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.

Home Exercise Programs for Self-Rehabilitation of Non-specific Low Back Pain

MAJ Mark Cenon and Maj Christela Turner

Daniel K. Inouye Graduate School of Nursing, Uniformed Services University of the Health Sciences

NURS5330: Doctor of Nursing Practice Project

Dr. Laura Taylor, Dr. Kennett Radford and Dr. Jennifer Fiandt

May 1, 2022

Copyright Acknowledgment Statement

"The author(s) hereby certify that the use of any original work by another author or copyrighted material used in the DNP project entitled: 'Standardized Exercise Program for Self- Rehabilitation of Non-specific Lower Back Pain' is either appropriately cited within the manuscript or used with formal written permission of copyright release by the owner of the original work."

Mark Christian Cenon

Digitally signed by Mark Christian Cenon
Date: 2022.04.29 16:26:30 -07'00'

Mark Cenon, MS, RN, MAJ,
USA Family Nurse Practitioner Program
Daniel K. Inouye Graduate School of Nursing Uniformed Services University
20 April 2022

Christela Turner

Digitally signed by Christela Turner
Date: 2022.04.29 16:26:53 -07'00'

Christela Turner, BSN, RN, Maj,
USAF Family Nurse Practitioner Program
Daniel K. Inouye Graduate School of Nursing Uniformed Services University
20 April 2022

DISCLAIMER: The opinions and assertions expressed herein are those of the author(s) and do not reflect the official policy or position of the Uniformed Services University of the Health Sciences or the Department of Defense.

Contents

Abstract

Background

Low back pain (LBP) is the highest musculoskeletal concern worldwide. Within the United States (U.S.) military health system (MHS), LBP results in 6,268,752 outpatient encounters during five years and $253 billion annual expenditures. Home Exercise Programs (HEPs) are effective in managing LBP. The Department of Veterans Affairs and Department of Defense (VA/DoD) "Management of Low Back Pain" Guideline includes exercise recommendations of Rehab, Refit, and Return to Duty (RX3), an evidence-based HEP management option for LBP.

Clinical Question

Can an evidence-based LBP HEP Toolkit (education and resources) offered to primary care providers (PCPs) at Joint Base Lewis-McChord (JBLM) clinics impact the number of HEP prescriptions and Physical Therapy (PT) referrals for adult patients with nonspecific LBP?

Project Design

LBP Toolkit education and resources were delivered to 19 providers over six weeks across five clinics. Education consisted of a 15-minute RX3 and VA/DoD CPG presentation and at least one check-in. Resources included prescription pads, RX3 handouts, and VA/DoD guideline pamphlets. Pre- and post-intervention assessments included: retrospective medical chart reviews and provider questionnaires to examine HEP prescription use, RX3 and DoD/VA resources familiarity, and PT referrals.

Analysis of Results

Pre-intervention chart data (N = 185) revealed 58 HEP prescriptions and 110 PT

referrals. Six-week post intervention chart review (N =126) shows a 97% increase in HEP prescription. (n = 78), a 51.85% decrease in PT referrals (n = 36), and an 57.9% / 97.7% PCP self-reported increase in RX3 and VA/DoD guideline utilization, respectively.

Organizational Impact

An HEP Toolkit supports PCPs in expanding treatment options for patients with nonspecific LBP. HEP effectively lowers PT referrals, subsequently reducing lost workdays to medical treatment, thereby improving medical readiness.

Keywords: low back pain, self-rehabilitation, home exercise program, primary care, military.

Home Exercise Programs for Self-Rehabilitation of Non-specific Low Back Pain

LBP is a global medical issue that can lead to poor quality of life, disability, absence from work, and costly healthcare. LBP is prevalent within the U.S. military and MHS, accounting for the highest musculoskeletal concern seen by healthcare providers. Various types of exercises are effective in the management of LBP. They are components of the home exercise programs, RX3 and the VA/ DoD pamphlet, "Management of Low Back Pain."

Our clinical question is: can an evidence-based LBP HEP Toolkit (education and resources) offered to primary care providers at Joint Base Lewis-McChord (JBLM) clinics impact the number of HEP prescriptions and Physical Therapy referrals for adult patients with nonspecific LBP?

The Iowa Model Revised served as the project's framework, which was conducted during a specific six-week period in participating clinics. The project involved pre-and post-intervention questionnaires, an in-service on RX3 and VA/DoD CPG, and the provision of "Toolkits for LBP" for provider use. The team completed a retrospective review from eligible medical records from participating clinics for adult patients diagnosed with nonspecific LBP, 15 days before and following the intervention.

Problem Synthesis

According to the World Health Organization (2019), musculoskeletal conditions (MSKCs) are the most common contributor to disability worldwide. Of all MSKCs, LBP is the leading cause of injury globally (WHO, 2019). National trends are similar to global trends regarding LBP among adults in the United States. Military personnel in the U.S. Armed Forces are also profoundly affected by LBP, resulting in operational and public health challenges, including increased healthcare costs, decreased productivity due to mobility

restrictions, and diminished quality of life and functionality for the individual (Childs, 2015).

Despite numerous mitigation and rehabilitation strategies, LBP continues to be a burden among U.S. military personnel. HEPs are an integral part of the VA/DoD CPGs for the treatment of LBP. However, there is a lack of HEP prescription and standardization in the exercise programs providers prescribe to their patients with LBP. The purpose of this EBP is to expand the utility of evidence based HEPs by PCPs that are widely available across the DoD and that function as an adjunct to the rehabilitation of non-specific LBP without red flags in adult cohorts at JBLM.

LBP is the leading cause of disability globally (WHO, 2019). According to an international health research study by the Institute for Health Metrics and Evaluation at the University of Washington, the Global Burden Disease Study, LBP has remained the top cause for non-fatal health loss in three decades among 354 diseases in 195 countries and territories (James et al., 2018). Furthermore, LBP attributes to most years lived with disability (YLDs) and was the sixth in overall disease burden (Hoy, 2014).

In the U.S., LBP ranks as the most common musculoskeletal injury in adults affecting approximately 28.6% of the population (Anderson & Watkins-Castillo, 2015). LBP is also one of the most common causes of disability, resulting in decreased quality of life and inability to work (Anderson & Watkins-Castillo, 2015). In addition, it is the top physical condition seen by medical providers (Anderson & Watkins-Castillo, 2015).

LBP has continued to be an economic burden that has escalated direct healthcare costs. On average, annual expenditures on PCP visits alone are approximately $253 billion (Anderson & Watkins-Castillo, 2015). Confounding the high cost of treatments for LBP are rising prices

for medications, advanced imaging, adverse events, and repeat visits for recurrence and chronicity (Childs et al., 2015). Combined with expenses from specialty clinics, the costs can increase up to $624.8 billion (Hurwitz et al., 2016). Unfortunately, costs only continue to trend upward, with a reported increase of 65% from 1997 to 2006 (Hurwitz et al., 2016).

Indirect costs of LBP also present a dilemma. These costs are attributed to decreased workforce productivity and lost workdays. LBP is the reason for approximately 20 million of the 290 million lost workdays annually in the U.S. (Anderson & Watkins-Castillo, 2015). The number of lost workdays costs the U.S. $7 billion annually (Childs et al., 2014).

Relevance to Military Nursing

In the military health system (MHS), LBP is the most common encounter seen by providers, similar to civilian hospital counterparts at about 40.5 per 1000 person-years (Bader et al., 2018; Childs et al., 2015; Clark & Hu, 2015; Sell et al., 2014). Serving approximately 10 million active-duty (AD), retirees, and their families, the MHS largely contributes to the national expenditure for LBP treatment.

The U.S. military requires its service members to be medically qualified to maintain operational readiness. Along with lower extremity injuries, LBP accounts for 44% of lost workdays, impacting unit efficiency and productivity (Rhon et al., 2018). In deployed settings, LBP continues to be the most frequent medical complaint and a preeminent cause of medical evacuations (Sell et al., 2014; Clark & Hu, 2015).

LBP is also problematic to individual military members and their families. It is one of the primary causes of disability and discharge from service (Rhon et al., 2018). In addition, a history

of LBP predisposes an individual for recurrent injuries leading to chronicity, which increases the risk for decreased mobility and quality of life and associated physical and psychosocial disorders (Sell et al., 2014; Childs et al., 2015).

LBP rehabilitation efforts align with the quadruple aims of the Defense Health Agency (DHA) to increase readiness, promote better health, better care, and lower costs. In the U.S. military, LBP constrains force readiness by reducing the number of deployable personnel and limiting productivity. Additionally, LBP results in individual challenges for the lives of military men and women. Service members (SMs) need access to evidence-based resources proven to make a difference (i.e., effective rehabilitation to reduce re-injury, reduction in pain, greater quality of life) to ensure better health and management of care. These resources must be readily available to DoD personnel and supported by current and relevant evidence

Clinical Question

With current evidence as above, the clinical question is: "can an evidence-based LBP HEP Toolkit (education and resources) offered to primary care providers (PCPs) at JBLM clinics impact the number of HEP prescriptions and Physical Therapy (PT) referrals for adult patients with nonspecific LBP?"

Search Strategy and Results

The PICOT question, "In adults with LBP without red flags (P), which interventions aimed at self-rehabilitation (I) compared to usual care or no intervention (C), help to improve pain and functionality (O)?", served as a guide for literature search to find relevant and current evidence-based solutions.

The DNP team used PubMed and CINAHL databases. Inclusion filters include the

English language, adult population, and dates of 2014 to 2020. Key terms used for the search were adults, low back pain, chronic, acute, subacute, physical activity, exercise, and rehabilitation. The initial search resulted in 1444 articles after removing duplicates. After reviewing titles and abstracts for applicability, proper project design, and evidence-based interventions, 116 articles remained for full-text review. After the full-text review, the DNP team excluded 102 articles due to the inability to obtain them as full-text articles, wrong interventions, wrong settings, wrong outcomes measured, or wrong study design. Thirteen studies supported the evidence-based solution to the PICOT question. Seven articles are Level I, one article is Level II, and five articles are Level III. Appendix E provides a brief analysis of each of the included study articles in the evidence table.

Solution Synthesis

The American College of Physicians (ACP) and the American Academy of Family Physicians (AAFP) CPG addressing acute, sub-acute, and chronic LBP recommend the use of non-invasive treatment, such as exercise (Qaseem et al., 2017; Searle et al., 2014). Exercise and physical activity (PA) were the fourth most mentioned theme when interviewing adults to describe relief methods for their LBP (Setchell et al., 2019).

Current evidence recommends PA and exercises to rehabilitate acute, sub-acute, and chronic LBP. Shipton (2018) reports that in the absence of red flags indicating severe pathology, treatment for acute LBP (lasting four weeks or less) includes advice to remain active and familiarization with self-management strategies such as HEPs. PA is a deterrent to exacerbation of acute LBP, and HEPs are the treatment of choice among physical therapists (Suri et al., 2017; Ladeira et al., 2015). For sub-acute LBP (lasting more than four weeks),

Taulaniemi et al. (2019) reported that HEPs improved healthcare workers' pain, physical functioning, lumbar movement, and abdominal strength. Finally, Saner et al. (2015) and Kanas et al. (2018) found that an exercise intervention improved pain and function after four weeks, eight weeks, and annual follow-ups of adults with chronic (lasting more than 12 weeks) LBP.

Recommended exercises for the treatment of LBP include exercises that target strength and stabilization of the core and trunk muscles, aerobic capacity and endurance, and flexibility (Gordon and Bloxham, 2016; Keane et al., 2017; Nagai et al., 2015; Cai et al., 2017; Wewege et al., 2018). In addition, HEPs are more beneficial if they are progressive, with differing levels of intensity to match the patient's current functional level and tolerance (Suh et al., 2019). HEPs that are widely available for providers and patients within the MHS are the RX3 and VA/DoD CPG, which incorporate all of these techniques in lower back rehabilitation.

The VA/ DoD conceived the CPG, "Diagnosis and Treatment of Low Back Pain," in collaboration with the ACP and American Pain Society in 2017. The CPG contains recommendations aiding MHS providers with clinical decision-making related to managing patients that present with LBP (VA/ DoD, 2017). The CPG also includes home management guidance to patients for self-rehabilitation and references a supplementary pamphlet for patients. The pamphlet "Managing Low Back Pain" discusses activity modification and HEPs, with complete text and photographic instructions (VA/ DoD, 2017).

Additionally, Mr. Timothy Gribbin is a Senior Scientist for the Consortium for Health and Military Performance (CHAMP), a DoD research initiative specializing in human performance optimization. He described RX3 as a program "created at the request of the U. S. Air Force (USAF) to improve the clinical care for USAF SMs with

neuromusculoskeletal injuries of the shoulder, knee, hip, and lower back. A multidisciplinary team of athletic trainers, physical therapists, orthopedic surgeons, primary care sports medicine physicians, and exercise physiologists developed a set of HEPs for patients to facilitate safe, full recovery from non- operative injury while minimizing the use of organizational resources and maximizing SM availability for job performance" (T.Gribbin, personal communication, April 25, 2020). RX3 for LBP consists of three phases, each lasting three weeks. Each phase comprises three categories of exercises that target flexibility, cardiovascular, and leg and core fitness exercises.

Improving Guidelines Adherence and HEP Prescription

Perez et al. (2012) state that barriers to adherence to guidelines include poor familiarity with CPG and time constraints. Efforts should address tailored interventions with these barriers in mind. Learmonth et al. (2016) echoed that healthcare providers both require and desire education about exercise promotion and need readily available resources to them and their patients. The same barriers are prevalent in exercise prescription, and suggested solutions include education on available resources, tools aid with time constraints, and written prescriptions to provide to patients (Hechanova et al., 2017; O'brien et al., 2017).

Focus Areas

In reviewing relevant literature regarding LBP and the use of HEPs, there are several themes and subjects this project will aim to investigate. We will concentrate on four key areas. The first is exploring the effectiveness of exercise prescription for rehabilitation of LBP and determining available programs that meet current evidence-based recommendations. The second is to examine the breadth of the problem in JBLM, considering subpopulations that are most at risk for LBP, such as U.S. Army personnel units transitioning into the implementation

of new physical fitness standards, the Army Combat Fitness Test. Third is determining current practices and usual care and whether the current implementation of CPGs (to include the VA/ DoD CPG) occur in clinical settings. Fourth is sufficient dissemination and prescription of HEPs, including an evaluation of the program with pre-intervention and post-intervention questionnaires and medical record reviews.

Business Case Analysis

A business case analysis worksheet with more detailed information on expenses, risk and benefits, alternative options and general description of the project milestones can be found in Appendix C.

Organizing Framework

The DNP team utilized the Iowa Model Revised to serve as the framework in guiding the implementation of this DNP EBP project. The Iowa Model was developed in the early 1990s by a team of nurses to guide clinicians in translating existing research into patient care (Iowa Model Collaborative, 2017). The model was revised to convey more ways to infuse change and incorporate multiple layers of evidence. The DNP team chose this model due to its streamlined and pragmatic flow, highlighting a clear pathway essential to project success. It also outlines a non-linear approach that includes decision-making points and feedback loops that are easy to follow and straightforward to implement change.

In identifying a potential opportunity for improvement, the DNP team found a triggering clinical and organizational issue within SMs at JBLM. A significant population of SMs is suffering from LBP with various etiologies and ultimately affecting force readiness. From this issue, the DNP team formulated a question enabling a more focused approach in analyzing the evidence. The DNP team conducted an extensive literature search to assemble,

appraise, and synthesize the body of evidence. Sufficient evidence (Appendix E) supported the project implementation. With Command support and stakeholders' involvement, the DNP team piloted the practice change at JBLM. Data analysis evaluated the practice change effectiveness. The successful implementation allowed local practice adoption and future promotion and dissemination. This model allowed for alternatives and redesign of the plan if the study results were not as anticipated. Most importantly, the DNP team strives to sustain a practice change based on evidence that can ultimately improve patient care outcomes.

Project Design

General Approach

This project used a pre- and post-test design, along with a retrospective chart review before and after education and resource intervention. The overall goal was to improve the overall adherence of PCPs' prescription of evidence based HEPs, and indirectly improve outcomes, such as quality of life of patients affected with LBP, improve access to care to primary care and PT clinics, decrease healthcare costs, and increase force readiness. The DNP team gathered relevant and current evidence from appraisals to collectively identify evidence based HEPs, that are also widely accessible for anyone under the DoD. These HEPs (VA/DoD CPG and RX3) consist of four types of exercises that target core strengthening, flexibility, and cardiovascular components. PCPs were provided education on the toolkit for appropriate implementation.

Setting and Population

Project implementation occurred at MAMC, the Army's second-largest treatment facility at JBLM, located in Tacoma, Washington. It maintains approximately 220 beds for inpatient care and expands to accommodate more than 300 beds during emergencies (Madigan Army

Medical Center [MAMC], n.d.). MAMC is a tertiary care medical center providing a wide array of medical services from newborn to geriatrics and numerous other specialties. In addition, MAMC comprises a network of 11 other satellite facilities that collectively serve more than 100,000 AD SMs, retirees, and their families (MAMC, n.d.). Their outpatient clinics handle nearly one million visits annually and consist of patient-centered medical home model teams of providers, nurses, medics, and administrators. The DNP team included five MAMC and satellite primary care clinics that have voluntarily participated.

Procedural Steps

There were four phases of the project implementation. The DNP team conducted Phase I from January 2020 to June 2021, Phase II from June 2021 to September 2021, Phase III from October 2021 to January 2022, and Phase IV from January 2022 to April 2022.

Phase I - Pre-implementation. This is the conception stage of the project. Phase I includes the following:

- identifying opportunities for change
- defining the problem and its significance in the U.S. military
- collecting and synthesizing evidence to support the solution.

