectiveness of a multifaceted implementation strategy compared to usual care on low back pain guideline adherence among general practitioners. *BMC Health Services Research*, 18(1), 358. doi:10.1186/s12913-018-3166-y
- Terdiman, Daniel. (2014). *Booting up: The eight-week journey for the USAF's new airmen*. Retrieved from <https://www.cnet.com/news/booting-up-the-eight-week-journey-for-the-usafs-new-usaf-airmen/>
- Trietsch, J., Steenkiste, B. v., Grol, R. P., Winkens, B., Ulenkate, H., Metsemakers, J., &

- Weijden, T. T. v. d. (2017). Effect of audit and feedback with peer review on general practitioners' prescribing and test ordering performance: A cluster-randomized controlled trial. *BMC Family Practice*, 18(1), 53-53. doi:10.1186/s12875-017-0605-5
- Unverzagt, S., Oemler, M., Braun, K., & Klement, A. (2014). Strategies for guideline implementation in primary care focusing on patients with cardiovascular disease: A systematic review. *Family Practice*, 31(3), 247-266. doi:10.1093/fampra/cmt080
- Wilson, C. & Brothers, M. (2010). Iron deficiency in women and its potential impact on military effectiveness. *Nursing Clinics of North America*, 45(2), 95-108. doi:10.1016/j.cnur.2010.02.005
- White, K. M., Dudley-Brown, S., & Terhaar, M. F. (2016). *Translation of evidence into nursing and health care* (Second;2; ed.). New York, NY: Springer Publishing Company, LLC

Appendix A

Collaborative Institutional Training Initiative (CITI) Certificates

 Completion Date: 28-Aug-2017 Expiration Date: 27-Aug-2020 Record ID: [REDACTED] This is to certify that: Virginia Frazier Has completed the following CITI Program course: Responsible Conduct of Research (RCR) (Curriculum Group) Responsible Conduct of Research (RCR) (Course Learner Group) 1 - Basic Course (Stage) Under requirements set by: Office of the Under Secretary of Defense (Personnel and Readiness) CITI Collaborative Institutional Training Initiative Verify at www.citiprogram.org/verify/tw0605dc42-aab0-4701-9206-4610d20ab0ec-24350246	 Completion Date: 28-Aug-2017 Expiration Date: 27-Aug-2020 Record ID: [REDACTED] This is to certify that: Virginia Frazier Has completed the following CITI Program course: OUUSD P&R Human Research (Curriculum Group) Biomedical Investigators and Research Study Team (Course Learner Group) 1 - Biomedical Investigators (Stage) Under requirements set by: Office of the Under Secretary of Defense (Personnel and Readiness) CITI Collaborative Institutional Training Initiative Verify at www.citiprogram.org/verify/tw072aee9-7c46-4bba-8309-681f5b679ea2-24350245
 Completion Date: 29-Aug-2017 Expiration Date: 28-Aug-2020 Record ID: [REDACTED] This is to certify that: Melissa Everage Has completed the following CITI Program course: Good Clinical Practice (U.S. FDA Focus) (Curriculum Group) GCP for Clinical Trials with Investigational Drugs and Medical Devices (U.S. FDA Focus) (Course Learner Group) 1 - GCP (Stage) Under requirements set by: Office of the Under Secretary of Defense (Personnel and Readiness) CITI Collaborative Institutional Training Initiative Verify at www.citiprogram.org/verify/tw062be5b2-6190-4ff2-bcb0-2610e67d93d-24345661	 Completion Date: 29-Aug-2017 Expiration Date: 28-Aug-2020 Record ID: [REDACTED] This is to certify that: Melissa Everage Has completed the following CITI Program course: OUUSD P&R Human Research (Curriculum Group) Biomedical Investigators and Research Study Team (Course Learner Group) 1 - Basic Course (Stage) Under requirements set by: Office of the Under Secretary of Defense (Personnel and Readiness) CITI Collaborative Institutional Training Initiative Verify at www.citiprogram.org/verify/tw1d00f9b-16ba-4658-9588-582d27351372-24345660
 Completion Date: 30-Aug-2017 Expiration Date: 29-Aug-2020 Record ID: [REDACTED] This is to certify that: Nicholas Robertson Has completed the following CITI Program course: Good Clinical Practice (U.S. FDA Focus) (Curriculum Group) GCP for Clinical Trials with Investigational Drugs and Medical Devices (U.S. FDA Focus) (Course Learner Group) 1 - GCP (Stage) Under requirements set by: Office of the Under Secretary of Defense (Personnel and Readiness) CITI Collaborative Institutional Training Initiative Verify at www.citiprogram.org/verify/tw04790684-9662-42d3-bc11-7f7b959c7cd5-24297415	 Completion Date: 30-Aug-2017 Expiration Date: 29-Aug-2020 Record ID: [REDACTED] This is to certify that: Nicholas Robertson Has completed the following CITI Program course: OUUSD P&R Human Research (Curriculum Group) Biomedical Investigators and Research Study Team (Course Learner Group) 1 - Basic Course (Stage) Under requirements set by: Office of the Under Secretary of Defense (Personnel and Readiness) CITI Collaborative Institutional Training Initiative Verify at www.citiprogram.org/verify/tw10ae5b28-fa41-4cae-8c2b-003ade242462-24297414
 Completion Date: 28-Aug-2017 Expiration Date: 27-Aug-2020 Record ID: [REDACTED] This is to certify that: Matthew Simmons Has completed the following CITI Program course: OUUSD P&R Human Research (Curriculum Group) Biomedical Investigators and Research Study Team (Course Learner Group) 1 - Basic Course (Stage) Under requirements set by: Office of the Under Secretary of Defense (Personnel and Readiness) CITI Collaborative Institutional Training Initiative	

Appendix B

Uniformed Services University Form 3202N

USUHS FORM 3202N

DANIEL K. INOUE GRADUATE SCHOOL OF NURSING

EVIDENCE-BASED PRACTICE/PERFORMANCE IMPROVEMENT PROPOSAL

VPR Date Stamp

Project Number: _____ (VPR will assign)

Project Title: **Implementing an Evidenced-Based Algorithm for the Diagnosis and Evaluation of Iron Deficiency Anemia in Female Basic Military Training Recruits**

SECTION A: STUDENT POC INFORMATION	
1. Name (Last, First, MI): Robertson, Nicholas, P	Student E-mail: nicholas.robertson@usuhs.edu
2. Home Address: _____	
SECTION B: COMMITTEE CHAIR / SENIOR MENTOR INFORMATION	
3. Name (Last, First, MI): Williams, Janice	
4. Telephone: _____	Fax: _____ E-mail: janice.williams@usuhs.edu
5. USUHS Building/ Room No.: Bldg E, Rm - _____	
SECTION C: PROJECT INFORMATION	
6. Attach the Abstract for the proposal, including the following sections: Site Location of the Project, Title, Authors, Background or Problem/Issue, Clinical Question/Purpose, Project Design, Anticipated Organizational Impact/Implications for Practice and also include the Proposed Timeline. Single space the abstract and use Times New Roman font, size 12.	
7. Is this proposal related to an active research project of the Chair/Senior Mentor identified in Section B? ☐ Yes ☒ No If yes, complete below; if no, proceed to Part 8. Project Number: _____ Project Title: _____ Project Start Date: _____ Project End Date: _____	
8. Anticipated period of performance: Project Start Date: 10/15/2019 Project End Date: 3/15/2020	
9. Performance Site(s): Joint-Base San Antonio-Lackland, Reid Medical Clinic	
10. Does this project involve any classified information? (Contact the USUHS Security Office for guidance) ☐ Yes ☒ No	
11. Do you have a funding source for this project? ☐ Yes ☒ No ☐ NA If yes, specify the funding agency and the amount provided: _____	
SECTION D: SIGNATURES	
The following signatures attest to the validity of the above information:	
ROBERTSON.NICHOLAS.P. _____ Student (Project Point of Contact for the project)	WILLIAMS.JANICE.K. _____ Chair/Senior Mentor (Signature and Date)
JOHNSON.HEATHER.L. _____ Chair/Program Director (Signature and Date)	_____ Chair/Program Director (Signature and Date)
_____ DNP Project Director or PhD Director (Signature and Date)	SEIBERT.DIANE.C. _____ Associate Dean for Academic Affairs, GSN (Signature and Date)
WASSERMAN.JOAN.E.1 _____ Associate Dean for Research, GSN (Signature and Date)	ROMANO.CAROL.A. _____ Dean, DKI Graduate School of Nursing (Signature and Date)
In light of the above signatures, the project is approved.	
USUHS Vice President for Research _____	Date _____

Appendix C

Military Treatment Facility Letter of Determination



DEPARTMENT OF THE AIR FORCE
59TH MEDICAL WING (AETC)
JOINT BASE SAN ANTONIO - LACKLAND
TEXAS

Nov 14, 2019

FINAL DETERMINATION - NOT RESEARCH

Determination Date: 11/13/2019

Project Lead: Nicholas Robertson/USAF - 59th Medical Wing (59 MDW)

Reference Number: FWH20200012N

Project Title: Implementing an Evidenced-Based Algorithm for the Diagnosis and Evaluation of Iron Deficiency Anemia in Female Basic Military Training Recruits

You may begin your project, as you would any other clinical or operational activity, with the approval and sponsorship of your leadership.

Your activity was determined on 13 Nov 19 to be considered **not research** as defined by DoD regulation 32 CFR 219 and FDA regulation 21 CFR 56. Continued IRB oversight for this activity is not required. The proposed activity is not funded by DHHS/DoD as research; is not a systematic investigation to test a hypothesis and permit conclusions to be drawn; is not designed to develop or contribute to generalizable knowledge; and the purpose is not to investigate the safety or effectiveness of a drug, medical device or biologic.