The first significant milestone for this phase was the assessment of the needs of the population at JBLM via communication with MAMC clinic leaders and delineating LBP as a significant concern. The second milestone was completing a literature review to clearly define LBP as a musculoskeletal conundrum in the U.S. military. The final milestone was collecting available evidence and synthesizing solutions, where the DNP team established the prescription of HEPs as an area needing improvement.

Phase II - Defining Target Population. The DNP team initiated Phase II after arrival at

JBLM. This phase consists of identifying the target population, communication with stakeholders, Institutional Review Boards (IRB) exemption, and connection with clinic directors to gain participation. The first milestone achieved during this phase is the decision of the DNP team to focus their efforts on PCPs at JBLM. This decision was made with discussion from the MAMC research team and statisticians after presenting the DNP team's findings regarding the significance of LBP, synthesized solutions, and the team's intent to increase HEPs prescription. In the second milestone for this phase, the DNP team determined their modalities to increase HEP prescriptions, to include an in-service education and provision of the "LBP Toolkit."

The in-service education consisted of a PowerPoint presentation created by the DNP team that introduced and discussed the RX3 and VA/ DoD CPG. The team also created a video of the presentation for PCPs if they were unavailable during planned face-to-face interaction that they could review on their own time.

The "LBP Toolkit" is composed of resources for PCPs to use or provide to patients. The toolkit consisted of a folder with patient handouts for RX3 with a QR code that links to the program, a prescription pad with the RX3 website, the VA/DoD CPG pamphlet for patient use, and a notecard from the VA/ DoD CPG that summarizes the assessment of "red flags" as reminders of exclusion criteria to PCPs. Photographs of the contents of the toolkit are in Appendix L. These materials are readily available for printing and ordering via the RX3 website https://www.hprc-online.org/physical-fitness/rx3 and the VA/ DoD website https://www.healthquality.va.gov/guidelines/Pain/lbp/.

The third milestone involved submitting documents required for IRB approval and the receipt of IRB exemption. Finally, the last milestone achieved for this phase was communication

with stakeholders, such as the clinic directors, to gain participation. In this milestone, the team identified five primary care clinics that voluntarily participated: Jay Family Medicine Clinic, McChord Clinic, Winder Family Medicine Clinic, Okubo Soldier Center Medical Home (SCMH), and Allen SCMH.

Phase III - Implementation and Evaluation. Phase III consisted of assessing current practices in the participating clinics, implementing the in-service education and provision of toolkits, and evaluating the effectiveness of the intervention. The first milestone achieved during this phase was the completion of a retrospective chart review to evaluate current HEP prescribing practices of the participating clinics. The retrospective chart review consisted of obtaining access to medical records of patients seen in the participating clinics from October 1, 2021 to October 15, 2021. Clinic codes identified the participating clinics, while the International Classification of Disease-10 (ICD -10) code M54.50 identified appropriate medical records. The DNP team did not utilize or disclose any personal health information (PHI) in reporting any of the data. Therefore, the medical record review information was limited to whether the patient received a prescription for HEPs, what type of HEP, and if the PCP initiated PT referral.

The DNP team achieved their second milestone in this phase via completion of in-service education classes regarding LBP and the readily available resources, RX3 and VA/ DoD CPG, to participating PCPs. The educational in-service consisted of a brief discussion, followed by the description of the toolkit. The DNP team collected additional data via a pre-intervention questionnaire (Appendix F) of self-reported HEP prescription practices from participating PCPs. The in-service briefing was completed via in-person, face-to-face discussions. Due to schedule conflicts, one clinic, Okubo SCMH, was unable to participate in the in-person education. However, the questionnaires, links to the prerecorded video

presentation, and the toolkit for printing was emailed to the clinical director. During this milestone, the DNP team also identified a "champion" from each clinic to serve as the primary point of contact for further questions and concerns and re-supply of the toolkits.

For the final milestone, the DNP team collected post-intervention data via a retrospective medical record review one month after the intervention education and toolkit provision. The same process described in the pre-intervention medical record review was followed but utilized the dates of February 10, 2022 to February 25, 2022 instead. The DNP team also requested that the participating PCPs complete a post-intervention outcomes questionnaire in person or via a website link (Appendix G).

Phase IV - Analysis of Results, Dissemination, and Sustainment. This phase consisted of statistical analysis of results, dissemination of results, and formulation of plans and recommendations for sustainment. The DNP team completed a statistical analysis of the results, with the aid of MAMC statisticians, as the first milestone for this phase. For the second milestone, the DNP team will disseminate the results to MAMC leadership and stakeholders and USUHS faculty and students in May 2022. In the final milestone, the DNP team provided the clinic directors and champions with educational materials and presentations for incoming PCPs. They were also given point of contact and links to the toolkit websites for ordering or printing materials.

Data and Analysis Plan

The independent variables consist of an educational in-service on RX3 and VA/DoD CPG and provision of the LBP toolkit for provider use. The dependent variables include the utilization of HEPs pre-and post-implementation and their effect on PT referrals. Fifteen days of chart review data were collected pre-and post-implementation. Descriptive statistics were

performed on the questionnaires to analyze the pre- and post-intervention outcomes after six weeks. The chart review data collected determined the utilization of HEPs and the frequency of PT referrals. Statisticians analyzed the data using Fisher's exact, the Pearson's correlation coefficient, and Chi-square tests to determine the statistical significance of the data collected from pre-and post-implementation questionnaires and patient chart reviews. The p-values for each data set were determined and assumed to be statistically significant at $p<0.05$.

Barriers

The DNP team identified multiple barriers during the implementation of this project. First is the conflict in scheduling the in-service in one of the clinics. To overcome this, the DNP team recorded an in-service education video and sent the link and toolkit attachments to the clinic with limited in-person schedule availability. These electronic versions were also sent to all the other clinics to allow PCPs who were unable to attend the in-person briefing a chance to view the project proposal. The second limitation was the time limitation of the providers to complete the questionnaires. For mitigation, the surveys created were brief, and the providers had an option to either complete them electronically or via paper form.

The third is provider resistance to prescribing HEPs. All clinicians who participated received an LBP toolkit to make prescribing more efficacious. Also, the DNP team completed routine periodic check-ins to the participating clinics to answer any questions and assist with any barriers. A fourth limitation involved the turnover of PCPs in the clinic which was beyond the control of the DNP team. Some providers who received the education initially were no longer at the same clinic during the collection of post-implementation questionnaires. The electronic version was sent to those providers to improve participation. Lastly, a limitation existed during the chart review process. PCPs' documentation practices varied in specificity of

the type of HEPs prescribed. Although the HEP utilization increased, it was unclear on some of the medical charts which HEP was used which made it challenging to accurately capture the increase in prescription use.

Despite the mitigations mentioned above, participation completion was affected for some PCPs. Providers have varying circumstances beyond our control at times, making data collection more challenging. A point of contact was established from each clinic to assist with gathering data. Supporting staff was also part of the educational brief, so they could assist the providers with the prescription of HEPs. MAMC statisticians assisted with the data retrieval of the electronic health record (EHR), to lessen the access required for the DNP team to retrieve the chart information needed. Their assistance made data retrieval faster and more accurate.

Sustainment and Dissemination Plan

To ease transition of project sustainment, PCP participants were provided toolkits to have for future copying as needed. The PCPs were provided with a link to the RX3 website which includes patient and provided resources. The website includes ready to download or print pamphlets, flyers, patient handouts, provider algorithms, and prescription pads. It also has video demonstrations of the components of the LBP HEP that are helpful for patients and PCPs. The PCPs were also provided with a link to the DoD/VA CPG website where they are able to print or download resources provided in the toolkit. The website also has the point of contact information for requesting future copies of LBP management resources for patients and PCPs.

Clinic champions were chosen to ensure continuity of project sustainment during PCP turnovers. An auto text was created in the EHR public drive for PCPs to use when documenting prescriptions of HEP. MHS Genesis EHR also has an option to save

commonly used websites on their favorites. This feature enables the PCPs to go directly to the RX3 and DoD/VA websites for future reference without consuming a large amount of time during patient encounters. The QR code created on the RX3 flier also helps when printed copies are unavailable for various reasons. Patients can scan the code with their phone cameras, and it takes them directly to the LBP HEP patient resources of the RX3 website.

The DNP team created a poster presentation for the clinical staff, MAMC leadership, and other stakeholders to disseminate the results. For transparency, the audience will be given the opportunity for questions and to provide feedback on the project. The DNP team also shared the project with the school leadership, faculty, and students via pre-recorded poster presentations prior to graduation.

HIPAA Concerns and Ethical Considerations

Prior to data collection, the DNP team informed participants on the project's purpose and expectations. Protected health information (PHI) or personal identifiable information (PII) was not collected. Pre- and post-intervention questionnaires were voluntary, and demographic data requested did not identify the participants. The main purpose of demographic data was to identify trends on HEP use based on years of practice as a PCP, age, profession, and service affiliation. No PHI or PII were utilized during the chart reviews. Patient charts were accessed utilizing LBP ICD 10 codes and clinic IDs. No patient demographics were collected. This project received the IRB determination of "exempt."

The DNP team abided by MAMC's hospital policies in securing project related data. All collected information was accessed on a need-to-know basis without PCP identification. Data collection and intervention implementation were performed according to IRB determination-

approved standards. The DNP team ensured participants' questions were answered clearly prior to participation.

Participation was voluntary without coercion. Participants were provided autonomy to discontinue participation at any time. To ensure beneficence and nonmaleficence, participants were provided best practice guidelines for LBP patient exclusion criteria. PCP participants had the autonomy to choose the HEP and LBP management suitable to meet optimal patient outcomes.

Project Results

Methods

The DNP team used Microsoft Office Excel & statistical software SPSS to analyze variables for this project. The DNP team computed descriptive statistics for data. Mean, and standard deviation (SD) represented continuous variables, whereas frequency and percentage showed the categorical variables. For intergroup analysis on measured parameters, the Fisher Exact test and chi-square test demonstrated the significance to the study parameters on a categorical scale between the groups. Pearson, correlation coefficient test, examined correlation with a 5% significance level. The DNP team based the p-values reported in this project on a two-sided test with a $p < 0.05$ statistical significance.

Demographics

A total of 19 PCPs who received in-service education completed both the pre- and post-intervention questionnaires and were included in the analysis. Table 1 provides a summary of the demographic information of the PCPs. There is a variance of the population within each primary care clinic participating in the study. There is no data available to assess what PCPs compose one primary care clinic. Thus, it is difficult to measure whether this project includes a

strong representation of the average type of PCPs within a type of clinic. The PCPs have varying ages, predominantly male population, a wide range of years of experience, and representation from the U.S. Army, U.S. Air Force, and civilian physicians, physician assistants, and nurse practitioners.

Table 1

Demographics of Primary Care Provider Participants

Parameters	N = 19
Age	
Mean	40.21
SD	08.33
Range	28 – 61
Gender N (%)	
Male	13 (68.4)
Female	06 (31.6)
Number of years in practice	
Mean	05.79
SD	05.24
Range	0 – 18
Job N (%)	
Physician assistant	07 (36.8)
Nurse Practitioner	07 (36.8)
Physician	05 (26.3)
Service N (%)	
Army	09 (47.4)
Air Force	07 (36.8)
Civilian	03 (15.8)

Note. Demographic data of all PCPs who completed pre- and post-intervention questionnaires.

The above data shows that the age of the participants in this study ranged from 28 –

61 years and had an average age of 40.21 years. The study involved 68.4% males and 31.6% females. The average number of years in practice was 5.79 years; 36.8% were physician assistants, 36.8% were nurse practitioners, and 26.3% were physicians. In addition, 47.4% of the participants are AD U.S. Army, 36.8% are U.S. Air Force, and 15.8% are civilians.

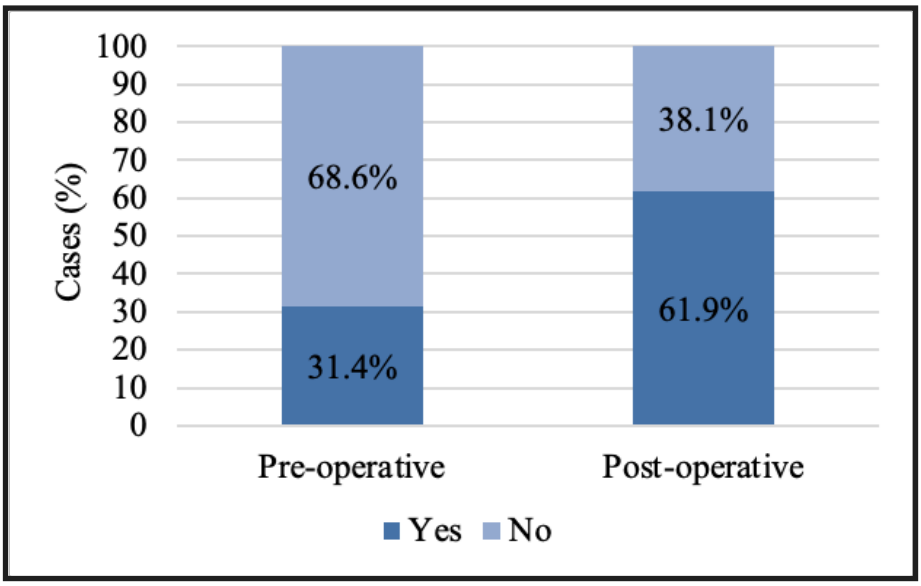
Effects on Prescription of HEPs, PT Referrals and Utilization of RX3 and VA/DoD CPG

The pre-intervention retrospective review resulted in 31.4% of the PCPs who prescribed HEPs, which was less than 61.9% of the PCPs who prescribed HEP at post-intervention. Figure 1 shows a statistically significant difference between pre-and post-intervention ($p = <0.001$, $p<0.05$) by Fisher Exact test. Figure 2 shows the pre-intervention review that resulted in 5.2% use of RX3 or DoD CPG compared to the 25.6% use at post-intervention which was a significant increase by Chi-square test ($p = 0.001$, $p<0.05$). Finally, Figure 3 shows that 59.2% of the PCPs referred patients to PT at pre-intervention, which decreased by 28.6% at post-intervention.

Again, the difference between pre-and post-intervention was statistically significant, according to the Fisher Exact test ($p = 0.030$, $p<0.05$).

Figure 1

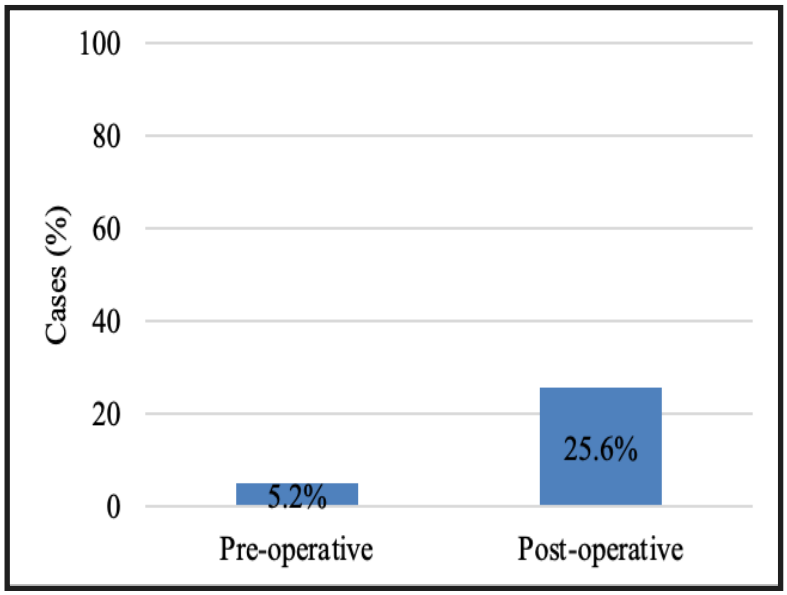
HEPs Prescription from Retrospective Medical Record Review



Note. Percentage of HEPs prescription comparison pre-intervention and post-intervention.

Figure 2

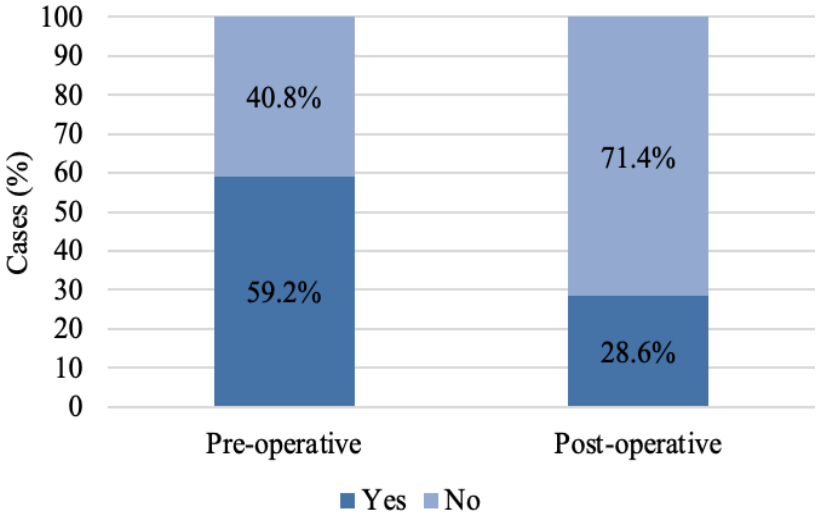
Use of RX3 or VA/DoD Guidelines from Retrospective Medical Record Review



Note. Comparison of RX3 or VA/DoD CPG prescriptions pre- and post-intervention.

Figure 3

PT Referrals from Retrospective Medical Record Review



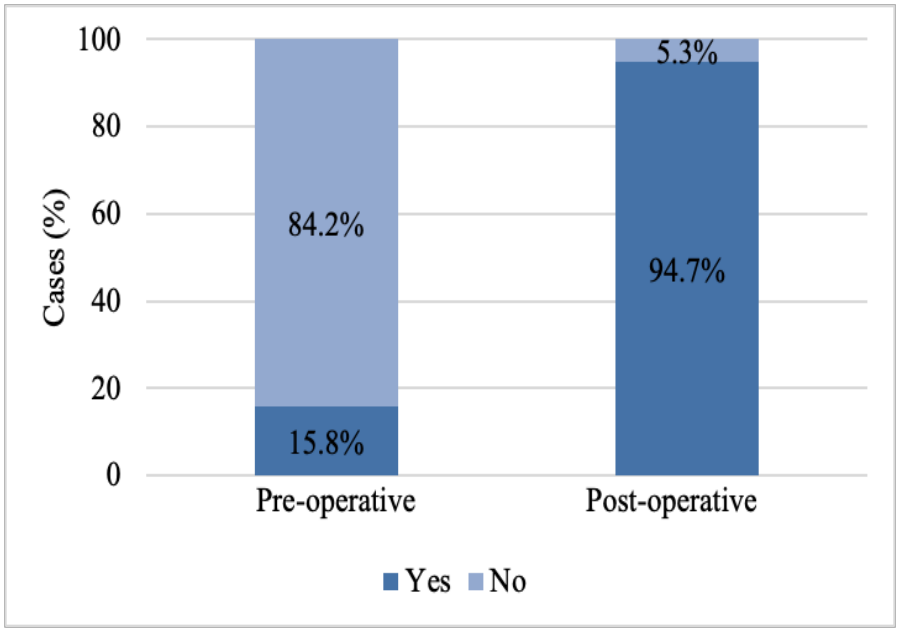
Note. Comparison of PT referrals initiation to no PT initiation pre- and post-intervention

From self-report questionnaires, 15.6% of the PCPs used RX3 when prescribing HEPs at pre-intervention and 94.7% at post-intervention. A significantly greater number of PCPs responded positively post-intervention than pre-intervention for the use of RX3 when prescribing HEPs, by Fisher Exact test ($p = <0.001$, $p<0.05$). Figure 4 shows a strong negative correlation between the PCPs' responses at pre- and post-intervention, and the difference was statistically significant by Pearson's correlation coefficient ($r = -0.544$, $p = 0.016$, $p<0.05$).

Additionally, 31.6% of the participants at pre-intervention compared to 57.9% at post-intervention, utilized the VA/ DoD CPG when prescribing HEPs. The PCPs' responses were comparable and did not show significant differences between pre- and post-intervention by the Fisher Exact test ($p = 0.191$, $p>0.05$). Figure 5 shows a weak, negative correlation between the PCPs' answers at pre- and post-intervention, by Pearson's correlation coefficient ($r = -0.109$, $p = 0.658$, $p>0.05$).

Figure 4

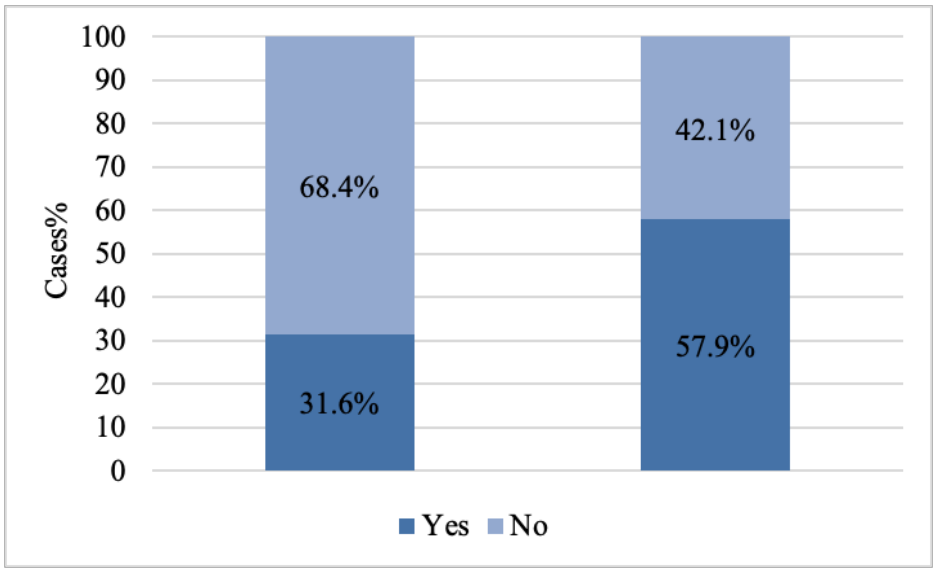
Self-reported Use of RX3



Note. Figure shows self- reported use of RX3, pre-intervention and post-intervention

Figure 5

Self-reported Use of VA/ DoD GPG



Note. Figure shows self- reported use of VA/ DoD CPG, pre-intervention, and post-intervention.

Analysis of Results

Overall, the retrospective medical record reviews demonstrated an improvement to the prescription of HEPs by PCPs. Data analysis showed a statistically significant increase in the prescription of HEPs, regardless of which program. Additionally, as expected and analogous with Ebben's et al. (2018) systematic review showing increase in guideline adherence follow multimodal education interventions, the data showed a statistically significant increase in RX3 and DoD CPG prescriptions. Finally, there was also a statistically significant decrease in PT referrals post-intervention compared to pre-intervention. This is concurrent with Ladeira's et al. (2015) which resulted in HEPs as a common treatment choice of physical therapists for acute and subacute LBP. Although, the article does not specifically focus on the effect in referrals, PT endorsement of HEPs can increase its legitimacy. The decrease in PT referrals in this project proves that an evidence-based HEP can serve as an alternative, a supplemental resource, or a bridge to PT while awaiting access to care, which can ultimately decrease PT referrals.

Self-reported prescription patterns using the pre-and post-intervention PCP questionnaires showed a significant increase in RX3 utilization, with a strong negative correlation, when comparing pre- and post-intervention. On the other hand, there is no statistically significant increase in the utilization of DoD CPG, and comparison of pre- and post-intervention data only showed a weak negative correlation. However, VA/DoD CPG utilization was only at 31.6% pre-intervention and increased to 57.9% post-intervention. The results are similar to O'brien et al. (2017), who found that PCPs increased HEPs prescriptions by 47% following their education intervention.

Aside from the variables discussed above, the DNP team also inquired into other factors

pertaining to the prescription of HEPs. These factors include PCPs' self-reported prescription of HEPs, PCPs' perception of barriers that contribute to non-adherence, and PCPs' perception of factors contributing to their prescription of HEPs. At pre-intervention, 84.2% of the participating PCPs reported that they prescribed HEPs, while at post-intervention, 100% of the PCPs reported that they prescribed HEPs. From the PCP questionnaire, the top three reported reasons for not prescribing HEPs are lack of available resources (reported by 57.9% of the PCPs), lack of familiarity with available programs (reported by 52.6% of PCPs), and time constraints (reported by 52.6% of PCPs). This is comparable to O'brien et al. (2017) reporting 66% of PCPs site time both time constraints and lack or unfamiliarity with resources as barriers to HEPs prescription. At post-intervention, PCPs reported what aided them in prescribing HEPs. These include readily printed resources to give to patients (84.2% of PCPs reported), website links embedded in the EHR, and QR codes for patients that are a direct link to HEPs resources (57.8% of PCPs reported, respectively).

The DNP team also discovered other resources that PCPs prefer to utilize for HEPs other than RX3 and VA/ DoD CPG. These resources include the American Academy of Orthopedics Handbook, Sports Medicine Patient Advisor, DoD Yoga, and Bob and Brad's YouTube channel. These resources require further inquiry to assess whether the exercises included are evidence- based.

Organizational Impact/Implications to Practice and Policy

From an organizational standpoint, this project's most crucial impact is the identification of barriers that primary care providers encounter, which impede prescription of HEPs, that are readily available across the DoD. In identifying these barriers, providers became aware of the burden of LBP within the JBLM MHS. This DNP project added several

accessible resources that may aid in reducing the strain to the MHS and the U.S. military that LBP causes, which has the potential to affect both direct and indirect costs.

This project has an impact on several target audiences. First, future investigators interested in preventive and rehabilitative health can readily replicate and improve upon the design. Second, current and incoming healthcare providers may receive training on these resources conveniently by viewing our short video recorded presentation available online via YouTube. Third, providers can capitalize on the current LBP toolkits provided to promote guideline adherence. The presentation and toolkits are user-friendly and cost-effective measures that serve as reminders of the availability of these resources. Finally, education and resource provision to the ADSM encouraged patient-centered care and shared decision-making. These resources promote standardization of the provision of evidence based HEPs within primary care clinics at JBLM.

Future Directions for Research and Practice

This project demonstrated a significant increase in the prescription of HEPs and showed the effectiveness of resource education and printed material in improving adherence to recommended guidelines. The predominant use of the EHR for clinical documentation warrants further investigation into the use of electronic resources. Embedding the websites for the HEPs within the EHR is one example. Additionally, virtual healthcare visits have played a significant role in patient care, especially during the peaks of the COVID-19 pandemic. Telehealth limits patients to unnecessary exposure and increases access to care, ascertaining that the virtual care trend will likely become a staple in medicine. These resources are available during virtual visits.

Retrospective chart reviews provided insight on other resources that PCPs utilize in

their prescription of HEPs, which also warrant further investigation. For example, several PCPs cite a U.S. Army Yoga link via YouTube, easily accessed by other PCPs and patients alike. Yoga has moderate evidence to reduce pain in patients with chronic LBP (Cramer et al., 2013). However, the DNP team was not familiar with a DoD-affiliated yoga program at the conception of this project. Therefore, the future direction should include other widely available resources within the DoD, such as the US Army Yoga link and Bob and Brad's YouTube channel, while ascertaining that these resources are evidence-based.

This DNP EBP focused on PCPs and PCPs' perceived barriers to the prescription of HEPs. A future investigation shifting the lens from provider to patient is necessary. This shift can answer several questions regarding patient satisfaction with provided HEPs, ease of navigation of provided websites for HEPs, simplicity in comprehension of instructions for HEPs, time efficiency, and effectiveness of HEPs, among other variables. Concentrating on patients can also provide valuable information on which HEPs and delivery methods (handout, personal instruction, web-based, mobile technology applications, and other educational forms) patients prefer to increase patient compliance.

Conclusion

AAFP and VA/ DoD recommend HEPs to manage non-specific LBP in adults. Evidence supports HEPs to include specific exercises to address core and back strength, flexibility, and endurance. There are various HEPs that PCPs at JBLM prescribe. Two DoD championed evidence-based HEPs are RX3 and VA/DoD CPG, "Management of Low Back Pain." This project provided insight into PCP perceived barriers in prescribing HEPs and offered solutions via in-person and web-based briefing and provision of toolkits. These resulted in significant improvements in PCPs’ awareness of available resources, resulting in

improved adherence of HEPs prescription to appropriate patients.

Although this project showed a significant difference in PT referrals pre- and post-intervention, these HEPs are also useful as an adjunct to PT while patients wait to access PT appointments. These HEPs can also aid patients, PCPs, and physical therapists where PT clinics are overwhelmed and understaffed, which was the case of one of the Soldier Centered Medical Homes (SCMHs) that participated in the project. There are also instances when patients have insufficient time or do not prefer to attend PT sessions. Again, in these situations, HEPs would be effective alternatives for self-rehabilitation. Finally, physical therapists may not always be available in deployed settings. The VA/DoD and RX3 HEPs are easily printable to bring to areas without internet access or easily accessed in areas where the internet is available.

PCPs are essential in communicating available resources to patients for disease prevention and management. Most providers desire to provide evidence-based care to their patients but may lack time or familiarity with evidence-based resources. Lack of standardization creates variability in prescription by providers, which results in delayed or inadequate rehabilitation of patients and thus, causes recurrence and progression of LBP. Multimodal educational techniques and utilization of toolkits are proven methods that increase provider compliance with CPGs (Hechanova et al., 2017; O'brien et al., 2017). This project focused on addressing barriers to increase the number of patients familiar with these resources. Adequate rehabilitation and prevention of LBP recurrence among patients in the MHS can improve individual and unit readiness, decrease healthcare costs, and increase access to primary and specialty care.

References

Bader, C. E., Giordano, N. A., McDonald, C. C., Meghani, S. H., & Polomano, R. C. (2018).Musculoskeletal pain and headache in the active-duty military population: An integrative review. *Worldviews on Evidence-Based Nursing, 15*(4), 264-271. https://doi.org/10.1111/wvn.12301

Cai, C., Yang, Y., & Kong, P. W. (2017). Comparison of lower limb and back exercises for runners with chronic low back pain. *Medicine & Science in Sports & Exercise, 49*(12), 2374-2384. https://doi.org/10.1249/MSS.0000000000001396

Childs, J. D., Fritz, J. M., Wu, S. S., Flynn, T. W., Wainner, R. S., Robertson, E. K., Forest, S.K., & George, S. Z. (2015). Implications of early and guideline adherent physical therapy for low back pain on utilization and costs. *BMC Health Services Research, 15*(1), 150. https://doi.org/10.1186/s12913-015-0830-3

Childs, J.D., Wu, S. S., Teyhen, S., Robinson, M. E., & George, S.Z. (2014). Prevention of low back pain in the military cluster randomized trial: Effects of brief psychosocial education on total and low back pain–related health care costs. *Spine Journal, 14*(4), 571-583. https://doi.org/10.1016/j.spinee.2013.03.019

Clark, L. L., & Hu, Z. (2015). Diagnoses of low back pain, active component, U.S. armed forces, 2010-2014. *MSMR (U.S. Army Center for Health Promotion and Preventive Medicine, Executive Communications Division), 22*(12), 8-11. https://pubmed.ncbi.nlm.nih.gov/26726722/

Cramer, H., Lauche, R., Haller, H., & Dobos, G. (2013). A systematic review and meta-analysis of yoga for low back pain. *The Clinical journal of pain*, *29*(5), 450–460. https://doi.org/10.1097/AJP.0b013e31825e1492

Ebben, R., Siqeca, F., Madsen, U. R., Vloet, L., & van Achterberg, T. (2018). Effectiveness of implementation strategies for the improvement of guideline and protocol adherence in emergency care: a systematic review. *BMJ open*, *8*(11), e017572. https://doi.org/10.1136/bmjopen-2017-017572

Gomarverdi, S., Khatiban, M., Bikmoradi, A., & Soltanian, A. R. (2019). Effects of a multi-component educational intervention on nurses' knowledge and adherence to standard precautions in intensive care units. *Journal of infection prevention*, *20*(2), 83–90. https://doi.org/10.1177/1757177419830780

Gordon, R., & Bloxham, S. (2016). A systematic review of the effects of exercise and physical activity on non-specific chronic low back pain. *Healthcare, 4*(2), 22. https://doi.org/10.3390/healthcare4020022

Hechanova, R. L., Wegler, J. L., & Forest, C. P. (2017). Exercise: A vitally important prescription. *JAAPA : Official Journal of the American Academy of Physician Assistants*, *30*(4), 17–22. https://doi.org/10.1097/01.JAA.0000513344.52255.cc

Hoy, D., March, L., Brooks, P., Blyth, F., Woolf, A., Bain, C., Williams, G., Smith, E., Vos, T., Barendregt, J., Murray, C., Burstein, R., & Buchbinder, R. (2014). The global burden of low back pain: Estimates from the global burden of disease 2010 study. *Annals of Rheumatic Diseases, 73*(6), 968-974. https://doi.org/10.1136/annrheumdis-2013-204428

Hurwitz, E.L., Li, D., Guillen, J., Schneider, M.J., Stevans, J. M., Phillips, R.B., Phelan, S.P., Lewis, E.A., Armstrong, R.C., & Vassilaki, M. (2016). Variations in patterns of utilization and charges for the care of low back pain in North Carolina, 2000 to 2009: A statewide claims' data analysis. *Journal of Manipulative and*

Physiological Therapeutics, 39(4), 252-262. https://doi.org/10.1016/j.jmpt.2016.02.006

Iowa Model Collaborative. (2017). Iowa model of evidence-based practice: Revisions and validation. *Worldviews on Evidence-Based Nursing, 14*(3), 175-182. https://doi.org/10.1111/wvn.12223

James, S. L. G., Abate, D., Abate, K. H., Abay, S. M., Abbafati, C., Abbasi, N., & Zhao, Z. (2018). Global, regional, and national incidence, prevalence, and years lived with disability for 354 diseases and injuries for 195 countries and territories, 1990-2017: A systematic analysis for the global burden of disease study 2017. *The Lancet, 392*(10159), 1789-1858. https://doi.org/10.1016/S0140-6736(18)32279-7

Kanas, M., Faria, R. S., Salles, L. G., Sorpreso, I. C. E., Martins, D. E., Cunha, R. A., & Wajchenberg, M. (2018). Home-based exercise therapy for treating non-specific chronic low back pain. *Revista Da Associacao Medica Brasileira, 64*(9), 824-831. https://doi.org/10.1590/1806-9282.64.09.824

Keane, L.G. (2017). Comparing AquaStretch with supervised land-based stretching for chronic lower back pain. *Journal of Bodywork & Movement Therapies, 21*(2), 297-305. https://doi.org/10.1016/j.jbmt.2016.07.004

Ladeira, C. E., Samuel-Cheng, M., & Hill, C. J. (2015). Physical therapists' treatment choices for non-specific low back pain in Florida: An electronic survey. *Journal of Manual & Manipulative Therapy, 23*(2), 109-118. https://doi.org/10.1179/2042618613Y.0000000065

Learmonth, Y. C., Adamson, B. C., Balto, J. M., Chiu, C. Y., Molina-Guzman, I. M., Finlayson, M., Barstow, E. A., & Motl, R. W. (2018). Investigating the needs and

wants of healthcare providers for promoting exercise in persons with multiple sclerosis: a qualitative study. *Disability and rehabilitation*, *40*(18), 2172–2180. https://doi.org/10.1080/09638288.2017.1327989

Lincoln, A. E., Smith, G. S., Amoroso, P. J., & Bell, N. S. (2002). The natural history and risk factors of musculoskeletal conditions resulting in disability among US Army personnel. *Work*, *18*(2), 99–113. https://pubmed.ncbi.nlm.nih.gov/12441574/

Macedo, L. G., Bostick, G. P., & Maher, C. G. (2013). Exercise for prevention of recurrences of nonspecific low back pain. *Physical therapy*, *93*(12), 1587–1591. https://doi.org/10.2522/ptj.20120464

Machado, G. C., Maher, C. G., Ferreira, P. H., Latimer, J., Koes, B. W., Steffens, D., & Ferreira, M. L. (2017). Can recurrence after an acute episode of low back pain be predicted? *Physical Therapy, 97*(9), 889-895. https://doi.org/10.1093/ptj/pzx067

Madigan Army Medical Center. (n.d.). *About Madigan Army Medical Center*. https://madigan.tricare.mil/About-Us

Nagai, T., Abt, J. P., Sell, T. C., Keenan, K. A., Clark, N. C., Smalley, B. W., Wirt, M., & Lephart, S. M. (2015). Lumbar spine and hip flexibility and trunk strength in helicopter pilots with and without low back pain history. *Work (Reading, Mass.), 52*(3), 715-722. https://doi.org/10.3233/WOR-152192

O'Brien, M. W., Shields, C. A., Oh, P. I., & Fowles, J. R. (2017). Health care provider confidence and exercise prescription practices of Exercise is Medicine Canada workshop attendees. *Applied Physiology, Nutrition, and Metabolism 42*(4), 384–390. https://doi.org/10.1139/apnm-2016-0413

Okelo, S. O., Butz, A. M., Sharma, R., Diette, G. B., Pitts, S. I., King, T. M., Linn, S. T.,

Reuben, M., Chelladurai, Y., & Robinson, K. A. (2013). Interventions to modify health care provider adherence to asthma guidelines: a systematic review. *Pediatrics*, *132*(3), 517–534. https://doi.org/10.1542/peds.2013-0779

Perez, X., Wisnivesky, J. P., Lurslurchachai, L., Kleinman, L. C., & Kronish, I. M. (2012).