Since the IRB does not have regulatory oversight for your study, it is the investigator's responsibility to validate the study's scientific merit and research design and to ensure the conduct of the study is upheld by the highest ethical standards, as required by the Wing. Should you require assistance in reviewing the scientific merit and research design of your study, please contact the Protocol Office. Protection of subjects' rights safety and welfare and responsibility for protecting PHI/PII and research data now fall on the investigator and their commander.

In accord with DoDI 6000.08 any intramural funding of this study as research or as a clinical investigation may continue to be received or sought regardless of this IRB determination.

Your study has received a one-time research determination. If the goals and/or activities of the project change during the course of the project, or if new activities are proposed that would constitute human subjects research, re-contact the Protocol Office, so that a regulatory expert may determine whether or not the revised plan involves human subject research activities.

[Redacted Signature]
Earl Grant, Jr., PhD
Designated Exempt
Reviewer

Appendix D

Other Project Documents

Table D1

Training Cost

A	B	C
BMT Trainee Cost	Calendar (24 Hr Day)	Training/Academic (8 Hr Day)
Course	\$ 25,423.65	\$ 25,423.65
Month	\$ 12,274.65	\$ 12,274.65
Week	\$ 2,824.85	\$ 2,824.85
Day	\$ 403.55	\$ 564.97
Hour	\$ 16.81	\$ 50.44
Minute	\$ 0.28	\$ 0.84
BMT Flight (48) Cost	Calendar (24 Hr Day)	Training/Academic (8 Hr Day)
Course	\$ 1,220,335.20	\$ 1,220,335.20
Month	\$ 589,183.00	\$ 589,183.00
Week	\$ 135,592.80	\$ 135,592.80
Day	\$ 19,370.40	\$ 27,118.56
Hour	\$ 807.10	\$ 3,389.82
Minute	\$ 13.45	\$ 56.50
BMT Accession Cost	Calendar (24 Hr Day)	Training/Academic (8 Hr Day)
Annual Accessions	36,131	36,131
Annual Cost	\$ 918,581,898.15	\$ 918,581,898.15
Day	\$ 14,580,665.05	\$ 20,412,931.07
Hour	\$ 607,527.71	\$ 2,551,616.38
Minute	\$ 10,125.46	\$ 42,526.94

Other Project Documents

Pre Implementation Data Collection

[illegible]

65460479	08/07/2019	x	x	x	x	x	x	x	x	x			x
65520679	08/07/2019	x	x	x		x		x	x	x			x
65527136	08/07/2019	x	x	x	x	x	x	x	x	x		x	
65541994	08/08/2019	x	x	x	x	x		x	x	x			x
65543592	08/08/2019	x	x	x	x			x	x	x	x		x
65545186	08/08/2019	x	x	x	x	x		x	x	x	x		x
65549189	08/09/2019	x	x	x		x		x	x	x	x		x
65394325	08/12/2019	x	x	x		x		x	x	x	x		x
65397791	08/12/2019	x	x	x	x	x		x	x	x	x		x
65401592	08/12/2019	x	x	x	x	x		x	x	x	x		x
65580434	08/12/2019	x	x	x	x	x		x	x	x	x		x
65580416	08/12/2019	x	x	x	x	x		x	x	x	x		x
65333307	08/12/2019	x	x	x		x		x	x	x	x		x
65332365	08/12/2019	x	x	x	x	x		x	x	x	x		x
65585087	08/13/2019	x	x	x	x	x		x	x	x	x		x
65585058	08/13/2019	x	x	x		x		x	x	x	x		x
65588860	08/13/2019	x	x	x	x	x		x	x	x	x		x
65595632	08/14/2019	x	x	x	x	x		x	x	x	x		x
65595690	08/14/2019	x	x	x	x	x		x	x	x	x		x
65608234	08/15/2019	x	x	x		x		x	x	x	x		x

[illegible][illegible]

65888708	09/13/2019	x	x	x	x	x		x	x	x	x			x
65889299	09/14/2019	x	x	x	x			x	x	x	x			x
65892871	09/16/2019	x	x	x	x	x		x	x	x	x			x
65906284	09/17/2019	x	x	x	x	x		x	x	x	x			x
65906295	09/17/2019	x	x	x	x	x		x	x	x	x			x

Table D3

Post Implementation Data Collection

Practice Site:				Date of Audit:		Auditor:												Guard/R	Active	Total \$
Record Number	Date of Encounter	Improved Compliance	Non-Compliant (please state at what point of the algorithm that they deviated)	CBC (\$28)	Retic (\$42)	Occult Stool (\$74)	Electrophoresis (\$135)	Iron (\$17.5)	TIBC (\$17.5)	Ferritin (\$33)	Number of Return Visits	Number or type of referrals	Extra procedures or studies completed	Waiver Approved	Waiver Denied	erve	Duty			
(No Record)66839758	31-Dec-19																			
66816339	27-Dec-19		X -Provider immediately deviated by ordering all labs for initial review. All followup items, to include GI studies were not	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00		1 - Gastroenterology (not in concurrence with	EGD and colonoscopy	Inprogress			x	\$347.00		
66762182	18-Dec-19		X -Provider immediately deviated by ordering all labs for initial review. Not treated correctly with only one daily dose of ferrous	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00		1	0	Inprogress		x		\$347.00		
66759574	18-Dec-19		X -Provider immediately deviated by ordering all labs for initial review. Not treated correctly with only one daily dose of ferrous	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00		1	0	In progress			x	\$347.00		
66759861	18-Dec-19		X -Provider immediately deviated by ordering all labs for initial review. G6PD *other specified abnormal findings of blood	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00		3	1 nutrition	In progress			x	\$347.00		
66741220	18-Dec-19		unable to find;																	
66759687	18-Dec-19	X	X -Provider immediately deviated by ordering all labs for initial review. Sickle cell trait.	\$28.00			\$135.00	\$17.50	\$17.50	\$33.00		3	0	In progress			x	\$231.00		
66759934	18-Dec-19		X -Provider immediately deviated by ordering all labs for initial review. G6PD *Other specified abnormal findings of blood	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00		4	3 (teon)	0	0			x	\$347.00	
66760130	18-Dec-19		X -Provider immediately deviated by ordering all labs for initial review. G6PD *Other specified abnormal findings of blood	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00		6	1 pulm	2			x	\$347.00		
66756574	18-Dec-19		unable to find																	
66765531	18-Dec-19		X -Provider immediately deviated by ordering all labs for initial review. G6PD *other specified abnormal findings of blood	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00		3	0	0	x			x	\$347.00	
66759770	18-Dec-19	X	X -Provider immediately deviated by ordering all labs for initial review. Sickle cell trait 06 DEC	\$28.00			\$135.00	\$17.50	\$17.50	\$33.00		4	0					x	\$231.00	
66773074	19-Dec-19		unable to find; will look again																	
66577338	20-Dec-19		X -Provider immediately deviated by ordering all labs for initial review. G6PD (other specified abnormal findings of blood	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00		6	0	x				x	\$347.00	
66786171	23-Dec-19		follow up																	
66797907 (guard) (other specified abnormal	23-Dec-19		X -Provider immediately deviated by ordering all labs for initial review. G6PD.	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00							x	\$347.00		
66798017 (reserve)	23-Dec-19		X -Provider immediately deviated by ordering all labs for initial review. Sickle cell trait.	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00		4	0	x				x	\$347.00	
66701089	13-Dec-19		f/u 66693969																	
66704400 (workup began prior to 22 Oct)	13-Dec-19		X -Provider immediately deviated by ordering all labs for initial review.	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00				x				x	\$347.00	
66519456	13-Dec-19		X -Provider immediately deviated by ordering all labs for initial review. G6PD, hgb 9.1	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00		3	0					x	\$347.00	
66692842	11-Dec-19		X -Provider immediately deviated by ordering all labs for initial review.	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00		3	0	x				x	\$347.00	

66693969	11-Dec-19		X - Provider immediately deviated by ordering all labs for initial review. G6PD	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00	6	Hematology	b12, folate, ESR, CRP, LDH, haptoglobin,	x		x			\$347.00
6693824 (guard)	11-Dec-19	X	X - Provider immediately deviated by ordering all labs for initial review. G6PD; Hgb 8. "other specified abnormal findings of blood"	\$28.00			\$135.00	\$17.50	\$17.50	\$33.00	3	0		x			x		\$231.00
67236466	02/11/2020		unable to locate																
67182275	02/11/2020	X	X - Provider immediately deviated by ordering all labs for initial review. G6PD; Hgb 8. "other specified abnormal findings of blood"	\$28.00				\$17.50	\$17.50	\$33.00	3	0		Pt declined waiver app				x	\$96.00
67236400	02/11/2020		unable to locate																
67248937	02/11/2020		unable to locate																
67214530	02/11/2020		unable to locate																
67245272	02/11/2020		Reserve flu																
67078153	02/10/2020		X - Provider immediately deviated by ordering all labs for initial review. G6PD; Hgb 8. "other specified abnormal findings of blood"	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00	3	0						x	\$347.00
67205025	02/07/2020		unable to locate																
67212414	02/07/2020		Unable to locate																
67212168	02/07/2020		Unable to locate																
67199441	02/07/2020		Unable to locate																
67106571	02/06/2020		x-Flight physical h&h low; full workup	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00	3	0		x			x		\$347.00
67162986	02/06/2020		X - Provider immediately deviated by ordering all labs for initial review. G6PD; Hgb 8. "other specified abnormal findings of blood"	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00	4	1	GI	EGD/Colonoscopy	x			x	\$347.00
67191667	02/06/2020		x-Flight physical h&h low; full workup with 1/3 occult stool +	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00	4	1	GI	Pending 2/26 EGD and colonoscopy		Pending 14 Feb		x	\$347.00
67154129	02/06/2020		Unable to locate																
67136308	02/05/2020		Unable to locate																
67179204 (reserve)	02/05/2020		X - Provider immediately deviated by ordering all labs for initial review. G6PD. "other specified abnormal findings of blood"	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00					Pending 2/26		x		\$347.00
67138682	02/05/2020		unable to locate																
67180472	02/05/2020		X - Provider immediately deviated by ordering all labs for initial review. G6PD. "other specified abnormal findings of blood"	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00	1	0			0			x	\$347.00