Barriers to adherence to COPD guidelines among primary care providers.*Respiratory medicine*, *106*(3), 374–381. https://doi.org/10.1016/j.rmed.2011.09.010

Qaseem, A., Wilt, T. J., McLean, R. M., Forciea, M. A., for the Clinical Guidelines Committee of the American College of Physicians & Clinical Guidelines Committee of the American College of Physicians. (2017). Noninvasive treatments for acute, subacute, and chronic low back pain: A clinical practice guideline from the American College of Physicians.*Annals of Internal Medicine, 166*(7), 514. https://doi.org/10.7326/m16-2367

Rhon, D. I., Teyhen, D. S., Shaffer, S. W., Goffar, S. L., Kiesel, K., & Plisky, P. P. (2018).Developing predictive models for return to work using the military power, performance and prevention (MP3) musculoskeletal injury risk algorithm: A study protocol for an injury risk assessment programme. *Injury Prevention, 24*(1), 81. https://doi.org/10.1136/injuryprev-2016-042234

Saner, J., Kool, J., Sieben, J. M., Luomajoki, H., Bastiaenen, C. H. G., & de Bie, R. A. (2015). A tailored exercise program versus general exercise for a subgroup of patients with low back pain and movement control impairment: A randomised controlled trial with one- year follow-up. *Manual Therapy, 20*(5), 672-679.

https://doi.org/10.1016/j.math.2015.02.005

Searle, A., Spink, M., Ho, A., & Chuter, V. (2015). Exercise interventions for the treatment of chronic low back pain: A systematic review and meta-analysis of randomised controlled trials. *Clinical Rehabilitation, 29*(12), 1155-1167. https://doi.org/10.1177/0269215515570379

Sell, T. C., Clark, N. C., Wood, D., Abt, J. P., Lovalekar, M., & Lephart, S. M. (2014). Single- leg balance impairments persist in fully operational military special forces operators with a previous history of low back pain. *Orthopaedic Journal of Sports Medicine, 2*(5). https://doi.org/10.1177/2325967114532780

Setchell, J., Costa, N., Ferreira, M., & Hodges, P. W. (2019). What decreases low back pain? A qualitative study of patient perspectives. *Scandinavian Journal of Pain, 19*(3), 597. https://doi.org/10.1515/sjpain-2019-0018

Shipton, E. A. (2018). Physical therapy approaches in the treatment of low back pain. *Pain and Therapy, 7*(2), 127-137. https://doi.org/10.1007/s40122-018-0105-x

Steffens, D., Maher, C. G., Pereira, L. S. M., Stevens, M. L., Oliveira, V. C., Chapple, M., Teixeira-Salmela, L. F., & Hancock, M. J. (2016). Prevention of Low Back Pain: A Systematic Review and Meta-analysis. *JAMA Internal Medicine*, *176*(2), 199–208. https://doi-org.usu01.idm.oclc.org/10.1001/jamainternmed.2015.7431

Suh, J. H., Kim, H., Jung, G. P., Ko, J. Y., & Ryu, J. S. (2019). The effect of lumbar stabilization and walking exercises on chronic low back pain: A randomized controlled trial. *Medicine (Baltimore), 98*(26), e16173. https://doi.org//10.1097/MD.0000000000016173

Suri, P., Rainville, J., de Schepper, E., Martha, J., Hartigan, C., & Hunter, D. J. (2018). Do

physical activities trigger flare-ups during an acute low back pain episode? A longitudinal case-crossover feasibility study. *Spine, 43*(6), 427-433. https://doi.org/10.1097/BRS.0000000000002326

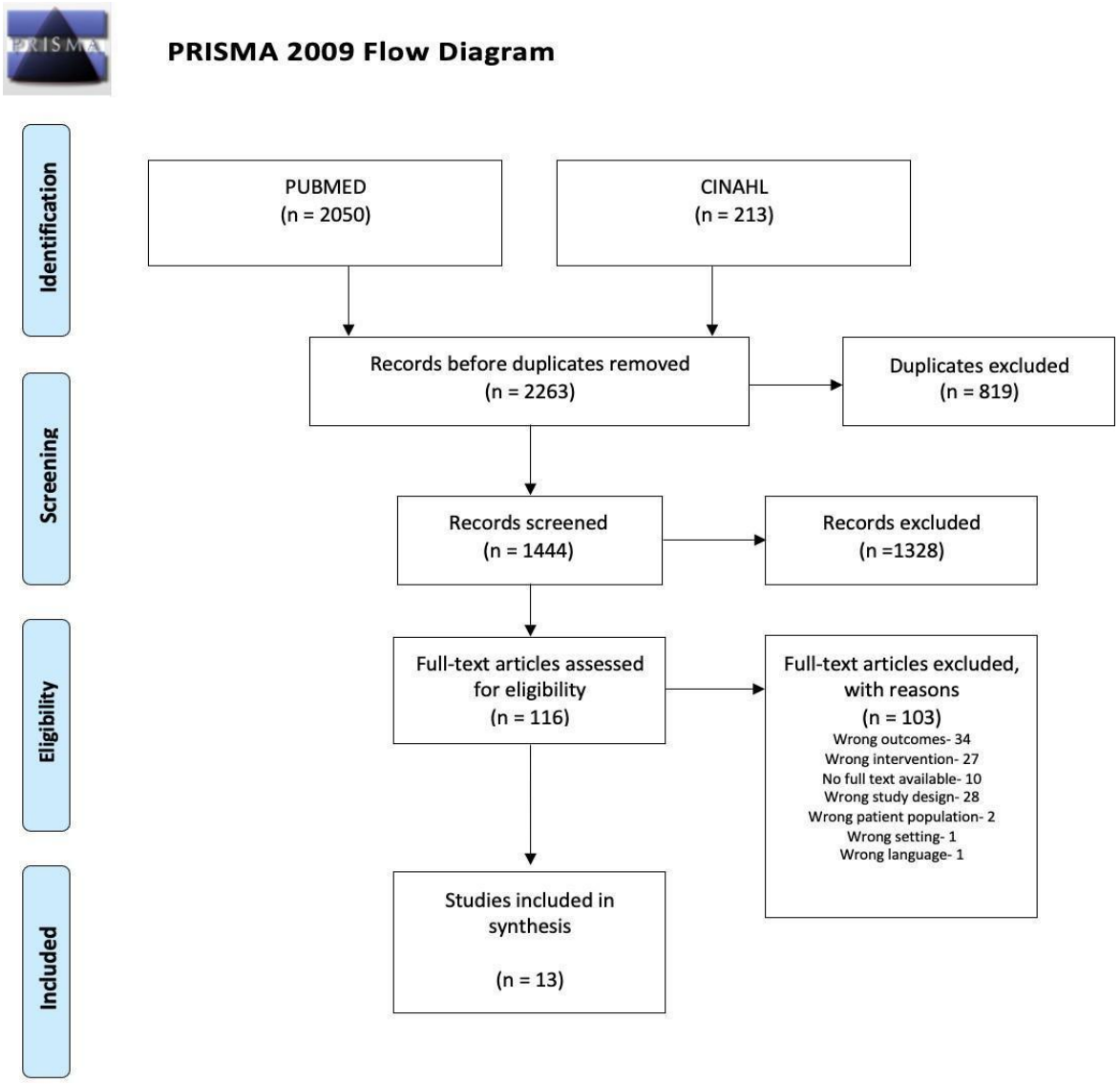
Taulaniemi, A., Kankaanpää, M., Tokola, K., Parkkari, J., & Suni, J. H. (2019). Neuromuscular exercise reduces low back pain intensity and improves physical functioning in nursing duties among female healthcare workers; Secondary analysis of a randomised controlled trial. *BMC Musculoskeletal Disorders, 20*(1), 328-15. https://doi.org/10.1186/s12891-019-2678-x

Wewege, M. A., Booth, J., & Parmenter, B. J. (2018). Aerobic vs. resistance exercise for chronic non-specific low back pain: A systematic review and meta-analysis. *Journal of Back and Musculoskeletal Rehabilitation, 31*(5), 889. https://doi.org/10.3233/BMR-170920

World Health Organization (2019). *Low Back Pain.* https://www.who.int/news-room/fact-sheets/detail/musculoskeletal-conditions

Appendix A

Search Strategy



From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). *P*referred *R*eporting *I*tems for *S*ystematic Reviews and *M*eta-*A*nalyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097

For more information, visit www.prisma-statement.org.

Appendix B

Project Timeline

Project Year (2021-2022)												
Activity/Month	**JUN**	**JUL**	**AUG**	**SEP**	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**
Project Planning -Task 1: Check in and establish rapport -Task 2: Stakeholder meetings -Task 3: Decide on target population and recruit -Task 4: Consider resources, constraints & approval -Task 5: Develop an implementation plan	X											
Project Implementation and Data Collection -Task 1: Prepare clinicians and materials -Task 2: Engage patients and do follow ups -Task 3: Collect baseline data -Task 4: Create an evaluation plan		X	X	X								
Data Analysis -Task 1: Collect post-pilot data -Task 2: Prepare dissemination of results -Task 3: Integrate adoption if change appropriate					X	X						
Disseminate Results and Sustain Practice Change -Task 1: Brief clinics and stakeholders -Task 2: Poster presentation -Task 3: Develop practice change into local policy -Task 4: Identify and engage key personnel							X	X	X	X	X	X

Appendix C

Business Case Analysis

BUSINESS CASE with VALUE BASED CARE ASSESSMENT

Proposed Title for Project/Initiative/Opportunity to Improve

Standardized Exercise Program for Self-Rehabilitation of Lower Back Pain (LBP)

Opportunity Statement *(Description of proposed project/initiative/opportunity to improve)*

There is currently no standardized evidence-based exercise program prescribed within military treatment facilities (MTFs) to aid in self-rehabilitation of patients with LBP. The Rehab, Refit, and Return to duty (RX3) program is readily available for prevention and recovery of patients with LBP reducing utilization of extensive hospital resources, lowering healthcare costs, and increasing access to care. RX3 also impacts force readiness by increasing work productivity due to improvement of overall physical fitness.

Business Opportunity/Objectives *(Prioritize listing – macro and micro objectives)*

The goal is to provide an evidence-based standardized exercise self-rehabilitation program for patients with LBP.
Macro objective: The overall objective is to facilitate swift and effective recovery of patients suffering from LBP.

Micro objectives:
1. Prevent reinjury during time of rehabilitation and increase functional capacity of patients suffering from LBP
2. Increase force readiness and work productivity by preventing manpower loss
3. Cost savings from direct expenses from provider and referral visits, as well as indirect expenses caused by loss of productivity
4. Increase access to care to primary care managers (PCMs), physical therapy (PT) or chiropractor visits
5. Provide a standardized self-exercise rehabilitation prescription that is customizable to patient needs

Potential Impact of the Initiative/Project *(Identify outcome metrics & benchmarks/and how objectives align with Quadruple Aim, Value Based Care, and HRO goals)*

1. Pain levels and functional capacity post intervention. Reduced pain and increased functional capacity aid in readiness (Quadruple Aim) of the force by ensuring that military members are able to effectively perform their specific duties. This metric also contributes to experience of care when patients' pain is addressed, and they are able to return to full or near full functional capacity.
2. Return to work days or return to full duty days. When Service Members (SMs), as well as other patients treated for LBP who contribute to the mission spend less time recovering because of an effective rehabilitation program, this contributes to readiness of the force and per capita cost by reducing indirect expenses caused by loss of productivity.
3. Reinjury and repeat visits to primary and specialty providers. Ineffective rehabilitation may cause reinjury and thus repeated visits to providers. An effective program that offers self-rehabilitation can decrease per capita cost by reducing extensive hospital resources, such as multiple follow-ups, emergency visits, referrals, medications and additional radiographic procedures.

Alternatives (courses of action) chosen for Analysis

1. Standardized rehab, refit and return to duty (RX3) exercise program

2. Other standardized exercise program (Yoga, Pilates, David Spine Solution)

3. *"Status Quo"*: Non standardized program or no prescribed program, usual care dependent on provider

Analysis of Alternatives

Alternative 1:	Standardized Exercise Program (RX3)
Pros	**Cons**
1. Standard, easy to prescribe and readily available. 2. Customizable depending on the patient's ability and current pain level due to the phasic nature of the program. 3. Already created by a multidisciplinary team of healthcare experts with experience in the field of musculoskeletal injuries. 4. Cost effective. 5. Program is composed of a combination of evidenced based exercises to ensure that all areas of rehabilitation (strength, endurance and flexibility) are targeted.	1. No direct supervision. Needs patient motivation to complete the program. 2. Program is for LBP without red flags. Cannot be safely prescribed to patients with known pathology or trauma. 3. Program is 3 weeks per phase. Patients can move to the next level depending on ability, however there is still a time commitment.
Alternative 2:	Other standardized programs
Pros	**Cons**

1. Also aids in recovery and rehabilitation. 2. Observed and taught by instructors. 3. Customizable to patient preference. 4. Can be in-person or virtual depending on availability.	1. Requires instructors and instructions. 2. May not be cost effective as some programs require payment to join. 3. Not all programs have a sound evidence base. 4. May not specifically target LBP complaints.

Alternative 3:	*"Status Quo"*: Prescription of exercise programs from different sources or no exercise program at all.

Pros	**Cons**
1. Easily available on the internet. 2. Requires little to no instruction. 3. Saves time.	1. Some patients do not receive instructions for exercise for their LBP after an injury. 2. Some patients receive printed instructions. However, these exercises may be lacking evidence or are not a combination of all the exercises needed for effective rehabilitation. 3. Some exercises have not been reviewed and researched by a multidisciplinary team. 4. There is no direct observation of the patient.

Assumptions

- Not all patients that report LPB receive an exercise program to aid with their rehabilitation.
- Even with an exercise program, there is little to no verbal instruction or demonstration.
- Some exercise programs are not based on sound evidence.
- Providers prescribe different exercise programs, if any at all.
- Most providers and patients are not familiar with RX3.
- Providers will be open to prescribing RX3 to patients with LBP.

- Back pain is the most common physical condition that is the reason to for patients to visit their doctors (Andersson, 2014)
- LBP is also common in deployed, and non-deployed military personnel (Lovelakar et al., 2016; Goertz et al., 2016; Rhon et al., 2016).
- The direct annual cost of LBP is estimated to be $85 billion (Childs et al., 2105).
- The indirect cost of LBP is estimated to be $238 billion (Childs et al., 2015).
- Average cost of single medical visits for back pain is $6096 (Hurwitz et al., 2016).
- Cost of physical therapy visit- $279/visit (Healthcarebluebook.com, 2020).
- Average cost of chiropractic care $58/visit (Fairhealthconsumer.org, 2017).
- Average cost of radiology: X-rays $47 & MRI $395 (Fairhealthconsumer.org, 2017)
- An average of 33% of patients with LBP complaints will have recurrent visits within 1 year (Machado, 2017).

Recommendation and Rationale

Recommendation

Our recommendation is for the prescription of RX3 for persons with LBP complaints that can be safely managed with a self-rehabilitation home exercise program.

Rationale

RX3 is a cost-effective evidence-based program for LBP that can be safely performed at home without the need for specialized equipment. It involves three progressive phases of effective exercises that delineates recommended sets and repetitions guiding patients towards reinjury prevention and recovery while tailoring to their personal levels of physical fitness.