67179252	02/05/2020	X	x-low hemoglobin then CBC plus iron panel	\$28.00					\$17.50	\$17.50	\$33.00	1	0	Pending 2/26		x	\$96.00
67187591	02/05/2020		unable to locate														
67178474 (reserve)	02/05/2020		Low hemoglobin G6PD screen														
67179258 (guard)	02/05/2020	G6PD Screen	x-low hemoglobin then CBC plus iron panel	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00	3	0	Pending		x	\$347.00	
67140611	02/04/2020		"abnormal results of function studies of other organs and systems" 19 DEC...full workup by J. Brown f/u from 08 Dec "other abnormal findings of blood chemistry" heme onc consult from hereditary spherocytosis								2						
67166570	02/04/2020												x			x	
67049289	02/04/2020			f/u from 23 DEC, SCT													
67138625	02/03/2020		unable to locate														
67094002	02/03/2020		unable to locate														
67132286	02/03/2020		unable to locate														
No Record)66835	31-Dec-19																
66816339	27-Dec-19		X -Provider immediately deviated by	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00	2	1 - Gastroenterol	EGD and colo	Inprogress		x	\$347.00
66762182	18-Dec-19		X -Provider immediately deviated by	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00	1	0	0	Inprogress		x	\$347.00
66759574	18-Dec-19		X -Provider immediately deviated by	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00	1	0	0	In progress	x		\$347.00
(No Record)66854	3-Jan-20																
	17-Dec-19	Coulter															
(No Record)66922473																	
(No Record)66911735																	
66874218	9-Jan-20	X	X - Provider ordered entire iron pane	\$28.00				\$17.50	\$17.50	\$33.00	2	0	0			x	\$96.00

(No Record)66937803																	
(No Record)66937805																	
66925817 (reference)	10-Jan-20		X - Provider immediately deviated by	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00	3	0	0			x	\$347.00
66928060 (Reference)	10-Jan-20		X - Provider immediately deviated by	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00	3	0	0			x	\$347.00
66927938 (reference)	10-Jan-20		X - Provider immediately deviated by	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00	3	0	0		x		\$347.00
(No Record)66835	31-Dec-19																
66816339	27-Dec-19		X - Provider immediately deviated by	\$28.00	\$42.00	\$74.00	\$135.00	\$17.50	\$17.50	\$33.00	2	1	Gastroenterol EGD and colon	In progress		x	\$347.00

43

[illegible]

44

[illegible]

45

67363463	25 Feb 20	X	X - Provider ordered full panel	\$28.00					\$17.50	\$17.50	\$33.00	1	0	Unknown		X	\$96.00	
Total		21		\$1,848.00	\$1,890.00	\$3,330.00	\$6,480.00	\$1,120.00	\$1,120.00	\$2,178.00						18	48	\$17,966.00
Total # Encounters				127	127	127	127	127	127	127								
Total # labs				66	45	45	48	65	65	66								
Total # ID'd Encounters				66	66	66	66	66	66	66								
Total # AD				48	27	27	30	46	46	48								
Cost total for AD				\$1,344.00	\$1,134.00	\$1,998.00	\$4,050.00	\$805.00	\$805.00	\$1,584.00								\$11,720.00
Cost savings from retrospective review for AD				\$0.00	\$882.00	\$1,554.00	\$2,430.00	\$30.00	\$30.00	\$0.00								\$4,926.00
Total # Gird/Res				18	18	18	18	18	18	18								
Cost total for Gird/Res				\$504.00	\$756.00	\$1,332.00	\$2,430.00	\$315.00	\$315.00	\$594.00								\$6,246.00
Cost savings from retrospective review for G/R				\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00								\$0.00
Percent Change in utilization for AD				0.00%	↓ 43.75%	↓ 43.75%	↓ 37.5%	↓ 4%	↓ 4%	0.00%								
Potential Savings for G/R based on results				\$0.00	\$330.00	\$582.00	\$911.00	\$13.00	\$13.00	\$0.00								\$1,849.00
Percent Change in utilization for ord/res				0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%								

Final Thoughts	Estimate annual savings = \$25,000 at current practice for only AD using only identified records	Estimated annual savings for g/r if adopted using only identified records= \$7,400	Estimated savings if accounting for percentage of unlocateabl e records for AD (accomplish ed by taking unlocatable records and applying the percentage of active records that are active duty to total number. This equals	Estimated savings if accounting for percentage of unlocateable records for G/R (accomplish ed by taking unlocatable records and applying the percentage of active records that are G/R to total number. This equals ~17 G/R of the 61	Total estimated savings based on current results if applied to both AD and G/R annually = \$62,292.00	Total estimated savings based on current results if applied to only AD annually = \$47,910	Total cost savings between retrospective chart review and present if all providers followed AAFP algorithm correctly for AD = \$105,248			
		Total est AD using all labs for 90 day	\$2,576.00	\$3,864.00	\$6,808.00	\$12,420.00	\$1,610.00	\$1,610.00	\$3,036.00	\$31,924.00
		Total est AD using AAFP for 90 days	\$2,576.00	\$0.00	\$0.00	\$0.00	\$0.00	\$0.00	\$3,036.00	\$5,612.00
		Difference/Savings	\$0.00	\$3,864.00	\$6,808.00	\$12,420.00	\$1,610.00	\$1,610.00	\$0.00	\$26,312.00
		Total savings annually if following AAFP Algorithm								\$105,248.00
		Estimated overall provider improved compliance rate (21 of 48 encounters showed improved	43.75%							

Appendix E

Audit/Feedback Form

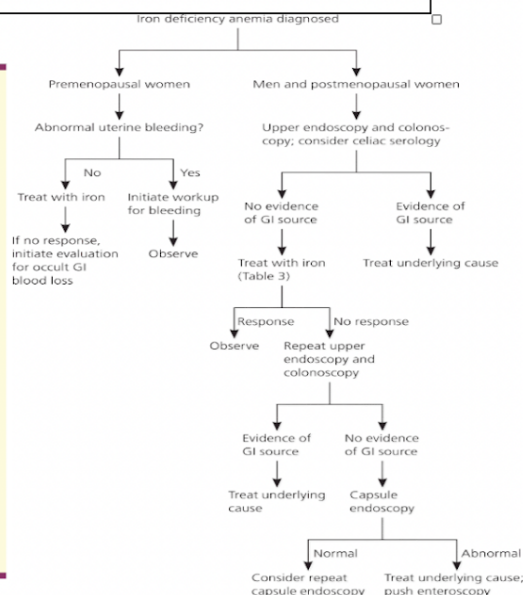
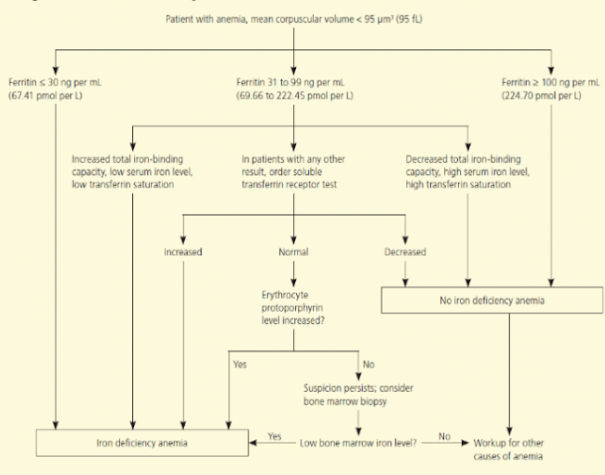
Iron Deficiency Anemia Diagnosis Project Audit/Feedback Form



Encounter Date	
Clinic	
Reviewed Provider and Credentials	
Reviewer	
Encounter #	
Patient Age	
ICD 10 Code (original appointment)	

AAFP Guideline Diagnostics Ordering

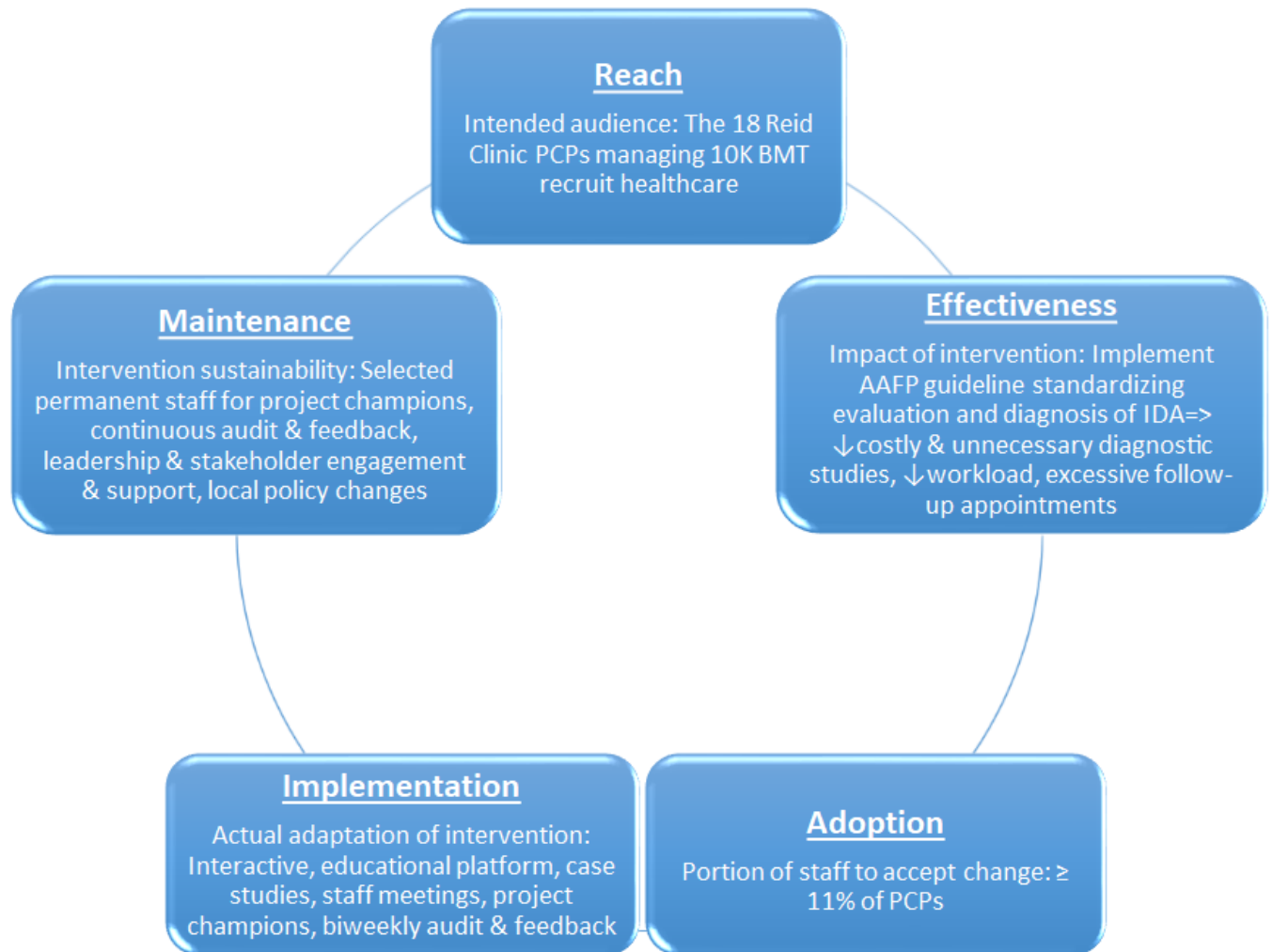
Diagnosis of Iron Deficiency Anemia



Diagnostics		
Item	Yes	No (With explanation)
Adhered to AAFP Guideline? If "No", please explain at what point they deviated and any rationale given in the medical record for deviation.		

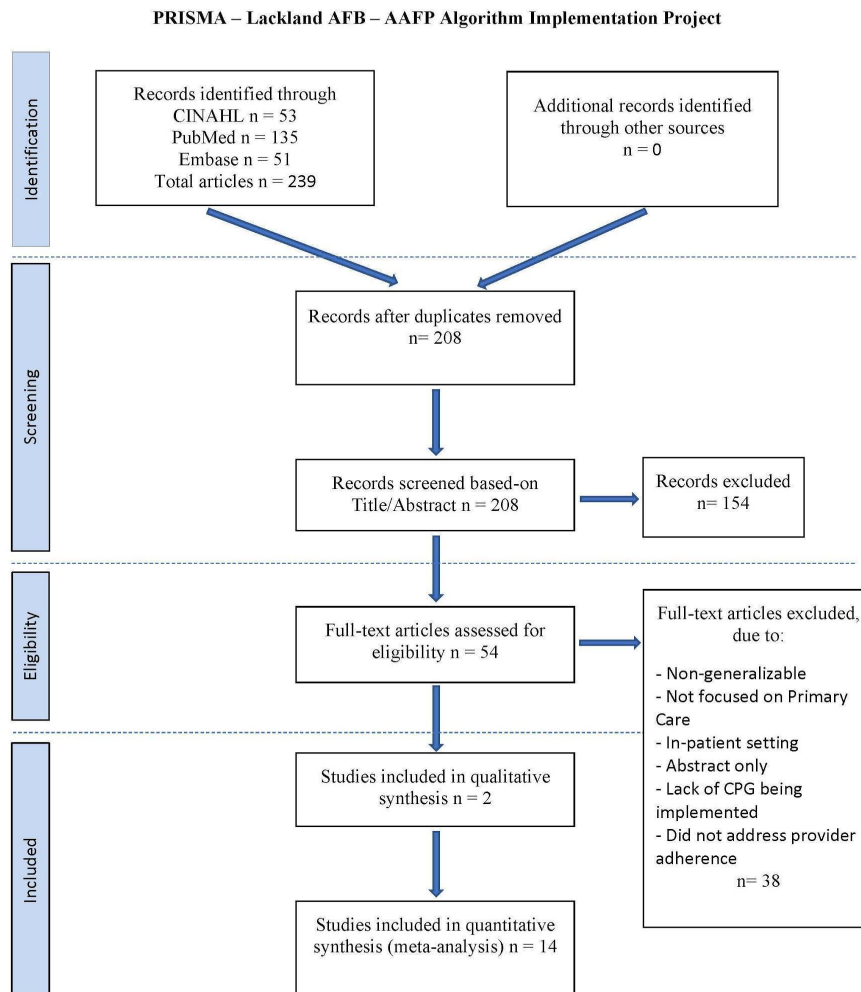
Assessment/Evaluation		
Item	Yes (With explanation)	No
Was further evaluation for potential causes for IDA performed? If "yes", explain if rationale was given for why or if it can be inferred from chart review.		
Was a diagnosis achieved? (IDA, Thalassemia, etc)		
Please state recommendations to provider for improvement if needed to facilitate feedback in these blocks.		

[illegible]

Appendix F**RE-AIM Framework**

Appendix G

PRISMA 2009 Flow Diagram



Note. This PRISMA flow-diagram outlines our literature review, the original number of articles discovered with our search parameters, and the final number of articles fully appraised after being screened against our inclusion and exclusion criteria.

Project Timeline

[illegible]

Appendix I

Evidence Appraisal

Article Title	Author(s)	Bibliographic Citation	Year	Journal	Purpose	Keywords	Population & Sample Size	Inclusion/Exclusion Criteria	Study Design	Level of Evidence	Quality of study	Independent Variables	Dependent Variables	Statistical Tests	Strategies/Tools Studied	Study Results	Limitations	Article Appraisal Tool and
Using theory to improve low back pain care in Australian Aboriginal primary care: a mixed method single cohort pilot study	Ivan Lin; Juli Coffin; Peter O'Sullivan	Lin, I. B., Coffin, J., & O'Sullivan, P. B. (2016). Using theory to improve low back pain care in Australian Aboriginal primary care: a mixed method single cohort pilot study. BMC Family Practice, 17(44), 1–14. doi: 10.1186/s12875-016-0441-z	2016	BMC Family Practice	Improve care, reduce inappropriate radiographic imaging, increase psychosocial oriented patient assessment, and increase the provision of LBP self-management information to patients using a four-step implementation approach.	Research translation, Musculoskeletal pain, Quality improvement, Guidelines, Health care, Evidence based practice, Theoretical domains framework	70 fulltime and parttime staff including GPs, nurses, and Aboriginal Health Workers, physiotherapist, social workers, psychologists, midwives, mental health workers, and staff working in health promotion programs.	Not specifically mentioned. Patients appears to be required to have low back pain to be included and providers must care for patients with low back pain to be included.	Mixed Method Cohort Study	Level - 4	B	Four-Step Implementation Intervention Strategy	Imaging inconsistent with guidelines, Imaging consistent with guidelines, Psychosocial Assessment completed or not completed, and LBP informational handout given or not given to patients.	SPSS Version 21 used, proportional mathematics, Basic confidence intervals and p-values obtained.	4-Step Systematic Intervention Framework - 1. Identify Target Behaviors 2. Understand Target Behaviors 3. Develop interventions to change behavior (use Theoretical Domains Framework as intervention) 4. Measure and understand change	88.9% decrease in inappropriate radiology orders after intervention giving an inference that there is an 88.9% increase in provider compliance (if each provider contributed equally to the radiologic orders).	Small sample size of practitioners within one healthcare system. Generalizability is unknown. Possible bias by having	A i The Johns Hopkins Nursing Evidencebased Practice Rating Scale
An Innovative Peer Assessment Approach to Enhance Guideline Adherence in Physical Therapy: Single- Masked, Cluster-Randomized Controlled Trial	Marjo Mass; Philip Van Der Wees; Carla Braam; Jan Koetsenruijter; Yvonne Heerkens; Cees Van Der Vleuten; Maria Nijhuis	Maas, M. J. M., Wees, P. J. V. D., Braam, C., Koetsenruijter, J., Heerkens, Y. F., C. P. M. Van Der Vleuten, & M. W. G. Nijhuis-Van Der Sanden. (2014). An Innovative Peer Assessment Approach to Enhance Guideline Adherence in Physical Therapy: Single-Masked, Cluster-Randomized Controlled Trial. Physical Therapy, 95(4), 600–612. doi: 10.2522/ptj.20130469	2015	American Physical Therapy Association	Effectiveness of Peer Assessment vs Case Discussion as strategies to increase adherences to CPGs for physical therapists.	Communication Guideline Adherence*/organization & administration Humans Interprofessional Relations Knowledge of Results (Psychology) Peer Review, Health Care/methods Physical Therapy Specialty/standards* Practice Guidelines as Topic* Quality Improvement/organization & administration	149 physical therapists from local community practices.	Physical therapists who work in small practices that responded to the invitation letter. Nothing else stated in the study.	Cluster RCT	Level - 2	A	Independent /Covariates Interventions (Peer Assessment vs Case Discussion) and pretest scores.	Dependent - Clinical vignette and post tests.	IBM SPSS Version 20 was utilized for statistical analysis. Chi-square tests and unpaired t tests used. Cronbach Alpha was used for internal consistency of clinical vignettes. Multilevel linear regression used for clustering within communities of practice. ICC calculation for each outcome measure to test clustering of the communities of practice levels.	Peer Assessment - Utilized peers to sit in three person groups and rate performance on each other as they addressed the clinical problem that the CPG is built for. Case Discussion - Talk in large group about case that contains a problem that the CPG is for, similar to a grandrounds	The Peer Assessment intervention was superior to simple case discussion in enhancing provider adherence to CPG. Not by much, by a 5% change. Still clinically significant with a P-value of 0.03		The Johns Hopkins Nursing Evidencebased Practice Rating Scale