Value Based Care - Investment Required by the Organization and the Associated "VALUE" or $ GAINED. *(forecasted estimated numbers)*

I. *Volume projection based on: 99 per 1000 person years of LBP in US military personnel or 10% of 150,000 JBLM medical beneficiaries population*

	99 per 1000 person years of NLBP in US military personnel or 10% of 150,000 JBLM medical beneficiaries.	15,000
	Projected participants	50 of 15,000
	Total	**50**

II. Reimbursement calculated for:

$6,096/LBP per patient x 50 (hospitalizations, outpatient visits, prescription medications and emergency room visits)	$ 304,800
$279/physical therapy visit x 8 (16.3% of 50) x 4 sessions (Childs et al., 2015; Fritz et al., 2015)	$ 8,928
$58/chiropractor visit x 15 (30% of 50) (Herman et al., 2020)	$ 870
Total	$ 314,598

II. *Costs:*

Variable Costs:

Supplies (Paper, ink, poster, misc.)	$ 1,000	**For this budget plan, 5 physicians, 3 NPs, and 4 PAs compensated for 1- hour of pay to conduct training.**
Work compensation for training is $106/physician (x5=$530), $57/NP (x3=$171), $56/PA (x4=$224) (Salary.com)	$ 925	
Total	**$ 1,925**	

Fixed Costs:

Overhead (Use of facility, lights, HVAC, computers, monitors, projectors, etc.)	$ 1,000
Total	**$ 2,925**

III. *Forecasted P&L statement:*

Revenues:

LBP recurrent visits after initial PCM visit ($6096/LBPx16.5) 16.5 is 33% of 50 participants	$ 100,584	**Based on assumption data, 33% of LBP patients will have recurrent visits within 1 year which is 33% of 50 participants for the purpose of this budget plan.**
Physical therapy and chiropractor visits ($8928+$870)	$ 9,798	
Total revenues	**$** 110,382	

Costs:

Variable costs	$ 1925
Fixed costs	$ 1000
Total costs	**$ 2925**

PROJECTED PROFIT ***$ 107,457***

Risks and Mitigation Plan

Risks	Plan
1. Patients do not experience improvement in pain or ability to function.	1. Collect data over time to assess effectiveness. If ineffective, revert back to usual care.

2. Patients not meeting criteria to participate due to set exclusion criteria.	2. Interview patients and assess patient history. Exclude patients that have red flags of NLBP.
3. Insufficient sample size.	3. Obtain samples directly from units in JBLM.
4. Exercise compliance rate	4. Educate participants on the importance of adherence. Weekly reminders and daily workout logs.
5. Resistance from providers/ leadership.	5. Introduce providers to RX3; present evidence and possible benefits.

Implementation Plan

Phase 1:	Gather evidence.
Milestone Description:	Do a literature review of evidence-based self-rehabilitation programs for NLBP. Assess the needs of the population to include clinics at Madigan Army Medical Center, outlying clinics and various units at JBLM. This phase delineates the specific needs of the population to properly address the rehabilitation of musculoskeletal injuries.

Deliverables	Due Date	Accountable Person
Measurable Goal: Identification of common musculoskeletal injuries seen in clinics at JBLM by communication with Phase II site director and clinic OICs. Collection and synthesis of at least 10 research studies supporting evidence for solutions. Decision for appropriate solution.	2 months- until Jun 2021	Investigators/ DNP candidates

Resources Needed

Multiple research database for evidence collection. Telephone/ computers for communication with site director and OICs of clinics.

Expected Level of Benefit

Sound data and strong evidence collected serves as the foundation for the project. Before a solution is identified, the problem needs to be well-defined, which data on the needs of the JBLM population can provide. Once the problem has been assessed, a solution can be reached by examining best and reliable evidence available.

Phase 2:	Decide on the target population and communicate the need with leadership and clinics.
Milestone Description:	Identification of which units/clinics in JBLM have the highest rates of NLBP. Communication with leadership and clinics in order to gain approval and establish participation.

Deliverables	Due Dates	Accountable Person
Measurable Goal: Collection of appropriate sample size based on population needs.	1 month after data collection - until July 2021	Investigators/ Coders/ DNP candidates

Resources Needed

Access to medical records. Computers to access these records and aid in correspondence with unit Commanders and clinic OICs.

Expected Level of Benefit

An intervention can successfully be assessed only with appropriate sampling.

Phase 3:	Implement intervention/ follow up.
Milestone Description:	Disseminate RX3 information to providers and participants. To increase participation and motivation, patient education remains an important factor to incorporate. Self-report adherence to the program utilizing a daily printed exercise log or electronic exercise log will be utilized to assess completion.

Deliverables	Due Dates	Accountable Person
Measurable goals: Written guidelines for providers and participants to include instructions for participation. Data documented with each follow up. Completion of pre-participation	3 months - until Oct 2021	Primary investigators/ DNP candidates/ providers

measuring pain, functional ability and quality of life.		
Resources Needed		
Printer/ paper for instructions. Time for providers/investigators to recommend and teach about the program, either as patients in clinic or participants in units.		
Expected Level of Benefit		
Data gathered in this phase will serve as the foundation for interpretation of findings and support for solution.		
Phase 4:	Evaluate results.	
Milestone Description:	Interpretation of data gathered during Phase III. Evaluation of RX3 in reduction of pain, improvement of functional ability and quality of life and lost workdays.	
Deliverables	Due Dates	Accountable Person
Measurable goals: Post implementation outcome measure evaluations of numerical pain score, disability, functional quality of life and impression of change.	1 month - until Nov 2021	DNP candidates to evaluate information gathered from all participants. Utilize statisticians at JBLM if available.
Resources Needed		
Reliable questionnaire tools to evaluate pre and post implementation metrics to include numerical pain scale, patient specific functional scale, Oswestry disability scale, length of work absence, and limited duty days. Printer/paper to print questionnaires for participants or computers for online surveys to be filled out via email as needed.		
Expected Level of Benefit		
The results will guide the direction of whether to proceed with implementing the standardization of NLBP self-exercise regimen at JBLM.		
Phase 5:	Finalize data, communicate findings and devise a plan for future implementation.	
Milestone Description:	This phase will summarize all findings from the evidence-based study to present to JBLM's stakeholders and the school institution to peers and faculty.	
Deliverables	Due Dates	Accountable Person
Measurable goals: Computer draft of poster to present to JBLM leadership and to be used for school presentation prior to graduation.	1 month after evaluation of findings- until Dec 2021 to summarize data for hospital stakeholders. Podium and poster presentation May 2022 for faculty and peers.	JBLM providers and leadership to implement change if determined to be effective. DNP candidates to disseminate information and cement change in handling pts with LBP within the clinics at JBLM.
Resources Needed		
Motivated staff for continued compliance of change. Approval of leadership to utilize RX3 at JBLM Madigan hospital or outlying clinics for LBP management. Computer and projector to present to JBLM stakeholders and poster board to present at school institution.		
Expected Level of Benefit		
An effective self-exercise program that can be utilized by JBLM can reduce healthcare costs, increase access to care, increase readiness and provide a readily available alternative for patients unable to attend in-person therapy. Dissemination of RX3 will broaden the awareness of providers within the military healthcare system of its availability which eases LBP management.		

NOTE: Modified from Harvard Business Review Press. (2011). *Pocket mentor: Developing a business case.* Boston: Author (pp8285).

Appendix D

Data Analysis Plan

		Variable Name	Variable Description and type of measure	Data Source	Possible Range of Values	Level of Measurement	Time Frame for Collection	Statistical Test	Decision Rule
Population	**Independent Variable**	Home exercise program	Description: Home exercise program (HEP) resources for low back pain (LBP) for providers Measure Type: Process	HEP resources can be found on the RX3 website and DoD site. Participants to be recorded by DNP candidates	0 = pre-education 1 = post-education	Nominal	August - September 2021 (6 weeks)	None	N/A
	Dependent Variable	Prescription of HEPs and utilization of resources	Description: Evaluation of provider education Measure Type: Outcome	Questionnaires given to all provider participants at pre and post implementation after 6 weeks Retrospective medical record reviews	Utilization of HEPs Yes and No Demographics 1 - 5 Familiarization - Yes and no Barriers - Yes and no Benefits - Yes and no	Nominal and ratio	Oct 2021 - (Pre-intervention) February 2022- (Post-intervention)	Fisher's exact	N/A

Appendix E

Evidence Table

1st Author Name (Publication Yr)	Study Purpose/Aims	Research Questions/Hypotheses (IF different from/specifically described separately from study purpose & aims)	Study Design	Total Sample Size (How many initially, how many at final analysis?)	Sampling Plan	Independent Variables AND LEVEL OF MEASUREMENT	Dependent Variables AND LEVEL OF MEASUREMENT	Statistical Analyses - what tests were used for which research questions?	Results	Strengths (how promoted internal/external validity)	Weaknesses (biases; poorly controlled threats to internal/external validity)	LEVEL OF EVIDENCE - using JHNEBP tool (Strength and Quality)
Cai et al. (2017)	To compare the treatment effect of lower limb (LL) exercises versus conventional lumbar extensor (LE) and lumbar stabilization (LS) exercises in recreational runners with chronic low back pain (CLBP) because there is currently no specific protocol for managing runners with CLBP.	Specific LL exercises would be more effective in reducing running-induced pain and improving self-rated running capability, LL strength, back muscle function, and running gait than the conventional back exercises.	Single-blind randomized trial	91 potential participants were screened. 7 did not meet inclusion criteria. 84 were then randomized into 3 equal gorups of 28. At final analysis, there were 74 participants. 10 lost to follow up or injuries unrelated to the study.	Participants were assessed at preintervention, mid-intervention, and intervention. Selected outcomes also followed at 3 and 6 months.	1. LL exercises - nominal 2. LE exercises - nominal 3. LS exercises - nominal	1. Numeric pain rating scale (NPRS) - ordinal 2. Patient-specific functional scale - ordinal 3. peak isokinetic torques - ratio 4. TrA (transverse abdominus) and LM (lumbar multifidus) percent thickness change - ratio 5. medium frequency slope (MFS) for iliocostalis and longissimus - ratio 6. Running gait parameters - ratio	The participants' characteristics, exercise compliance rate, and running distance were compared among the 3 groups using ANOVA (parametric) or the Kruskal-Wallis test (nonparametric).A generalized estimating equation (GEE) approach using SPSS 21.0 was used to compare the treatment and interaction effects.	LL group improved 0.949 pts /time point in Pt specific functional scale, which was higher than the LE and LS groups. All 3 groups improved in average 0.746 points/time point in numeric pain rating scale for running induced pain. Knee extension strength increased in the LL group, which was higher than the LE and LS groups. The LL group also showed a > increase in running step length compared with the LS group. All 3 groups improved similarly in back muscle function. **LL exercise therapy could be a new option for cLBP management given its superior effects in improving running capability, knee extension strength, and running gait. **Home exercise compliance rate much better than formal PT session attendance and pain reductions in the study were attributed to home exercises.	1. Filled a research gap on lack of evidence-based protocols to treat runners with chronic LBP. 2. exclusion criteria eliminated factors that can affect outcome measures. 3. Participants were assessed on all outcome measures at preintervention, mid-intervention, and end-intervention by a dedicated therapist who was blinded to the treatment groups.	1. study relied heavily on compliance from participants. 2. low attendance to the supervised exercise session (4-7 visits of 16) 3. did not evaluate if hoe exercises alone were sufficient to successfully treat cLBP conditions. 4. Findings are more geared towards younger, recreational runners and its application should have more caution with older, less active adults.	Level IIB
Gordon & Bloxham (2016)	To review the effects of physical activity and exercise interventions involving aerobic exercise, muscular strength and stabilization exercises and/or flexibility training on nonspecific chronic low back pain (NSCLBP) to identify effective strategies for treatment.	A general exercise program that combines muscular strength, flexibility and aerobic fitness is beneficial for rehabilitation of NSCLBP.	Systematic review	Database searches initially included 621 articles from 2005 to 2015 and was narrowed to 14 studies after articles were reviewed dating 2014 and 2015.	Articles were retrieved from databases SPORTDiscuss, Medline and Google Scholar. Studies were included within the final review based on population, intervention and outcome. Inclusion criteria were patients with NSCLBP aged 18 years or older. Literature reviews and any article which did not involve a delivery of an intervention program to NSCLBP patients were excluded.	1. Aerobic exercise program - nominal 2. Muscular strength and stabilization program - norminal 3. Flexibility intervention program - nominal	1. LBP (Visual analog scale) - ordinal 2. Disability or functional status - ratio	P values of <.05 were considered statistically significant for the included studies.	Moderate intensity aerobic exercise should be promoted for NSCLBP rehabilitation. Aerobic fitness, behavioral treatment and multidisciplinary treatment programs are important for reducing CLBP and improving disability. The combination of both core abdominal muscle strength and spine stabilization programs are more effective at reducing NSCLBP than core muscular exercises alone. A general exercise program is suggested as opposed to focusing on one particular area of fitness. Improving the flexibility of the lumbar spine and hamstrings can significantly reduce CLBP by 18.5% - 58%. Therefore including lumbar flexion exercises in an intervention program for CLBP is important. **Exercise intervention programs involving either muscular strength, flexibility or aerobic fitness is beneficial for NSCLBP but not acute low back pain.	1. Pain was categorized into three different categories. Studies included were all from the same chronic category. 2. Majority of the included studies had male and female participants which increases generalizability of the outcomes to the general adult population. 3. All p values of the 14 included studies were statistically significant or statistically highly significant.	1. The studies included in the review included each exercise intervention separately. It lacks research results combining all three exercises. 2. NSCLBP have varying etiologies that can influence the results. Those external factors were not mentioned. 3. Some studies excluded patients with BMI >30. This limits the applicability of results to obese patients.	Level IB
Kanas et al. (2018)	To evaluate pain, functional capacity, and quality of life of patients with non-specific chronic low back pain (NSCLBP), after home-based exercise therapy with different kinds of supervision.	NSCLBP with lower complexity can be treated and prevented at a home based exercise program and do not require a physical therapist supervised program.	Non-randomized clinical trial with unblinded assessment	30 patients with NSCLBP were selected, after a medical assessment, to participate. Participants were blinded into 2 unblinded groups; according to their availbaility to get to the rehabilitation center. All participants remained at final analysis without attrition.	Study conducted from April 2016 to April 2017 at a spine clinic of a sports injury center. Inclusion criteria were: age 18 and 65 years, both gender, NSCLBP >12 weeks, having front and lateral lumbosacral x-rays, agree to informed consent. Exclusion criteria are as follows: pregnancy, readiographic changes, prior spine surgery, neural compression symptoms, and a specific disease cause for LBP. Group A (N=17) had exercise therapy without weekly supervision. Group B (N=13) had weekly supervision.	1. Home-based exercise program - nominal 2. Weekly supervision by a physical therapist - nominal	1. Pain numerical rating scale (PNRS) - ordinal 2. Disability (Roland Morris) - ratio 3. Functional capacity - ratio 4. Quality of life (Short form-36) - ratio	The scores from the questionnaires were analyzed using models of generalized estimating equation (GEE) considering the relationship between the different assessments of the same patient. The results were presented through estimated means with confidence intervals of 95% (CI95%). The comparison between groups and times of assessment were presented through estimated mean differences and its respective CI95%, and p values were corrected using Bonferroni. The analyses were conducted using the SPSS® software, version 18, with significance level set at 5%.	There was an improvementin pain and functional capacity between the initial evaluation and week 4, and the initial evaluation and week 8 in both groups (p<0.05). In the quality of life evaluation, the criteria for pain, functional capacity, and physical aspects had significant improvement after 8 weeks (P<0.05). There was no difference when comparing groups A and B (p>0.05). The weekly supervision did not significantly influence the final outcome between the groups.	1. Included both genders in the study with a wide age spectrum of the adults increasing the applicability of the outcome to the general population. 2. All participants were able to adhere to the study until completion without attrition.	1. It was not possible to blind the physical therapist that supervised the Group B sessions, nor to randomize the grouping of individuals due to the nature of the intervention and availability of participants. 2. The participants were responsible for controlling the frequency of sessions, which generates a risk of bias. 3. Small sample size	Level IIIB