Elusive search for effective provider interventions : a systematic review of provider interventions to increase adherence to evidence-based treatment for depression	Eric R. Pedersen, Lisa Rubenstein, Ryan Kandrack , Marjorie Danz, Bradley Belsher, Aneesa Motala , Marika Booth, Jody Larkin, and Susanne Hempel	Pedersen, E. R., Rubenstein, L., Kandrack, R., Danz, M., Belsher, B., Motala, A., ... Hempel, S. (2018). Elusive search for effective provider interventions: a systematic review of provider interventions to increase adherence to evidence-based treatment for depression. Implementation Science, 13(99), 1–30. doi: 10.1186/s13012-018-0788-8	2018	Implementation Science	Assess the effectiveness of healthcare provider interventions that aim to increase adherences to CPGs for depression.	Depression, Provider intervention, Guidelines, Evidence-based, Major depressive disorder, Primary care, Specialty care	2,149 Providers and 239,477 patients from various mental health outpatients settings across the globe.	Healthcare providers from an outpatient setting. Interventions aimed to increase adherences to depression guidelines by using some type of strategy. Interventions aimed at improving treatment were also included. Excluded studies that looking only at improving screening, assessment of patients, or referral behavior.	Systematic Review of RCTs.	Level - 1	A	PROSPER O - Systematic Review Protocol	Appx 80-100 outcomes of interventions reviewed, too many to list individually.	Hartung-Knapp-Sidik-Jonkman Random Effects Meta-Analysis for odds ratios, standardized mean differences, incidence rate ratios, basic confidence intervals and p-values, 12 Statistics used.	Grades of Recommendation, Assessment, Development, and Evaluation (GRADE) Approach for quality of evidence review for systematic review. Too many tools utilized to specifically list here. Generally focused on provider education, distribution of guidelines, training sessions, tailored training, uni vs multidimensional education, etc.	Provider interventions aimed at guideline distribution or education are unlikely to be effective without additional components. No specific multidimensional platform showed consistently increased provider adherence to guidelines. More research is needed into better interventional strategies to enhance provider compliance on depression CPGs.	Restricted to RCTs as pre/post studies are difficult to methodologically integrate with RCTs. (Cochrane Effective Practice and Organization of Care Group recommended combining controlled pre/post studies with RCTs for efficacious organizational interventions). They excluded a large volume of studies that did not report specifically on provider behavior. They did not included studies that looked at recognition, screening, or diagnosis which are all part of the CPG that could have further shed light on provider adherence secondarily.	The Johns Hopkins Nursing Evidence Based Practice Rating Scale
--	--	--	------	------------------------	---	--	--	--	----------------------------	-----------	---	--	--	--	--	--	---	--

Article Title	Author(s)	Bibliographic Citation	Year	Journal	Purpose	Keywords	Population & Sample Size	Inclusion/Exclusion Criteria	Study Design	Level of Evidence	Quality of study	Independent Variables	Dependent Variables	Statistical Tests	Strategies/Tools Studied	Study Results	Limitations	Article Appraisal Tool and
A randomized matched-pairs study of feasibility, acceptability, and effectiveness of systems consultation: a novel implementation strategy for adopting clinical guidelines for Opioid prescribing in primary care	Andrew Quanbeck, Randall T. Brown, Aleksandra E. Zgierska, Nora Jacobson, James M. Robinson, Roberta A. Johnson, Brienna M. Deyo, Lynn Madden, Wen-Jan Tuan and Esra Alagoz	Quanbeck, A., Brown, R. T., Zgierska, A. E., Jacobson, N., Robinson, J. M., Johnson, R. A., ... Alagoz, E. (2018). A randomized matched-pairs study of feasibility, acceptability, and effectiveness of systems consultation: a novel implementation strategy for adopting clinical guidelines for Opioid prescribing in primary care. Implementation Science, 13(21), 1–13. doi: 10.1186/s13012-018-0713-1	2018	Implementation Science	Determine the effectiveness of an innovative implementation strategy called "systems consultation" to improve provider adherence to CPGs for opioid prescribing in primary care settings.	Opioid prescribing, Evidencebased practice, Organizational coaching, Clinical practice guidelines, Organizational implementation strategies, Primary care	8 local community primary care clinics on the UWHealth System (4 as a control and 4 as the intervention groups).	Excluded clinics with resident training, any clinics in which the consultants were actively working, EHRs required.	nonblinded RCT	Level - 2	B	System's Consultation Strategy	Provider Adherence, opioid prescriptions, urine drug testings, treatment agreements, etc. Basically, all items found within the CPG.	None stated; however, statistical data provided with basic confidence intervals and p values.	Systems Consultation Implementation Strategy utilizing the RE-AIM Framework.	Discovered a checklist-based and blended implementation strategy based on principles of system engineering is successful for implementing guidelines into practice. Statistically significant improvements were noted in multiple key criteria from the CPG. Four categories saw the following p-value changes: 0.024, 0.011, 0.012, and 0.019 indicating effective change to provider adherence to many key points from the CPG.	Large focus on opioid prescribing/opioid epidemic in the United States during study, possibly confounding efficacy of study results. Limited power study	A i The Johns Hopkins Nursing Evidencebased Practice Rating Scale

Results from the CLUES study: a cluster randomized trial for the evaluation of cardiovascular guideline implementation in primary care in Spain	Etceberria, Alcorta, Perez, Emparanza, Velasco, Iglesias, Rotaache	Etceberria, A., Alcorta, I., Perez, J., de Velasco, E., Iglesias, M., & Rotaache, R. (2018). Results from the CLUES study: A cluster randomized trial for the evaluation of cardiovascular guideline implementation in primary care in Spain. BMC Health Services Research, 18(1), 93-93. doi:10.1186/s12913-018-2863-x	2018	BMC Health Services Research	Evaluate the effectiveness of a multifaceted tailored intervention in the implementation of three cardiovascular risk-related CPGs (HTN, DM2, and dyslipidemia) in primary care at a Basque Health Service in Spain as compared with usual implementation.	Diabetes, guidelines, health plan implementation, hyperlipidemias, hypertension, primary health care, cardiovascular risk factors	43 primary care units, 448 physicians total ; 21 PCU (235 Fam Phys) in intervention gp and 22 PCU (213 FPs) control gp	-Pts need to meet one: Diagnosis of DM2 documented in the medical record; Diagnosis of HTN documented in medical record; - Eligible for coronary risk assessment, women 45-75 and men 40-74 with no ischemic heart dz; - statin treatment started at baseline and post intervention periods	Cluster randomized trial at 2 urban primary care clinics	Level II	A	Multifaceted intervention with presentation , websites, workshops	Primary: % DM2 pts HgbA1C performed annually; % HTN pts lab tests, albuminuria creat ratio annually; % dyslipidemia at least one CR assessment performed; Secondary: % pts with HbA1C <7%, BP<140/80, annual lab tests, annual CR assessment, foot exams, metformin prescribed..	independent t-Student test implemented in IBM SPSS version 19 and the correction by the design effect (DE),	Control: guidelines introduced usual way through email, published on web, presented in clinical meetings. Intervention: In addition to the above also had multifaceted intervention with 1) presentation meetings led by physicians 2) Access to specifically designed website with simple access to recommendations and patient education material, drug info for professionals; 3) workshops for family physicians and nurses x 8 events	Primary outcomes: Significant differences between groups were observed in primary outcomes in the dyslipidemia CPG: increased CR assessment for both women and men. No significant differences were observed in diabetes and hypertension related outcomes. The multifaceted implementation increased the CR assessment and improved prescription, but ineffective to improve diabetes and hypertension related outcomes. Secondary endpoints, annual CR assessment was significantly higher in both diabetic and hypertensive patients in the intervention group. Rates of CR assessment before starting new statin treatments also increased, resulting in a lower rate of statin prescribing in low risk women. Diuretic prescribing was higher in the intervention group. Clinical outcomes (HbA1c and blood pressure control) did not differ between groups, so no effect on clinical outcomes. May need more than educational intervention	1 year time frame may not be long enough; all physicians were included even if didn't include all of the training	The Johns Hopkins Nursing Evidence Based Practice Rating Scale
---	--	---	------	------------------------------	--	---	--	---	--	----------	---	---	--	---	--	--	---	--