1st Author Name (Publication Yr)	Study Purpose/Aims	Research Questions/Hypotheses (IF different from/specifically described separately from study purpose & aims)	Study Design	Total Sample Size (How many initially, how many at final analysis?)	Sampling Plan	Independent Variables AND LEVEL OF MEASUREMENT	Dependent Variables AND LEVEL OF MEASUREMENT	Statistical Analyses - what tests were used for which research questions?	Results	Strengths (how promoted internal/external validity)	Weaknesses (biases; poorly controlled threats to internal/external validity)	LEVEL OF EVIDENCE - using JHNEBP tool (Strength and Quality)
Keane (2016)	To compare AquaStretch with supervised land based stretching (LBS) and measure three outcomes: pain, perceived disability, and fear of movement (kinesiophobia).	Land and water exercise are both beneficial and comparable for treating CLBP and reduces LBP and disability.	Repeated measure randomized controlled trial (RCT) using a blind selection.	42 subjects were recruited to the trial via posters displayed at a national training center, Facebook and a local magazine, although only 29 actulaly took part in the research without any dropouts once the study commenced.	Study performed between April 30 and June 2014 at a training facility. 29 subjects were assigned via random, blind selection into 3 groups: control (N=9), LBS (N=10) and AquaStretch (N=10). Inclusion criteria were: aged 18 and 70, self-reported CLBP for atleast 3 months, no surgical back interventions, not pregnant. Exclusion criteria were: acute back pain lasting 1-6 weeks, osteoperosis, stenosis, fractured vertebrae, history of back surgery, spondylosis and spondylitis.	1. AquaStretch - nominal 2. LBS - nominal 3. control (usual physical activity) - nominal	1. LBP (Visual analog scale) - ordinal 2. Disability (Modified oswestry LBP questionnaire [MOLBPQ]) - ratio 3. Tampa scale of kinesiophobia[TSK]) - ordinal	Statistical analysis was performed using Statistical Package for Social Sciences (SPSS v21. Results were considered statistically significant at 95% confidence interval (p<0.05). A repeated measure one way ANOVA was used to findt he mean within each group. The study showed no violation of significance using Mauchly's test of sphericity for 3 variables (p>0.05): MOLBPQ, TSK and WAS). Additionally a Shapiro-Wilk's test (p>0.05) and a visual inspection of the histograms, normal Q-Q plots and box plots showed that scores were normally distriuted for all 3 variables as significant values were all greater than p>0.05 therefore parametric tests were applied to all data.	VAS improved within both AquaStretch and LBS groups. However it is evident that at week 6 the comparison between LBS and AquaStretch indicates that LBS group perceived less pain than the AquaStretch group which concurs with other research stuies of short duration that land exercise and water are comparable for relieving pain in CLBP sufferers.	1. The trial added to current research to prove that longer duration treatment is of significant benefit to sbjects with CLBP and fear of movement. 2. No conflict of interest from financial funding or particpant bias.	1. A larger sample size would enable statistical analysis on a greater array of CLBP presentations, together with differing levels/stages of pain and a more etensive age and gender range. 2. External factors such as other treatment modalities that can influence result were considered. 3. Age and its relationship to pain were not studied 4. A combination of both treatments (LBS and Aquastretch) can provide additional details such as cost effectiveness.	Level IB
Ladeira et al. (2015)	The purprose of this study was twofold: a) to describe physical therapy's (PTs) preferences for treating acute and subacute non-specific LBP (NSLBP) in Florida and to compare these preferences to EBP recommendations and b) to compare outpatient musculoskeletal therapist (MSPT) choices for management of acute and subacute LBP to non-outpatient musculoskeletal therapist (NMSPT) choices.	Intervention for LBP is largely based on evidence-based practice (EBP) recommendations among PTs in the United States.	Descriptive study	A total of 327 out of 2804 PTs participated in the study with a repsonse rate of 14.5%.	The sample was selected in 2007 from the population of licensed PTs in thes state of Florida collected from the Florida Department of Health, Division of Medical Quality Assurance. Of the 22,000 PTs licensed to work in Florida in 2006, 15% (2804 PTs) had an email address listed and were invited to participate. Study participants were divided into 2 groups: a) MSPTs b) NMSPTs working in multiple settings, home health, neurological or MSK inpatient settings, school systems, academia, etc.	1. MSPTs - nominal 2. NMSPTs - nominal	1. Adeherance to EBP guidelines - ratio 2. Preferences in acute and subacute LBP management - ratio	Descriptive statistics was used in this study to describe the demographic characteristics of the sample (age, gender, clinical experience, patient caseload, LBP patient caseload, and continuing education courses attended in manual therapy). The investigators described the treatment choices for the therapists by rate (percentage). The present authors used the chi-square to compare MSPTs versus NMPTS adherence to EBP guideline recommendations for acute and for subacute LBP.	In acute LBP management, MSPTs performed at a statistically higher rate than NMSPTs in regards to adherance to EBP recommendations. In subacute LBP, there was not a statistcall significant difference on EBP adherance between MSPTs and NMSPTs. **The adherance to EBP guideline recommendations for LBP was low for all participating PTs in Florida. This was worse for NMSPTs, as compared to MSPTs. High velocity low amplitude manipulation was underutilized for acute LBP management, and passive interventioanl modalitis were overutilized in subacute management.	1. Three expert PTs validated the specific treatment techniques selected for the survey. 2. Definitions regarding treatment adherance to both acute and subacute vignettes used in the study were based on up to date EBP recommendations within a 6-year timeline.	1. Low response rate from potential participants (14.5%) due to use of electronic survey which is often lower than traditional postal response rate because of server rejection, automated out of office replies, and organizational/personal spam filters. 2. Slef-selection bias to participate in the study since the participants who responded probably worked in the field of MSK medicine and were more knowledgeable than nonrespondents.	Level IIIB
Nagai et al. (2015)	To compare lumbar spine and hip felxibility and trunk strength in pilots with and without a LBP history.	It was hypothesized that pilots with a history of LBP would exhibit lower normalized trunk muscle strength, lower trunk and hip ROM, and greater side-to-side asymmetry when compared to pilots without a history of LBP.	Cross-sectional design	A total of 30 pilots with a self-reported history of LBP within the last 12 months were matched with pilots without LBP history. No attrition rate was reported.	The LBP group sample was selected from an active-duty helicopter pilot combat unit. Inclusion criteria were: age 18 to 55 years; no neurological balance disorders; no current spinal, upper limb or lower limb impairment. They were matched with a no-LBP group based on gender, age (+ or - 5 ears), and total flight hours of about 500 hours. To focus on flight related LBP, all pilots have flown at least 100 hours to be qualified in the study.	1 LBP group - nominal 2. no-LBP group - nominal	1. Trunk strength - ratio 2. Lumbar spine flexibility - ratio 3. Hip flexibility - ratio	All statistical analyses were performed using SPSS 20.0. Descriptive statistics were calculated for all variables. Each dependent variable within each group was assessed for normality (Shapiro-Wilk test). Paired t-tests (normal data) or Wilcoxon tests (non-normal data) were used to compare between the groups. Significance was set at p<0.05 a priori.	The LBP group demonstrated significantly lower trunk extension strength and trunk extension/flexion strength ratio (p<0.008). The LBP group demonstrated significantly less lateral flexion ROM as well as greater lateral flecion and rotation side-to-side asymmetry (p<0.009). The LBP group demonstrated significantly greater total hip totation side-to-side asymmetry (p=0.037). Given the results, specific exercises that are targeted to improve trunk strength, ROM, and side-to-side symmetries could be developed to reduce LBP in helicopter pilots.	1. All lumbar spine range of motion (ROM) measurements were performed by the same certified athletic trainer. 2. All ROM measurements were taken atleast 3 times and the average was used for data analyses.	1. Military pilots face external factors that are unique to their occupation that may influence the outcome of the study. 2. All pilots in the LBP group had a history of self-reported LBP, but everyone was asymptomatic at the time of testing. Pilots with severe or ongoing LBP may have different MSK characteristics. 3. The study used self-report of their LBP experience. The Oswestry LBP disabaility questionnaire (OSW) is typically intended for use with patientsand/or research subjects with a current episode of LBP vs a past episode.	Level IIIB

1st Author Name (Publication Yr)	Study Purpose/Aims	Research Questions/Hypotheses (IF different from/specifically described separately from study purpose & aims)	Study Design	Total Sample Size (How many initially, how many at final analysis?)	Sampling Plan	Independent Variables AND LEVEL OF MEASUREMENT	Dependent Variables AND LEVEL OF MEASUREMENT	Statistical Analyses - what tests were used for which research questions?	Results	Strengths (how promoted internal/external validity)	Weaknesses (biases; poorly controlled threats to internal/external validity)	LEVEL OF EVIDENCE - using JHNEBP tool (Strength and Quality)
Qaseem et al. (2017)	To provide treatment guidance based on the efficacy, comparative effectiveness, and safety of noninvasive pharmacologic and nonpharmacologic treatments for acute (<4 weeks), subacute (4 to 12 weeks), and chronic (>12 weeks) LBP in primary care.	1. What are the comparative benefits and harms of different pharmacologic therapies for acute or chronic nonradicular LBP, radicular LBP, or spinal stenosis, including acetaminophen, NSAIDS, opioids, muscle relaxants, antiseizure medicaitons, antidepressants, corticosteroids, and topical or patch-delivered medications? 2. What are the comparative benefits and harms of different nonpharmacologic, noninvasive therapies for acute or chronic nonradicular LBP, radicular LBP, or spinal stenosis, including but not limited to interdisciplinary rehabilitation, exercise (various types), physical modalities, traction tables/devices, back supports/bracing, spinal manipulation, various psychological therapies, acupuncture, massage (various types), yoga, magnets, and low-level lasers?	Clinical Practice Guidelines from the American College of Physicians (ACP) based on systematic review of randomized, controlled trials	Did not mention number of studies initially and at final analysis.	Reviewers searched MEDLINE and Cochrane databases. Studies included were published through April 2015 on noninvasive pharmacologic and nonpharmacologic treatments for LBP with updated searches performed on November 2016. The study population included adults (age 18 years or older) with acute, subacute, or chronic nonradicular LBP, radicular LBP, or symptomatic spinal stenosis.	1. pharmacologic interventions - nominal 2. non-pharmacologic interventions - nominal	1. LBP (VAS) - ordinal 2. Overall function (Oswestry disability index [ODI] - ratio 3. Quality of life - ratio 4. Work disability - ratio 5. Return to work - ratio 6. Global improvement - ratio 7. LBP episodes and frequency - ratio 8. Patient satisfaction - ratio 9. Adverse effects - ratio	No overall statistical analyses mentioned. The ACP graded the recommendations using the ACP's guideline grading system and graded studies as strong or weak. Quality of evidence was rated as low, moderate or high.	**See appendix 1 and appendix 2 of this CPG for complete summary of findings for acute, subacute, and chronic LBP therpies. Recommendations based on results: 1. For acute and subacute LBP, recommended nonpharmacological treatment with superficial hat, massage, acupuncture, or spinal manipulation. If pharmacological treatment desired, should select NSAIDs or SMRs. 2. For CLBP, should initially select nonpharmacologic treatment with exercise, multidisciplinary rehabilitation, acupuncture, mindfulness-based stress reduction, tai chi, yoga, motor control exercise, progressive relaxation, electromyography biofeedback, low-level laser therapy, operant therapy, cognitive behavioral therapy, or spinal manipulation. 3. For CLBP with inadequate response to nonpharmacologic therapy, should consider pharmacologic treatment with NSAIDs as first-line therapy, or tramadol or dulexotine as second-line therapy. Opioids should only be considered as an option in patients who have failed aforementioned treatments and only if the potential benefits outweigh risks and a discussion of risk and realistic benefits have taken place.	1. Underwent peer review process by the journal and was posted for coomments on the AHRQ website and ACP Regents and ACP Governors at the regional level. 2. Reviewers combined data when possible using meta-analysis and assessed risk of bias and study quality according to established methods to ensure studies are valid and reliable.	1. Evidence is insufficient or lacking to determine treatments for radicular LBP. 2. Most of the RCTs enrolled a mixture of patients with acute, subacute, and chronic LBP, so it si difficult to extrapolate the benefits of treatment compared with its duration. 3. Insufficient evidence for most physical modalities and on which patients are likely to benefit from which specific therapy. 4. Evidence on patient-important outcomes, such as disability or return to work, was largely unavailable, and available evidence showed no clear connection with improvements in pain. 5. Great heterogeneity of sample populations with unknown external factors that can potentially affect outcomes.	Level IB
Saner et al. (2015)	To test the effectiveness of a specific exercise treatment to improve movement contol versus general exercise.	There is an added benefit to a tailored movement control exercise program versus general exercise for patients with NSLBP and movement control impairment (MCI).	Parallel group random controlled trial	201 participants assessed for eligibility. After exclusions, 106 were eligible to participate. They were then randomized to 2 groups: MCI group (N=52) and general exercise group (N=54). At final analysis, 98 remained.	Patients presenting with subacute and chronic LBP longer than 6 weeks were recruited from referring hospitals and resident physicians, and through advertising to staff and students at a university. Eligible participants were: age 18-75 years, had MCI complaints with 2 or more positive results out of 6 MCI tests, and disability of 5 points or more on the Roland Morris disability questionnaire (RMDQ). Exclusion criteria were: specific LBP with spinal surgery <6 weeks, spondylodesis, comorbid conditions limiting exercise training, pain below the knee and/or constant pain, score of 130 on the Orebro MSK pain screening questionnaire, and/or >3 months os sick leave due to LBP.	1. MCI group - nominal 2. General exercise group - nominal	1. Function (Patient specific function scale [PSFS]) - ordinal 2. Pain (Graded chronic pain scale [GCPS]) - ordinal 3. Disability (RMDQ) - ratio 4. Patient satisfaction (numeric rating of 0 to 10) - ordinal	Univariate analysis of variance (ANOVA) for PSFS and subsequent analysis of covariance (ANCOVA) analyzed the potential influence of the identified covariates of baseline differences and pain duration. Analyses were conducted using SPSS statistics 20. Two-sided significance was set at $p \leq 0.05$.	The findings of this study indicate no additional benefit on disability and pain to patients with NSLBP and MCI of movement control exercise versus general exercise. Both groups improved significantly on all outcomes over time. The results of this study support previous findings that exercise in general, regardless of the type (movement control or general), is beneficial for patients with NSLBP.	1. Outcome assessors and data analysts were blinded to the allocation and were not involved in treatment throughout the trial. 2. Patients were kept naive to the specific research goal even though they knew which group they were in. 3. The set of 6 MCI tests used in the study had substantial intra-rater and inter-rater reliability. 4. All physiotherapists attended the same amount of 4 hour protocol training of their respective treatment. 5. Reliability and validity of measuring outcomes had high validity and reliability. 6. The adherance to the intervention protocol was high for patients and therapists in both groups.	1. Blinding of patients and physiotherapists to the allocation was not possible. 2. There were 28 physiotherapists who performed the treatments. Therapists in both groups had mixed levels of experience. 3. A selection bias towards NSLBP population with low psychosocial influence and high self-management competence may be present and must be considered when selecting either exercise program for future treatment. 4. The incluson criteria of MCI score of 2 out of 6 was designed to select patients who would have the best chance of improvement with specific exercises.	Level IB
Setchell et al. (2019)	To address a gap in literature by investigating what decreases LBP from the perspectives of individuals living with the condition.	What do patients with LBP perceive as effective in their own LBP management?	Descriptive qualitative design using a custom-built online survey	130 people responded to the questionnaire. Did not include how many were contacted initially.	Individuals with LBP were invited to participate in this study via pain groups, previous studies, and broadly via posting on community notice boards (including on-line). Inclusion criteria were: residing in Australia, age 18 years or older, self identification of current or history of LBP. Mean age of participants is 43 and 76.4% were females.	1. online survey - nominal	1. Passive strategies - nominal 2. Active strategies - nominal	To analyze the data produced from the survey, an established inductive descriptive technique "content analysis" was used involving analysis of the frequency of concepts (themes) within a dataset. The frequency of the particular types of concepts as well as the order it was mentioned were analyzed. Categories were derived from the data, not pre-imposed. The number of data entries that were listed under each theme were quantified as both a total (n) and a percentage (%) of participant responses.	Participants most commonly said that their LBP was reduced by: heat/cold (86, 66%), medication (84, 64.1%), and rest (78, 60%). Next most common was activity/exercise (73, 55.7%). Other factors such as seeing a health professional (52, 39.7%), stretching/therapeutic exercise (50, 38.1%), reducing aggravating activities (45, 34.3%), and psychological changes (41, 31.3%) were mentioned less often.	1. A Consolidated Criteria for Reporting Qualitative Research (COREQ) was used to guide the study reporting and design to increse trustworthiness and rigor. 2. Findings were shared with a qualitative researcher external to the study who confirmed that the analysis was grounded in the data.	1. Perceptions are subjective and participants can have erroneous beliefs about what effects their condition. 2. Participants have different prioritizations and may base answers on other factors other than efficacy of the intervention such as cost or convenience. 3. Most participants had perisistent symptoms so the findings may not apply to those with acute episodes of LBP.	Level IIIB