Article Title	Author(s)	Bibliographic Citation	Year	Journal	Purpose	Keywords	Population & Sample Size	Inclusion/Exclusion Criteria	Study Design	Level of Evidence	Quality of study	Independent Variables	Dependent Variables	Statistical Tests	Strategies/Tools Studied	Study Results	Limitations	Article Appraisal Tool and
Barriers and strategies in guideline implementation A scoping review	Fischer, Lange, Klose, Greiner, and Kraemer	Fischer, F., Lange, K., Klose, K., Greiner, W., & Kraemer, A. (2016). Barriers and strategies in guideline implementation- A scoping review. Healthcare (Basel, Switzerland), 4(3), 36. doi:10.3390/healthcare4030036	2016	Healthcare	Describe and categorize the most important barriers to guideline implementation identified by a scoping review and provide an overview of different kinds of strategies that are directly related to the underlying barriers so that information is provided to promote the effective implementation and incorporation of a guideline into practice	guideline implementation; scoping review; barrier; strategy	of 1659 articles, 69 articles included in review	guideline, implementation, English and German language, barriers or strategies, compliance, acceptance, conformity, approval or adherence; Exclusion based on exclusively disease specific information on barriers or strategies that don't allow for generalizations, no direct reference to barriers or strategies for guideline implementation, no clinical guidelines, no comparability as with developing countries, and study protocol	Scoping Review based on Systematic Review and MetaAnalyses	Level I	A	see tools used	barriers and implementation strategies	n/a	Standard dissemination (e.g., receiving guideline via e-Mail) Dissemination of training material Continuing education Active learning from experts: opinion leaders Educational meetings Individualized feedback and group performance audit Quality circle Educational meetings Educational outreach visits Marketing outreach visits Identifying opinion leaders Financial opportunities/penalties Standing orders	central elements of successful strategies for guideline implementation: dissemination, education and training, social interaction, decision support systems and standing orders. A structured implementation can improve adherence to guidelines. Therefore, the barriers to guideline implementation and adherence need to be analysed in advance so that strategies that are tailored to the specific setting and target groups can be developed. PERSONAL FACTOR BARRIERS: Knowledge, lack of awareness and familiarity of the guideline and recs. Attitudes, lack of agreement, self efficacy skills, outcome expectancy and motivation. Implementation : focus on dissemination and educational strategies such as active learning from experts and continuing education address knowledge deficit, audit and feedback address the attitude. Education- Need to have meetings, outreach visits, audit and feedback , workshops, small gp postgrad trng . Workflow- decision support systems and reminders, standing orders.	Systematic review conducted via PubMed only with narrow search algorithm	A i The Johns Hopkins Nursing Evidence Based Practice Rating Scale

ALGORITHM IMPLEMENTATION

56

Cluster randomised trial of a tailored intervention to improve the management of overweight and obesity in primary care in england	Goodfellow, Agarwal, Harrad, Shepherd, Morris, Ring, Walker...	Goodfellow, J., Agarwal, S., Harrad, F., Shepherd, D., Morris, T., Ring, A., . . . Baker, R. (2016). Cluster randomised trial of a tailored intervention to improve the management of overweight and obesity in primary care in england. Implementation Science, 11(1), 77-77. doi:10.1186/s13012-016-0441-3	2016	Implementation Science	in obese or overweight patients in primary care, does a tailored implementation intervention, in comparison with no intervention, increase the proportion of patients who are offered weight management as described in the NICE guidelines	barrier;guideline implementation;scoping review;strategy	16 general practices in control group, 12 in intervention group	All general practices in East Midlands of England invited; Exclusion were participation in another study of obesity and assessing similar outcomes during the previous year and if the practice had changed or were planning to change their computer system over the trial period	Cluster d Random ized Controll ed Trial	Level II	A	Gp Training in practice teams in multiple areas according to NICE guidelines	Primary: % of obese/overweight patients to whom the provider offered a wt loss intervention; Secondary: % of pts with BMI or waist circumference measurement, % of pts with record of lifestyle assessment, % of pts referred to wt loss services, % pts managed within the practice via referral, % of overweight/obese pts who changed their wt, mean change wt over time period	cluster analysis using general linear model, sensitivity analysis; generalized estimating equation analysis	presentation, discussion, resources (pt booklets, BMI charts, leaflets, posters, referral pathways) in 1 hr	Mostly negative findings. No improvement in guideline adherence in the intervention gp compared with the control with all study outcomes. The process eval suggested the providers felt more confident in their ability to manage obesity	General practices included may be underrepresented of area; 9 month timeline	The Johns Hopkins Nursing Evidence Based Practice Rating Scale
Adherence To Diabetes Mellitus Treatment Guidelines From Theory To Practice: The Missing Link	Hashmi & Khan	Hashmi, N. R., & Khan, S. A. (2016). Adherence to diabetes mellitus treatment guidelines from theory to practice: The missing link. Journal of Ayub Medical College, Abbottabad : JAMC, 28(4), 802-808.	2016	Journal of Ayub Medical College , Abbottabad: JAMC	Provide a brief review based on a literature review for an ongoing interventional study being done by authors in two tertiary care hospital in lahore pakistan for improving adherence to diabetes guidelines. Will discuss implementation cycle and prevent a framework for factors involved in adherence to guidelines.	Diabetes mellitus; diabetes management, diabetes guidelines, adherence to guidelines	unknown # articles used	unknown	Literature Review	Level V	C	physician pt reminders, manpower training, referral coordination , data monitoring	adherence to diabetic guidelines	n/a	health system structure, disease management strategies like physician patient reminders, manpower training, referral care coordination, resource allocations, incentives and data monitoring as important determinants in diabetic patient management and outcomes;Organizational strategies including setting clear goals, training appropriate health care personnel and adequate communication among the team members	Factors affecting adherence: intrinsic attributes of guidelines and implementation process, physician-related factors, factors r/t healthcare system and implementation of guideline.	didn't include how they performed their literature search to come up with their conclusions. Very generalized. Unclear recommendations	The Johns Hopkins Nursing Evidence Based Practice Rating Scale

Article Title	Author(s)	Bibliographic Citation	Year	Journal	Purpose	Keywords	Population & Sample Size	Inclusion/Exclusion Criteria	Study Design	Level of Evidence	Quality of study	Independent Variables	Dependent Variables	Statistical Tests	Strategies/Tools Studied	Study Results	Limitations	Article Appraisal Tool and
Systematic review and meta-analysis of the effectiveness of implementation strategies for noncommunicable disease guidelines in primary health care.	Kovacs	Kovacs, E., Strobl, R., Phillips, A., Stephan, A., Müller, M., Gensichen, J., & Grill, E. (2018). Systematic review and meta-analysis of the effectiveness of implementation strategies for non-communicable disease guidelines in primary health care. Journal of General Internal Medicine, 33(7), 1142-1154. doi:10.1007/s11606-018-4435-5	2018	Journal of General Internal Medicine	Evaluate the effectiveness of interventions to improve guideline adherence of PCPs in the primary care setting, focusing on recent results.	evidence-based medicine; implementation; general practitioner; intervention; harvest plot.	involved at least 100 PCPS, 36 studies in harvest plot, 21 studies in forest plot (886 initial, 211 full text)	primary care providers, only providers in developed countries, English or German	Systematic Review and Meta-Analysis	Level I	A	passive distribution of the guideline or educational materials, meetings, clearing services, audit, motivational interview, reminder, patient-mediated intervention	knowledge transfer, diagnostic behavior, prescription, patient-based outcomes	harvest plot; Egger test for asymmetry	(1): professional interventions targeting the health care provider directly, (2) financial interventions addressing either the provider or the patient by various means of incentives, (3) organisational interventions aiming to support the desired behaviour by modifying the setting and (4) regulatory interventions which introduce changes on the level of legislation. PROFESSIONAL	Complex methods are not necessarily more effective. single-component interventions were equally effective as complex multifaceted intervention schemes in improving process of care and outcome of care. Diverse single intervention methods: audit, reminder, motivational interview, or patient-mediated intervention showed largest effect (73%). Similar rate of success observed for	Used only two databases so other literature may still be out there.	Article Appraisal Tool and

															INTERVENTION S: local consenses process, educational outreach visits, involvement of local opinion leaders, patient mediated interventions, audit and feedback, reminders, marketing and mass media, distribution of educational materials, educational meetings	educational meetings (67%), multifaceted with combining 2 methods (65% indicators effective). Least effective were passive distro of materials, no organized activity. Active participation in educational process is key factor for success. Passively receiving educational materials was least effective		
Quality improvement, implementation, and dissemination strategies to improve mental health care for children and adolescents:a systematic review	FormanHoffman, Middleton, McKeeman, Stambaugh	Forman-Hoffman, V., Middleton, J., McKeeman, J., Stambaugh, L., Christian, R., Gaynes, B., ... Viswanathan, M. (2017). Quality improvement, implementation, and dissemination strategies to improve mental health care for children and adolescents: A systematic review. Implementation Science, 12(1), 93-93. doi:10.1186/s13012-017-0626-4	2017	Implementation Science	three goals: (1) assess the effectiveness of quality improvement, implementation, and dissemination strategies intended to improve the mental health care of children and adolescents; (2) examine harms associated with these strategies; and (3) determine whether effectiveness or harms differ for subgroups based on system, organizational, practitioner, or patient characteristics	Adolescents, Children, Dissemination, Evidence-based medicine, Implementation, Mental health, Quality improvement, Systematic review	19 studies of practitioners who care for children and adolescents with mental health problems	human, QI, implementation, and dissemination strategies that targeted systems, organizations, or practitioners that deliver mental health care to children and adolescents who were already experiencing mental health symptoms.	Systematic Review	Level I	B	quality improvement strategies, implementation strategies, dissemination strategies	patient: access to care, satisfaction, treatment engagement, therapeutic alliance with practitioner provider: satisfaction with or acceptability of approach, protocol adherence/program model fidelity, competence/skills, system: costs, uptake, feasibility, timeliness, penetration, sustainability	qualitative comparative analysis	computer decision support for guidelines, internet portal to provide access to practice guidelines, paying practitioners to implement EBP, professional training plus feedback	Eleven strategies significantly improved at least one measure of intermediate outcomes, final health outcomes, or resource use. Moderate strength of evidence supported using provider financial incentives such as pay for performance to improve the competence with which practitioners can implement evidence-based practices (EBPs). Inconsistent evidence with educational meetings, materials, and outreach; programs appeared to be successful in combination with reminders or providing practitioners with newly collected clinical information. Low strength of evidence for no benefit for initiatives that included only educational materials or meetings (or both), or only educational materials and outreach components. LOW BENEFIT: reminders	Due to heterogeneous body of evidence authors had difficulty in pinpointing any particular strategy because there was only a single study testing each strategy.	The Johns Hopkins Nursing Evidence Based Practice Rating Scale

																	(computer)		
Determinants of adherence to recommendations for depressed elderly patients in primary care: A multimethods study	Aakhus, Eivind Oxman, Andrew D. Flottorp, Signe A.	Aakhus, Eivind Oxman, Andrew D. Flottorp, Signe A. (2014). Determinants of adherence to recommendations for depressed elderly patients in primary care: A multimethods study. Scandinavian Journal of Primary Health Care, 32(4): 170-179. doi: 10.3109/02813432.2014.984961	2014	Scandinavian Journal of Primary Health Care	identify and prioritize determinants of adherence to six recommendations for elderly patients with depression	Primary Health Care Depression -- In Old Age Patient Compliance Practice Guidelines Human Norway Surveys Interviews Checklists Summated Rating Scaling Funding Source Male Female Aged Health Personnel Patients Multimethod Studies	740 healthcare professionals; 352 determinants	Plausibility & feasibility	Systematic Review	Level I	A	quality, improvement strategies, determinants, dissemination, recommendations, methods	social contact, collaborative care plan, depression, care managers counseling, access to care, adherence, healthcare professionals	five-step framework described by Glenton and colleagues	survey, Social contact, collaborative care, care managers, counseling, media	The large number of determinants that we identified indicates the need for a systematic approach to prioritize which determinants to target in an implementation strategy. Healthcare professionals might want to consider these determinants in their own practices and could address many of the identified determinants on their own. However, a collective effort is necessary to improve adherence to these recommendations and improve the care of depressed elderly patients.	Wide variation across communities, practices, healthcare professionals, and patients. Prioritization of the determinants was based on assessment of the importance of each determinant and the extent to which each determinant could be addressed.	John Hopkins Nursing Evidence-Based Practice Rating Scale	

Article Title	Author(s)	Bibliographic Citation	Year	Journal	Purpose	Keywords	Population & Sample Size	Inclusion/Exclusion Criteria	Study Design	Level of Evidence	Quality of study	Independent Variables	Dependent Variables	Statistical Tests	Strategies/Tools Studied	Study Results	Limitations	Article Appraisal Tool and
Adherence to recommended Australian sexually transmitted infections screening guidelines among asymptomatic men who have sex with men: A best practice implementation project	Baynes, A. McArthur, A.	Baynes, A., McArthur, A. (2014). Adherence to recommended Australian sexually transmitted infections screening guidelines among asymptomatic men who have sex with men: A best practice implementation project. Joanna Briggs Institute Database of Systematic Reviews and Implementation Reports, 12(12): 210-226. doi: 10.111124/jbisir-2014-1989	2014	JBIR Database of Systematic Reviews and Implementation Reports	The goal of this project was to assess the level of staff compliance with evidence-based criteria, recommended in the Australian Sexually Transmitted Infection and HIV Testing Guidelines 2014, for asymptomatic men who have sex with men attending Canberra Sexual Health Centre, and implement strategies to improve compliance if necessary.	article awareness chlamydia education evidence based practice follow up gonorrhea hepatitis C rapid test human knowledge clinical audit medical record men who have sex with men practice guideline sample size sexually transmitted disease syphilis systematic review	Eighty-three medical records were audited by the team leader, against the criteria for this four-week period.	compliance, a nurse practitioner, the clinical nurse consultant and a sexual health nurse, MSM, STI	Systematic Review	Level I	A	collaboration, follow-up audit, multifaceted interventions	compliance, evidence-based criteria, improve knowledge,		Joanna Briggs Institute (JBI) Practical Application of Clinical Evidence System (PACES) online software and Getting Research into Practice (GRIP) audit and feedback tool.	This project has demonstrated that increasing staff awareness through education and prompts has made a positive contribution to increasing compliance with national STI and BBV screening guidelines for MSM. This is an important first step in early diagnosis of BBVs and STIs, allowing for early treatment and contact tracing. This best practice implementation	A limitation to the project was that some of the staff were unaware that new guidelines had been released in April 2014. Another limitation of this audit was that it relied on a clinical audit of patient medical records, not on observation of actual practice. Some staff may have been compliant with the new guidelines, and advised their patients about the new recommendation, but may not have documented	John Hopkins Nursing Evidence-Based Practice Rating Scale

																n project showed how an evidence-based audit with staff feedback can facilitate change.	their compliance.	
ACC/AHA Special Report: Clinical Practice Guideline Implementation Strategies: A Summary of Systematic Reviews by the NHLBI Implementation Science Work Group: A Report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines	Chan, W. V. Pearson, T. A. Bennett, G. C. Cushman, W. C. Gaziano, T. A. Gorman, P. N. Handler, J. Krumholz, H. M. Kushner, R. F. MacKenzie, T. D. Sacco, R. L. Smith, S. C., Jr. Stevens, V. J., Wells, B. L., Castillo, G., Heil, S. K., Stephens, J., & Vann, J. C. (2017). ACC/AHA special report: Clinical Practice Guideline implementation strategies: A summary of systematic reviews by the NHLBI implementation science work group: A report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Circulation, 135 (9): e122e137. doi: 10.1161/cir.0000000000000481	Chan, W. V., Pearson, T. A., Bennett, G. C., Cushman, W. C., Gaziano, T. A., Gorman, P. N., Handler, J., Krumholz, H. M., Kushner, R. F., MacKenzie, T. D., Sacco, R. L., Smith, S. C., Jr. Stevens, V. J., Wells, B. L., Castillo, G., Heil, S. K., Stephens, J., & Vann, J. C. (2017). ACC/AHA special report: Clinical Practice Guideline implementation strategies: A summary of systematic reviews by the NHLBI implementation science work group: A report of the American College of Cardiology/American Heart Association Task Force on Clinical Practice Guidelines. Circulation, 135 (9): e122e137. doi: 10.1161/cir.0000000000000481	2017	Circulation	Review evidence from the published implementation science literature and identify effective or promising strategies to enhance the adoption and implementation of clinical practice guidelines.	American Heart Association Cardiovascular Diseases/diagnosis/*prevention & control Hematologic Diseases/diagnosis/*prevention & control Humans Lung Diseases/diagnosis/*prevention & control National Heart, Lung, and Blood Institute (U.S.) United States *AHA Scientific Statements *cost *detailing *effectiveness *evidence-based *incentives *interventions *reminders *systematic review	826 articles and 55 were selected; 4 critical questions, each focusing on the adoption and effectiveness of 4 intervention strategies	Reviews were excluded if they did not focus on CPGs or on the implementation of a clinical practice that directly affected patient care. Reviews were also excluded if they did not include interventions aimed at clinicians or focused on the implementation of administrative practices.	Systematic Review	Level I	A	improvement strategies, determinants, dissemination, recommendations, methods, quality	clinical questions, knowledge, protocol, adherence, model,	The Implementation Science Work Group (ISWG) developed a conceptual framework—based on the Multilevel Approaches Toward Community Health (MATCH) model4—to define 4 levels where guideline implementation strategies can be initiated: the policy level, clinical institution level, provider level, and patient level.	Audit and feedback and educational outreach visits	found general effectiveness for 2 of the 4 selected implementation interventions (educational outreach visits and audit and feedback) for improving process of care and clinical outcomes.	Data used in this report were not retrieved from the primary studies, thus limiting information on the details of the interventions and results to that reported by the review authors. Second, this report used a qualitative synthesis of the evidence, which does not allow an assessment of the size of any expected benefits from the implementation of an implementation strategy. The report also relied heavily on the judgments of the authors of the SRs and the quality of the reviews. Third, analysis in this report is limited to 4 interventions aimed at providers and did not explore systems-level implementation.	John Hopkins Nursing Evidence-Based Practice Rating Scale

Article Title	Author(s)	Bibliographic Citation	Year	Journal	Purpose	Keywords	Population & Sample Size	Inclusion/Exclusion Criteria	Study Design	Level of Evidence	Quality of study	Independent Variables	Dependent Variables	Statistical Tests	Strategies/Tools Studied	Study Results	Limitations	Article Appraisal Tool and
Development of a theoryinformed implementation intervention to improve the triage, treatment and transfer of stroke patients in emergency departments using the Theoretical Domains Framework (TDF): the T(3) Trial	Craig, L.E.	Craig, L. E., Taylor, N., Grimley, R., Cadilhac, D. A., McInnes, E., Phillips, R., ... Middleton, S. (2017). Development of a theoryinformed implementation intervention to improve the triage, treatment and transfer of stroke patients in emergency departments using the Theoretical Domains Framework (TDF): the T3 Trial. Implementation science : IS, 12(1), 88. doi:10.1186/s13012-017-0616-6	2017	Implementation Science	To describe the development of an implementation intervention using theory to inform selection of behaviour change techniques, and evidence of effectiveness of implementation of interventions	Attitude of Health Personnel Blood Glucose Body Temperature Emergency Service, Hospital/*organization & administration/standards Guideline Adherence Humans Inservice Training Patient Transfer/*organization & administration/standards Personnel, Hospital/*psychology Practice Guidelines as Topic Professional Role Prospective Studies Psychological Theory Quality Improvement/*organization & administration Quality Indicators, Health Care Single-Blind Method Stroke/diagnosis/*therapy Thrombolytic Therapy Triage/*organization & administration/standards *Behaviour change techniques *Implementation intervention *Theoretical Domains Framework	omprised of 12 different clinical care elements (hereonin referred to as 'target behaviours' [Table 1])	outpatient settings, providers,	RCT	Level I	A	theory, behavior change, development, implementation, intervention	theoretical domain framework, effectiveness, evidence-based	The T3 Trial clinical intervention is an evidence-based care bundle of clinical protocols for triage, treatment and transfer of patients following acute stroke	Theoretical frameworks and models based on behaviour change theories	he TDF was successfully applied in all steps of development an implementation intervention for the T3 Trial clinical protocols. The use of researcher opinion was valuable for the BCT selection process in terms of incorporating research evidence and well-informed judgment and incorporating the important practical issues of feasibility and acceptability.	further work to clarify TDF domain definitions and to provide example barriers for each domain would complement this mapping process and minimise disagreements.	A i John Hopkins Nursing Evidence - Based Practice Rating Scale
Effectiveness of a multifaceted implementation strategy compared to usual care on low back pain guideline adherence among general practitioners	Amela Suman, Frederieke G. Schaafsma, Peter M. van de Ven, Pauline Slotje, Rachelle Buchbinder, Maurits W. van Tulder, and Johannes R. Anema	Suman, A., Schaafsma, F. G., van de Ven, P. M., Buchbinder, R., van Tulder, M. W., & Anema, J. R. (2018). Effectiveness of a multifaceted implementation strategy compared to usual care on low back pain guideline adherence among general practitioners. BMC health services research, 18(1), 358. doi:10.1186/s12913-018-3166-y	2018	BMC	Evaluate the effect of a multifaceted implementation strategy on guideline adherence among Dutch general practitioners	Primary health care, Low back pain, Health plan implementation, Guidelines, Referral and consultation	2453 patient contacts in the usual care group and 2677 patient contacts in the implementation group	GPs in Amsterdam with LBP patients; patients 18-76	RCT	Level I	B	Multicomponent, multidisciplinary continuing medical education (CME) training in which interdisciplinary communication and collaboration (i.e. between GPs, physiotherapists, and occupational physicians), and patientphysician communication	reduce referrals to medical specialist consultation and diagnostic imaging, and to increase consideration of psychosocial and occupational risk factors	Descriptive statistics, performance indicators (Generalized Estimating Equations (GEEs))	online and offline educational materials, and social media platforms (i.e. forum, Twitter, Facebook) supplemented the CME training. This professional based strategy was supported by a patient-based eHealth strategy consisting of informative videomessages, information on various topics regarding LBP (e.g. work, daily life), exercises, and social media platforms.	The overall rate of imaging requests decreased over time in both groups. There was no increase in either group over time in the number of times GPs registered consideration of psychosocial or occupational factors, or in the number of referrals for psychosocial care. The numbers of referrals to occupational physicians was very low in both groups at baseline and remained low over time.	Limited to one metropolitan area. Not all GPs attended CME training. Most GPs may have previous training on LBP guidelines	The Johns Hopkins Nursing Evidence Based Practice Rating Scale