1st Author Name (Publication Yr)	Study Purpose/Aims	Research Questions/Hypotheses (IF different from/specifically described separately from study purpose & aims)	Study Design	Total Sample Size (How many initially, how many at final analysis?)	Sampling Plan	Independent Variables AND LEVEL OF MEASUREMENT	Dependent Variables AND LEVEL OF MEASUREMENT	Statistical Analyses - what tests were used for which research questions?	Results	Strengths (how promoted internal/external validity)	Weaknesses (biases; poorly controlled threats to internal/external validity)	LEVEL OF EVIDENCE - using JHNEBP tool (Strength and Quality)
Suh et al. (2019)	To compare the efficiency between 2 exercises: the individualized graded lumbar stabilization exercise (IGLSE) and walkng exercise (WE).	The authors hypothesized that IGLSE and WE are highly effective in alleviating LBP and increasing compliance because of their customizability.	Randomized controlled trial	A total of 60 patients were enrolled in the study. 60 patients enrolled in the study were randomly assigned to 1 of 4 groups, based on the exercise type: FE, WE, SE and SWE. Each group had 15 participants. After dropouts, remaining 48 subjects completed the 6-week exerise program. After 6-week post program follow up, 47 subjects were interviewed via telephone.	Study conducted between May 2016 and April 2017. Patients were recruited from an outpatient rehabilitation clinic. Inclusion criteria were subjects >20 years of age with intermittent CLBP >3 months. Exclusion criteria were as follows: Pain <40 on VAS during physical activity, neurological motor weakness, spinal deformity, recent lumbar or abdominal srugery, systemic inflammatory disease or psychiatric disease, severe kneww or hip arthritis, pregnancy and previous paraspinus exercise treatment within 3 months.	1. Lumbar stabilization exercise (SE) - nominal 2. Walking exercise (WE) - nominal 3. Flexibility exercise (FE) - nominal 4. Stabilization with WE (SWE) - nominal	1. LBP (Visual analog scale) during rest and physical activity - ordinal 2. Oswestry disability index - ratio 3. Beck depression inventory - ordinal 4. Frequency of medication use (# of times/day) - ratio	SPSS 21.0 software was used for all statistical analyses. Wilcoxin signed rank test was used to compare the variable before and after the exercise in each group. Kruskal-Wallis test was used to compare the 4 groups. Repeated measures ANOVA was used to compare the pain scores (VAS) at various time points: 1st week (preexercise program), 6th week (immediately post-exercise program), and 12th week (6weeks post-exercise program). The results are presented as the mean + or - standard deviation. P values of <.05 were considered statistically significant.	LBP during physical activity was significantly reduced in all 4 groups after the 6-week exercise program. LBP during rest was significantly decreased in the FE and SE groups. Moreover, the frequency of medication use was decreased significantly in the FE group. Exercise frequency was significantly increased in the SE and WE groups, and exercise time was significantly increased in the SE group. Patients in the SE group showed the highest compliance. The Oswestry disability index and Beck depression inventory were significantly improved in all 4 groups and there was no significant difference between all groups.	1. One researcher was blinded to group allocation measured the outcomes. Statisticians and primary investigators were unaware of the group allocation until data analyses were complete. 2. No statistically significant difference with the sample population with respect to age, sex, exercise amount, and the frequency of medication use among the groups.	1. Unable to blind participants given the nature of the exercise therapy and evaluation. 2. Causes of LBP of the participants were heterogenous. Although still valuable study since the study was to determine an effective exercise method for general LBP. 3. The full extent of the effect of SE, WE, and FE on LBP may be limited as abdominal bracing exercise and correct posture training were performed in all 4 groups owing to ethial reasons. 4. short study period of 6 weeks may be a limiting factor 5. The drug type and potency participants were taking were not considered	Level IB
Suri et al. (2018)	The primary aim of this study was to determine whether physical activities trigger flare-ups of pain during the course of acute low back pain (LBP). A secondary aim was to examine stress and depression as triggers of LBP flare-ups.	Do physical activities trigger flare-ups during the course of an acute LBP episode?	Longitudinal case-crossover study	Of 437 surveys completed by participants in the case-crossover analysis, 73 were excluded owing to being completed within 1 day of each other, and 36 flare periods were excluded for having been completed >4 hours after flare-up onset. This left 328 surveys (81 flare periods and 247 control periods) completed during 6-week follow-up, an average of 11 completed surveys per participant.	Inclusion criteria included adults with a new episode of LBP of duration ≤ 3 months, preceded by at least 1 month without LBP and required to have daily Internet access, a valid email address, and basic computer literacy. Participants were recruited from an outpatient spine clinic between 2009 and 2010. Exclusion criteria included radiating lower extremity pain below the knee, signs or symptoms suggest ing radiculopathy or neurogenic claudication, suspected "red flag" conditions, pregnancy, recent major trauma, or severe comorbidities that would limit participation.	1. Physical activities - nominal 2. Stress and depression - nominal	1. LBP flare ups - ratio	Odds ratios (ORs) and 95% confidence intervals (CIs) were calculated for associations between potential triggers during the past 24 hours, and the risk of LBP flare-ups, using conditional logistic regression. Power calculations were conducted based on the original NURSE RCT four-arm study design. The descriptive results at baseline are presented as means with standard deviations (SD) or proportions. The differences between the 2 groups at the baseline were analysed by the Independent samples t-test, X2test, or Mann–Whitney U test as applicable. The results of the intervention were analysed according to intention to-treat (ITT) principle. Differences in time (at the 3 measurement points) between the 2 groups (exercisers vs non-exercisers) were tested using a generalised linear mixed model (GLMM).	Of 48 participants followed longitudinally, 30 participants had both case ("flare") and control periods and contributed data to the case-crossover analysis. There were 81 flare periods and 247 control periods, an average of 11 periods per participant. Among participants with acute LBP, prolonged sitting (>6 hours) and stress or depression triggered LBP flareups. Physical therapy was a deterrent of flare-ups.	1. To minimize recall bias, we used Internet-based data collection to permit prospec tive, frequent serial assessment of possible triggers (which we refer to henceforth simply as "triggers") and LBP flare ups. 2. The study's prospective ascertainment of exposure status minimized recall bias, at the cost of decreased efficiency (since data were collected for 18 individuals who did not contribute both case and control periods to the analysis).	1. Future prospective case-crossover studies will benefit from considering options to optimize both power (larger sample sizes, more frequent sampling, and longer follow-up) and efficiency (targeting participants with high pain variability, and strategies to increase capture of flare periods).	Level IIIB

1st Author Name (Publication Yr)	Study Purpose/Aims	Research Questions/Hypotheses (IF different from/specifically described separately from study purpose & aims)	Study Design	Total Sample Size (How many initially, how many at final analysis?)	Sampling Plan	Independent Variables AND LEVEL OF MEASUREMENT	Dependent Variables AND LEVEL OF MEASUREMENT	Statistical Analyses - what tests were used for which research questions?	Results	Strengths (how promoted internal/external validity)	Weaknesses (biases; poorly controlled threats to internal/external validity)	LEVEL OF EVIDENCE - using JHNEBP tool (Strength and Quality)
Taulaniemi et al. (2019)	Overall aim of the 6-month exercise program was to reduce pain-induced disturbances of movement control and increase the muscular strength and endurance needed in heavy nursing tasks.	Neuromuscular (NME) reduces LBP intensity and pain interfering with work, and improves lumbar movement control, fitness levels, and work-related factors more than non-exercise.	Secondary analysis of a randomised controlled trial	A total of 219 women aged 30–55 year underwent randomisation from October 2011 to August 2013. Of the 219 women, 80% (n = 176) participated in the 6-month follow-up measurements immediately after the intervention period and 72% (n = 157) participated in the 12-month followup measurements. The drop-out rate was equal in both study groups. Of the sample, 87% were nurses or nursing assistants, and 70% did shift work. with non-specific LBP were originally allocated to 4 groups (exercise, counselling, combined exercise and counselling, control). The present study is a secondary analysis comparing exercisers (n = 110) vs non-exercisers (n = 109).	Adult female healthcare workers age 30–55-year-old were eligible if they had worked in their current job for at least 12 months and had experienced LBP of an intensity of 2 or above on a numeric rating scale within the preceding 4 weeks. Age range was set to get a study sample, which participants had been exposed to physically demanding work, and would still be working during the 24 months' follow up (in NURSE RCT). The exclusion criteria were a serious earlier back injury (disc protrusion, fracture, surgery), chronic LBP as diagnosed by a physician or a self-report of continuous LBP over the past seven months or longer, pregnancy or recent delivery (< 12 months), and engaging in a neuromuscular type of exercise more than once a week.	1. Neuromuscular exercises - nominal 2. Non-exercisers - nominal	1. LBP (Visual Analog Scale [VAS]) - ordinal 2. Pain interfering with work - ratio 3. lumbar movement control - ratio 4. fitness components, and work-related measurements - ratio	Power calculations conducted based on the original NURSE RCT four-arm study design. The descriptive results at baseline are presented as means with standard deviations (SD) or proportions. The differences between the 2 groups at the baseline were analysed by the Independent samples t-test, X2test, or Mann–Whitney U test as applicable. The results of the intervention were analysed according to intention to-treat (ITT) principle. Differences in time (at the 3 measurement points) between the 2 groups (exercisers vs non-exercisers) were tested using a generalised linear mixed model (GLMM). The change in the results of other measurements after the intervention period were calculated by Pearson (rp) or Spearman's correlation coefficient (rs) as applicable. More accurate analyses of the changes in lumbar movement control according to the baseline results were analysed with the test. All statistical analyses	The mean exercise attendance was 26.3 (SD 12.2) of targeted 48 sessions over 24 weeks, 53% exercising 1–2 times a week, with 80% (n = 176) and 72% (n = 157) participating in 6- and in 12-month follow-up measurements, respectively. The exercise intervention reduced pain (p = 0.047), and pain interfering with work (p = 0.046); improved lumbar movement control (p = 0.042), abdominal strength (p = 0.033) and physical functioning in heavy nursing duties (p= 0.007); but had no effect on other fitness and work-related measurements when compared to not exercising. High exercise compliance resulted in less pain and better lumbar movement control and walking test results. **Neuromuscular exercise was effective in reducing pain and improving lumbar movement control, abdominal strength, and physical functioning in nursing duties compared to not exercising.	1. The exercise program was feasible, and its principles can be applied to other kinds of exercise programs. 2. Secondary analysis of a four-arm randomised controlled trial.	1. Lumbar movement control was assessed by 4, repeatable MCI tests (waiter's bow, pelvic tilt, sitting knee extension, prone knee flexion), but the test battery is probably not sensitive enough to detect all (or the smaller) changes in movement control. The 4 tests measure lumbar movement control principally in the sagittal plane, not in the frontal or horizontal plane, which are essential in both walking and performing nursing duties that often involve standing in asymmetric poses. 2. Field tests were used to measure physical fitness. Smaller changes in muscular strength and endurance cannot be detected with the tests used and cannot define which elements of the exercise program caused the reduction in pain. 3. A training program of 6 months is quite long in comparison to the duration of 6–12 weeks used	Level IB
Wewege et al. (2018)	To compare the efficacy of progressive aerobic training (PAT) and progressive resistance training (PRT) studies utilizing protocols consistent with the current recommendations for exercise prescription for chronic musculoskeletal pain for improving pain intensity, disability, and quality of life in individuals with CNSLBP.	PAT and PRT are not equal in efficacy for improving CLBP in patients.	A systematic review and meta-analysis	Five electronic databases were systematically searched up to 1 March 2016: Medline, CINAHL, EMBASE, Scopus and PEDro. The Initial search of 5 databases identified 9045 articles, and 16 more articles were identified through examination of relevant journals and reviews. Following removal of duplicates, 4002 studies were examined by title/abstract, of which 3819 were removed. Of the remaining 183 studies, 177 did not meet the inclusion criteria after full-text examination; 10 of these were excluded because their full text paper was written in a language other than English. Six studies met the inclusion criteria for this analysis.	Included studies were English-language RCTs that examined land-based PAT, PRT, or a combination of PAT and PRT, in males and females with a mean age of 18–45 years. All participants were diag nosed with CNSLBP for > 3 months, with or without radiation in the lower limb. Interventions where the effects of the exercise component could not be isolated from another concurrent intervention, such as pilates, motor-control and stabilizing exercises components; cognitive behavioral therapy, ergonomic advice, medication or education, were excluded. Functional/body weight exercise programs and studies that included participants with previous spinal surgery or back pain attributed to other diagnosis and pathology were excluded.	1. PAT - nominal 2. PRT - nominal	1. pain intensity (VAS) - ordinal 2. disability (Oswestry Disability Index (ODI) and Roland Morris Disability Questionnaire (RMDQ-24) - ratio 3. quality of life (Short Form Health Survey (SF-36) - ratio	Standardized mean difference (SMD) was calculated as a percentage change from baseline and was applied when different methods were used to establish the same outcome (e.g. for pain intensity). If not reported, 95% confidence intervals and standard deviations for overall treatment effects were calculated using RevMan 5.3. Heterogeneity was quantified using the Cochran Q test (Chi2) and Higgins I2. Level of significance was set at p <0.05 and figures were produced using RevMan 5.3.	PAT and PRT decreased pain intensity in individuals with CNSLBP (p < 0.03), although neither mode was superior. Resistance exercise improved psychological wellbeing, p=0.002.	1. Study quality was assessed using a Physiotherapy Evidence Database (PEDro) score which has demonstrated strong validity and inter-rater relia bility for the evaluation of RCTs. 2. Visual analysis of Egger plots revealed no publication bias for any analysis conducted in this study. 3. The I2 scores indicated no significant heterogeneity for either of the significant results in this analysis.	1. Lack of blinding of subjects, therapists or assessors, though the authors acknowledge that participant and therapist blinding is difficult to achieve in exercise intervention trials. 2. Three studies (50%) reported a dropout rate of > 15%, but only one of these studies implemented an intention-to-treat analysis to address this issue. 3. Results were extracted and analysed from English manuscripts. Had they been able to include the non-English papers (n=10) identified through the search, this may have influenced the findings.	Level IB

Appendix F

Pre-intervention Questionnaire

Standardized Exercise Rehabilitation Program for Nonspecific Low Back Pain (LBP)

Pre-Education Outcomes

Age: _____ Years in practice as a clinician: _____

Sex: Male Female

Discipline: Physician Nurse Practitioner Physician assistant

Service Army Air Force Navy Civilian

1. Are home exercise programs (HEP) beneficial for low back pain (LBP) rehabilitation? No Yes

2. Do you prescribe HEP for LBP rehabilitation? No Yes
If not, do you encounter any of the following provider barrier(s) from prescribing HEP?

- ○ Lack of familiarity with available programs No Yes
- ○ Perception that HEPs are ineffective No Yes
- ○ Resources are not readily available No Yes
- ○ Prefer to refer patients to physical therapy No Yes
- ○ Patient refusal No Yes
- ○ Appointment time constraints No Yes

If yes, do you use any of the following resource(s)?

- ○ Photocopied exercises from a book. Book title _____ No Yes
- ○ Printed exercises from a website. Site name _____ No Yes
- ○ DoD guidelines No Yes
- ○ Rx3 No Yes
- ○ Search engine (Google, Yahoo, etc...) results No Yes

3. Are there any other barriers you encounter from prescribing HEP not previously mentioned? Please list here _____ No Yes

4. Are there any other resources that you use not previously mentioned? Please list here _____ No Yes

5. Will having an available LBP HEP reduce your physical therapy referrals? No Yes

6. Is it beneficial to standardize the prescribed LBP HEP for patients? No Yes

7. As a clinician, what method(s) can ease your delivery of HEP?
Check all that apply.

- ○ Providing an easily accessible website embedded in Genesis EHR
- ○ Readily printed materials to hand to patients
- ○ QR code of the exercise program for patients to scan in the exam room
- ○ Exercise prescription pads for patients with a website of exercise program
- ○ Premade auto-text on prescribing LBP HEP in EHR

Appendix G

Post-intervention Questionnaire

Standardized Exercise Rehabilitation Program for Nonspecific Low Back Pain (LBP)

Post-Education Outcomes

Age: _____ Years in practice as a clinician: _____

Sex: Male Female

Discipline: Physician Nurse Practitioner Physician assistant

Service Army Air Force Navy Civilian

1. Do you find low back pain (LBP) home exercise programs (HEP) beneficial for patients? No Yes

2. Do you prescribe an HEP for LBP? No Yes

If not, what barrier(s) from the following do you encounter on prescribing an HEP?

- ○ Lack of familiarity with available programs No Yes
- ○ Perception that HEPs are ineffective No Yes
- ○ Resources are not readily available No Yes
- ○ Prefer to refer patients to physical therapy No Yes
- ○ Patient refusal No Yes
- ○ Appointment time constraints No Yes

If yes, what resource(s) do you use?

- ○ Photocopied exercises from a book. Book title _____ No Yes
- ○ Printed exercises from a website. Site name _____ No Yes
- ○ DoD guidelines No Yes
- ○ Rx3 No Yes
- ○ Search engine (Google, Yahoo, etc...) results No Yes

3. Are there any other barriers you encountered from prescribing HEP not previously mentioned? Please list here _____ No Yes

5. Did having a readily available LBP HEP reduce your physical therapy referrals? No Yes

6. Is it beneficial to standardize the prescribed LBP HEP for patients using Rx3? No Yes

7. Is it beneficial to standardize the prescribed LBP HEP for patients using another resource?

No Yes

Please list preferred resources here _____

8. Given the resources below, what did you find useful in prescribing LBP HEP for patients? Check all that apply.

- ○ Easily accessible website embedded in EHR
- ○ Readily printed materials to hand to patients
- ○ QR code of the exercise program for patients to scan in the exam room
- ○ Exercise prescription pads for patients with a website of exercise program
- ○ Premade auto text on prescribing LBP HEP in EHR

Appendix H

Team Mentor Agreement Form

Appendix C: Daniel K. Inouye Graduate School of Nursing
DNP Project Team Mentor (Committee Membership) Agreement Form

DOCTOR OF NURSING PRACTICE PROJECT
DNP Project Clinical Question and Team Mentor (Committee Membership) Agreement Form

Graduation Year:

Name(s) of DNP Project Student Team:

1. JBLM Phase II Site: AGCNS ☐ FNP ■ PMHNP ☐ RNA ☐ WHNP ☐
2. _____ Phase II Site: AGCNS ☐ FNP ☐ PMHNP ☐ RNA ☐ WHNP ☐
3. _____ Phase II Site: AGCNS ☐ FNP ☐ PMHNP ☐ RNA ☐ WHNP ☐
4. _____ Phase II Site: AGCNS ☐ FNP ☐ PMHNP ☐ RNA ☐ WHNP ☐
5. _____ Phase II Site: AGCNS ☐ FNP ☐ PMHNP ☐ RNA ☐ WHNP ☐
6. _____ Phase II Site: AGCNS ☐ FNP ☐ PMHNP ☐ RNA ☐ WHNP ☐

The tentative title of the DNP Project Proposal for this student group is:
Home Exercise Programs for Self-Rehabilitation of Non-specific Lower Back Pain

Committee Approved DNP Project Clinical Question:
Will a brief educational presentation of HEPs for LBP and provision of toolkits to providers assigned to primary care clinics at Joint Base Lewis McChord (JBLM) increase prescription of HEPs to patients with sub-acute and chronic nonspecific LBP ?

Names of DNP Project Team Mentors

I agree to serve as a member of the DNP Project Team (Team Mentors) for the above DNP Student Project Team. As a Project Team Mentor, I agree to the duties and responsibilities outlined within the DNP Project Manual which include but are not limited to the provision of consultation and guidance supporting the entire DNP project journey and to ensure the DNP project is of sufficient rigor and demonstrates doctoral level scholarship to meet the requirements for USUHS GSN graduation.

Form Version: 1 Jun 2016

Appendix C: Daniel K. Inouye Graduate School of Nursing
DNP Project Team Mentor (Committee Membership) Agreement Form

NOTE: You may have 3-4 DNP Team Mentors [committee members including your DNP Senior Mentor (Chair)]. The Phase II Site Director may also be a member of the group, as well as other USUHS faculty or others who may serve as content experts. All non-USUHS faculty selected as a Team Mentor must be approved by the DNP Project Director.