Effect of audit and feedback with peer review on general practitioners' prescribing and test ordering performance: a cluster-randomized controlled trial	J. Trietsch, B. van Steenkiste, R. Grol, B. Winkens, H. Ulenkate, J. Metsemakers, and T. van der Weijden	Trietsch, J., van Steenkiste, B., Grol, R., Winkens, B., Ulenkate, H., Metsemakers, J., & van der Weijden, T. (2017). Effect of audit and feedback with peer review on general practitioners' prescribing and test ordering performance: a cluster-randomized controlled trial. BMC family practice, 18(1), 53. doi:10.1186/s12875-017-0605-5	2017	BMC	Effect of audit and feedback with peer review on general practitioners' prescribing and test ordering performance: a cluster-randomized controlled trial	Physician's practice patterns, Education, Medical, Continuing/methods, Clinical audit, Clinical evaluation, Physician prescribing pattern	197 GPs working in 88 practices	GPs of local quality improvement collaboratives	RCT	Level I	C	audit and comparative feedback	test ordering and prescribing volumes	Chi-square test or Ttest	audit and feedback with peer review	Benefits from other studies were not confirmed in this trial. Did not see a decrease in drugs prescribed; audit and feedback not feasible	Perception of participants; unattainable goals; lack of quality indicators; failed to recruit sufficient sample size; results may have been skewed	The Johns Hopkins Nursing Evidence Based Practice Rating Scale
--	--	---	------	-----	--	---	---------------------------------	---	-----	---------	---	--------------------------------	---------------------------------------	--------------------------	-------------------------------------	---	--	--

Article Title	Author(s)	Bibliographic Citation	Year	Journal	Purpose	Keywords	Population & Sample Size	Inclusion/Exclusion Criteria	Study Design	Level of Evidence	Quality of study	Independent Variables	Dependent Variables	Statistical Tests	Strategies/Tools Studied	Study Results	Limitations	Article Appraisal Tool and
Strategies for guideline implementation in primary care focusing on patients with cardiovascular disease: a systematic review	Susanne Unverzagt, Matthias Oemler, Kristin Braun, Andreas Klement	Unverzagt, S., Oemler, M., Braun, K., & Klement, A. (2014). Strategies for guideline implementation in primary care focusing on patients with cardiovascular disease: A systematic review. Family Practice, 31(3), 247266. doi:10.1093/fampra/cmt080	2014	Family Practice	Find which implementation strategy can improve physician adherence to the recommendations of guidelines in primary care.	Cardiovascular disease, guidelines, meta-analysis, physician adherence, primary care, systematic review.	Eighty-four trials (54 trials compared unimodal strategies and 30 multimodal strategies to usual care); 15 trials investigated provider reminder systems, 3 audit and feedback, 15 provider education, 4 patient education, 5 promotion of selfmanagement and 14 organizational change.	Only RCTs; patients in primary care with CVD; 3 months post intervention data	Systematic Review and Meta Analysis	Level I	B	Unimodal and multimodal intervention techniques	Physician adherence	RevMan 5	Provider reminder systems; audit and feedback; patient education; provider education; promotion of self-management; organizational change	Reminder systems = positive; audit and feedback = mixed; Provider education = positive; patient education = mixed; patient self management = negative; organizational change = highly positive	Contamination of the treatment of patients in the control group cannot be ruled out	A i The Johns Hopkins Nursing Evidence Based Practice Rating Scale

Appendix J

Synthesis of Interventions

Authors	Audit (JBI PAGES & GRIP)	Standi ng Order	Media (PUBLISHED ON WEB, ELECTRONIC MEDICAL ALERTS)	Feedback (individual /grp)	Survey	PERSONAL Education (MATERIAL, CMES, e-learning;PAMPLETS)	Algori thms	IN PERSON Professional Training e.g., workshops	Distribute CPG e.g., email, lamination, reminders	GRADE approach	4-step Systematic Intervention Framework	Change targeted behaviors	Conceptual framework - MATCH MODEL	RE-AIM Framework	Theoretical Domain Framework
Lin et al.	X - ↑			X - ↑			X - ↑	X - ↑	X - ↑		x - ↑	x - ↑			x - ↑
Pederse n et al.						x - ↓		x - ↓	x - ↓	x ↓					
Andrew et al.	x - ↑			X - ↑				X - ↑						x - ↑	
Etxeberr ia et al.			X ↑			x ↑	x ↑	x ↑	x ↑						
Fischer et al.	x ↑	x ↑		x ↑		x ↑	X ↑	x ↑	x ↑						
Goodfell ow et al.						x ↓	X ↓	X ↓	x ↓						
Hashmi & Khan Kovacs	x ↑		X ↓	x ↑		X ↑	X ↑	x ↑	X ↑						
Forman-Hoffman et al.				x ↑		X ↓	X ↑	X ↑	X ↑			x ↑			
Aakhus et al.			X ↓		X ↓	X ↓		X ↑	X ↓						
Baynes & McArthur	X ↑	X ↓	X ↓	X ↑		X ↓			X ↓						
Chan et al.	X ↑			X ↑				X ↑	X ↓			X ↑	X ↑		
Craig et al.				X ↑					x ↓			X ↑			X ↑
Surman et al.			x ↓			x ↓		x ↓	x ↓						
Trietsch et al.	x ↓			x ↓											
Unverza gt et al.	X ↑			X ↑		X ↑		X ↑	x ↓			X ↑			
Total Positive Outcom es	8	1	1	11	0	4	5	10	6	0	1	6	1	1	2
Total Negative Outcom es	1	1	4	1	1	7	1	3	8	1	0	0	0	0	0
Summari zed Total	7	0	-3	10	-1	-3	4	7	-2	-1	1	6	1	1	2

Appendix K

Completion Verification Form



Appendix G: Daniel K. Inouye Graduate School of Nursing
DNP Project Completion Verification Form

DOCTOR OF NURSING PRACTICE PROJECT Completion Verification Form

The DNP Project titled: Implementing an Evidence-Based Algorithm for the Diagnosis and Evaluation of Iron Deficiency Anemia (IDA) in Female Basic Military Training Recruits was completed at JBSA-Lackland, Reid Medical Clinic by the following student(s):

<u>(type student name)</u>	<u>(signature)</u>	<u>(date)</u>
Melissa Everage_____	<i>Melissa Everage</i> _____	28 March 2020
Virginia Frazier_____	<i>Virginia Frazier</i> _____	28 March 2020
Nicholas Robertson_____	<i>Nicholas Robertson</i> _____	28 March 2020
Matthew Simmons_____	<i>Matthew Simmons</i> _____	28 March 2020

The DNP Practice Project Team verifies that the following components of the DNP project, accomplished by the above students, is of sufficient rigor and demonstrates doctoral level scholarship to meet the requirements for USUHS GSN graduation:

- Presentation of DNP project to the leadership/stakeholders at the Phase II Site,
- Abstract/Impact Statement (*Appendix F*), and
- DNP Project written report.

Verified by:

<u>(type name)</u>	<u>(signature)</u>	<u>(date)</u>	
Dr. Janice Williams	<i>Janice Williams</i> _____	28 March 2020	Senior Mentor
Lt Col John Williamson	<i>John Williamson</i> _____	28 March 2020	Team Mentor
Lt Col Karla Dennard	<i>Karla Dennard</i> _____	28 March 2020	Team Mentor/Phase II Site Director

For RNA Students only - add the following additional signature for final verification of project completion:

<u>(type name)</u>	<u>(Signature)</u>	<u>(Date)</u>
RNA Project Director	_____	_____

Form Version: 26 Aug 2017