Senior Mentor (Chair): MAJ Holly Archer Signature: ARCHER.HOLLY.R.1264169913 Date: 18Dec2020

Team Mentor (Committee): LTC Tommy Thompson Signature: THOMPSON.TOMMY.LEE.1234023647 Date: 19DEC2020

Team Mentor (Committee): _____ Signature: _____ Date: _____

Team Mentor (Committee): _____ Signature: _____ Date: _____

Appendix I

CITI Certificates

CITI PROGRAM

Completion Date 26-Mar-2020
Expiration Date 26-Mar-2023
Record ID 36038308

This is to certify that:

Mark Cenon

Has completed the following CITI Program course:

Not valid for renewal of certification through CME.

OUSD 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/?w925557d8-f31e-4dc0-8ce4-10ce0aedfdc2-36038308

CITI PROGRAM

Completion Date 24-Mar-2020
Expiration Date 24-Mar-2023
Record ID 36044390

This is to certify that:

Mark Cenon

Has completed the following CITI Program course:

Not valid for renewal of certification through CME.

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/?w2ad05bb2-abf8-45c4-9049-1275586737e3-36044390

CITI PROGRAM

Completion Date 31-Mar-2020
Expiration Date 31-Mar-2023
Record ID 36038312

This is to certify that:

Mark Cenon

Has completed the following CITI Program course:

Not valid for renewal of certification through CME.

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/?w824336e4-d9a9-4245-b539-80f86fcce230-36038312

CITI PROGRAM

Completion Date 31-Mar-2020
Expiration Date 31-Mar-2023
Record ID 36109519

This is to certify that:

Christela Turner

Not valid for renewal of certification through CME. Do not use for TransCelerate mutual recognition (see Completion Report).

Has completed the following CITI Program course:

OUSD 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/?w9ed44d7b-cfa8-4efe-85a1-595778309cf0-36109519

CITI PROGRAM

Completion Date 30-Mar-2020
Expiration Date 30-Mar-2023
Record ID 36109688

This is to certify that:

Christela Turner

Has completed the following CITI Program course:

Not valid for renewal of certification through CME. Do not use for TransCelerate mutual recognition (see Completion Report).

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/?w226270cb-8e10-4271-b4af-11a550d2a455-36109688

CITI PROGRAM

Completion Date 30-Mar-2020
Expiration Date 30-Mar-2023
Record ID 36109520

This is to certify that:

Christela Turner

Has completed the following CITI Program course:

Not valid for renewal of certification through CME. Do not use for TransCelerate mutual recognition (see Completion Report).

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/?w6ee2fba0-ec25-45dc-92cb-326c1ae09b84-36109520

Appendix J

USU Form 3202N

USUHS FORM 3202N
DANIEL K. INOUYE GRADUATE SCHOOL OF NURSING
EVIDENCE-BASED PRACTICE/PERFORMANCE IMPROVEMENT PROPOSAL

VPR Date Stamp

Project Number: _____ (VPR will assign)

Project Title: Home Exercise Programs for Self-Rehabilitation of Non-specific Lower Back Pain

SECTION A: STUDENT POC INFORMATION

1. Name (Last, First, MI): Cenon, Mark, C. Student E-mail: mark.cenon@usuhs.edu
2. Home Address: 1933 Dock St .Apt 529 Tacoma, WA Cell Number: (601) 831-1157

SECTION B: COMMITTEE CHAIR / SENIOR MENTOR INFORMATION

3. Name (Last, First, MI): Taylor, Laura
4. Telephone: (800) 515-5257 Fax: N/A E-mail: laura.taylor@usuhs.edu
5. USUHS Building/ Room No.: Madigan Army Medical Center

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: N/A
   Project Title: N/A
   Project Start Date: _____ Project End Date: _____
8. Anticipated period of performance: Project Start Date: 9/1/2021 Project End Date: 5/1/2022
9. Performance Site(s): Joint Base Lewis McChord
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:

Mark Christian Cenon Digitally signed by Mark Christian Cenon Date: 2021.08.16 18:56:33 -07'00'		Laura Taylor, PhD, RN, ANEF, FAAN Digitally signed by Laura Taylor, PhD, RN, ANEF, FAAN Date: 2021.09.19 12:53:45 -04'00'	
Student (Project Point of Contact for the Group)	(Signature and Date)	Chair/Senior Mentor	(Signature and Date)
Chair/Program Director	(Signature and Date)	Chair/Program Director	(Signature and Date)
DNP Project Director or PhD Director	(Signature and Date)	Associate Dean for Academic Affairs, GSN	(Signature and Date)
Associate Dean for Research, GSN	(Signature and Date)	Dean, DKI Graduate School of Nursing	(Signature and Date)

In light of the above signatures, the project is approved.

RANDOLPH.TOYA.V.1242107698 Digitally signed by RANDOLPH.TOYA.V.1242107698 Date: 2021.10.26 09:40:05 -04'00'

USUHS Vice President for Research

10/26/2021

Date

USUHS Form 3202N (VPR) - Revised Sep 2015 v1.2
Previous versions are obsolete

Appendix K

MTF IRB Letter of Determination

DEPARTMENT OF

THE ARMY

MADIGAN ARMY

MEDICAL CENTER 9040

JACKSON AVENUE

TACOMA, WA 98431-1100

MCHJ-ISI 9 August 2021

MEMORANDUM FOR CPT Mark Cenon, AN, DNP/ FNP Candidate Class of 2022, USUHS

SUBJECT: Determination of Not Research for project titled “Home exercise program for self-rehabilitation of non-specific lower back pain”. Human Research Protections Office Reference No. 221069

1. The Madigan Army Medical Center Human Research Protections Office received the above-referenced evidence-based practice (EBP) project on 30 July 2021 to review for applicability of human subjects protection regulations.

2. This project aims to determine whether education on evidence-based home exercise programs (HEPs) to primary care providers will increase its utilization. Several clinical practice guidelines and literature recommend the use of HEPs for rehabilitation of back pain. Project activities include utilization of education to introduce providers to evidence- based HEPs and resources, educating providers on how to place a hyperlink of resource websites into MHS Genesis, and creation of “auto text” that will be given to providers for their use and ease of documentation. A pre-post education survey to analyze current practices and views regarding prescription of HEPs for low back pain will be administered to measure a change in practice and utilization, as well as perceived benefits of HEPs. A record review will also be conducted pre and post education in order to assess increase in utilization and documentation of HEPs.

3. This study does not constitute research as defined under the human

subjects protection regulations, as it is not “a systematic investigation . . . designed to develop or contribute to generalizable knowledge.” [32 CFR 219.102(l)] Additionally, per DoD Instruction (DoDI) 3216.02, “activities, including program evaluation, customer satisfaction surveys, user surveys, outcome reviews, and other methods, designed solely to assess the performance of DoD programs where the results of the evaluation are only for the use of Government officials responsible for the operation or oversight of the program being evaluated and are not intended for generalized use beyond such program” are not research involving human subjects, and as such, are not covered under the requirements of DoDI 3216.02.

4. **This determination should not be construed as approval to conduct this project.** It is your responsibility to identify and obtain any necessary permissions or approvals to conduct the project prior to initiation. This activity may proceed with no further requirement for review by the Madigan Army Medical Center Human Research Protections Office, pending other required approvals.

5. In addition, your project may become research subject to IRB review if it is modified and/or includes a systematic investigation to develop or contribute to generalizable knowledge. In the event there is a change to the above-described project that may affect its determination, please submit a modification form for review and determination. No change to this activity may be implemented until the review is completed and you have been notified that there is no revision to the determination that your activity is still deemed not to be research. A request for review does not need to be submitted for the following changes to your activity: (1) personnel conducting the activity; (2) location or site at which activities will be conducted; (3) number of respondents; or (4) period of time over which the activity will be conducted. You are not authorized to take project data away from the institution.

6. All publications, presentations or abstracts arising from this work must be cleared through appropriate publication clearance procedures prior to publication IAW your institutions local publication clearance policy. Many journals are interested in publishing projects that are not research. If you do decide to publish your findings, please use paragraph headings such as: “issue,” “procedures for collecting and evaluating information,” “information found,” “lessons learned,” etc. and avoid using headings such as “research questions or hypothesis,” “methods,” “results,” “study limitations,” etc.

7. The Madigan Army Medical Center Human Research Protections Office point of contact for this review is Dr. Mary S. McCarthy, Center for Nursing Science & Clinical Inquiry, at 253-968-3695 or mary.s.mccarthy1.civ@mail.mil.

[redacted]

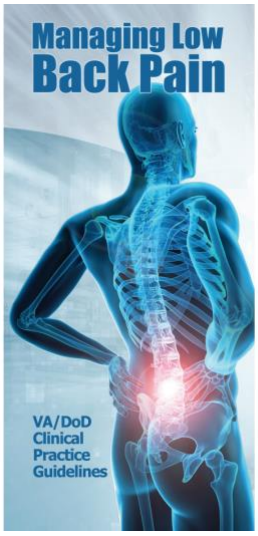
Mary S. McCarthy, PhD, RN,
FAAN Exempt Determination
Official Center for Nursing
Science & Clinical
Inquiry
Madigan Army Medical Center

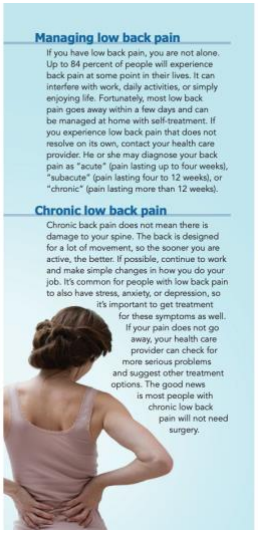
Appendix L

LBP Toolkit Contents

Figure L1

VA/DoD CPG Booklet

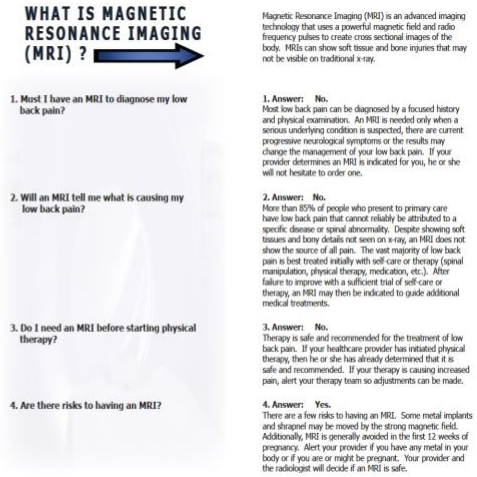




Note. VA/ DoD Booklet, "Management of Low Back Pain" for patients.

Figure L2

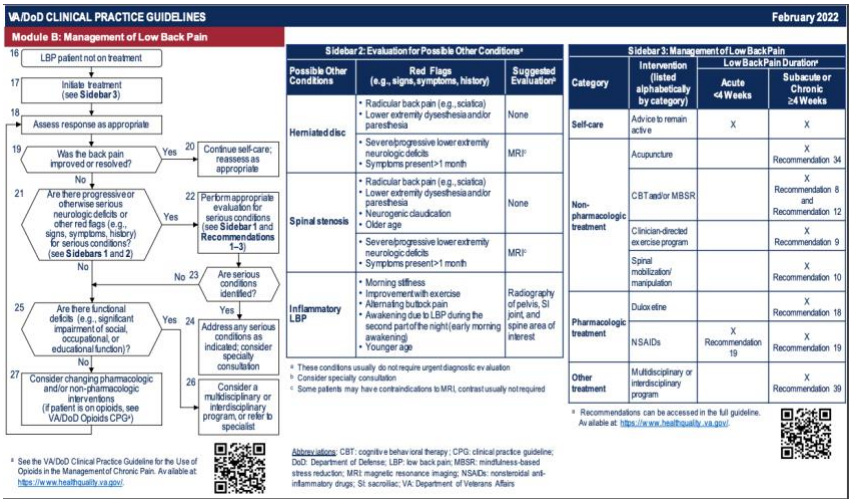
VA/ DoD CPG Pamphlet



Note. VA/ DoD Pamphlet, "Low Back Pain and MRIs."

Figure L3

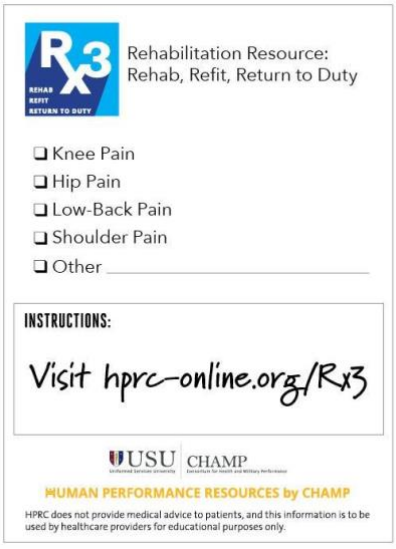
VA/ DoD CPG Quick Reference Guide for Providers



Note. VA/ DoD CPG Quick Reference Card for provider use.

Figure L4

RX3 Prescription Pad



Note. RX3 prescription pad for provider use as patient handout.

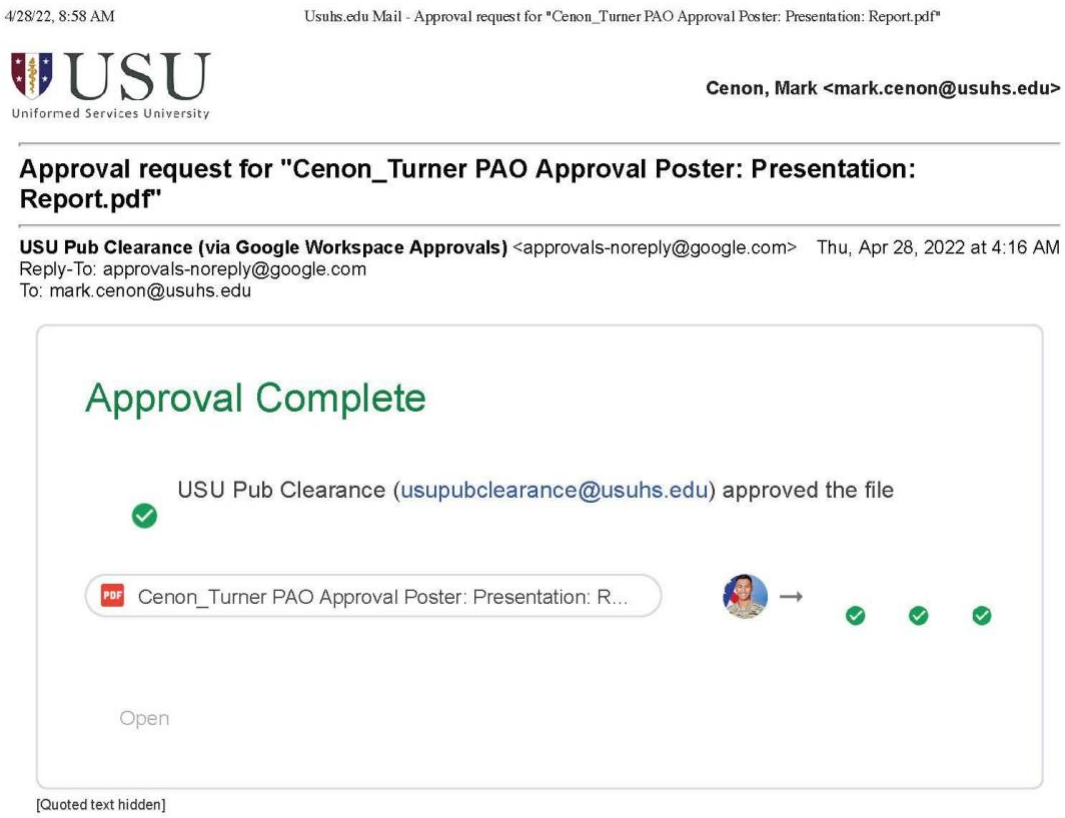
Figure L5

RX3 Flashcard

Note. RX3 Phase I flashcard for patient use.

Appendix M.

PAO Clearance/ Level of Dissemination Classification



4/28/22, 8:58 AM Usuhs.edu Mail - Approval request for "Cenon_Turner PAO Approval Poster: Presentation: Report.pdf"

USU
Uniformed Services University

Cenon, Mark <mark.cenon@usuhs.edu>

Approval request for "Cenon_Turner PAO Approval Poster: Presentation: Report.pdf"

USU Pub Clearance (via Google Workspace Approvals) <approvals-noreply@google.com> Thu, Apr 28, 2022 at 4:16 AM
Reply-To: approvals-noreply@google.com
To: mark.cenon@usuhs.edu

Approval Complete

USU Pub Clearance (usupubclearance@usuhs.edu) approved the file

PDF Cenon_Turner PAO Approval Poster: Presentation: R...

Open

[Quoted text hidden]

Appendix N

DNP Project 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: Home Exercise Programs for Self-Rehabilitation of Non-specific Low Ba

was completed at Joint Base Lewis McChord by the following student(s):

(type student name)	*(signature)*	*(date)*
MAJ Mark Cenon	Mark Christian Cenon Digitally signed by Mark Christian Cenon Date: 2022.04.28 12:48:16 -07'00'	28 APR 20
Maj Christela Turner	Christela Turner TURNER.CHRISTELA.MA RIE.1283665506	28 APR 20

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 to the DNP Project Team,
- Presentation of DNP project to the leadership at the Phase II Site,
- Abstract/Impact Statement *(Appendix I)*, and
- DNP Project Written Report.

Verified by:

(type name)	*(signature)*	*(date)*	
Dr. Laura Taylor	Laura Taylor, PhD, RN, ANEF, FAAN Digitally signed by Laura Taylor, PhD, RN, ANEF, FAAN Date: 2022.04.28 22:28:16 -04'00'	28 April 202	Senior Mentor
Dr.Jose Rodrigue	[redacted]	29 April 2022	Team Mentor
			Team Mentor
Dr. Jennifer Fian	FIANDT.JENNIFER.COREY.1162428906 Digitally signed by FIANDT.JENNIFER.COREY.1162428906 Date: 2022.04.29 15:38:41 -07'00'	29Apr22	Team Mentor & Phase II Site Director

Form Version: 1 June 2016