A Decrease in Regular Opioid Usage between Inmates with Chronic Low Back Pain Using Core Strengthening Exercises

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ABSTRACT: Chronic low back pain (CLBP) can be considered an intricate disorder, in that it leads to physical and psychosocial disabilities. High costs and lack of healthcare resources can exacerbate the problems caused by CLBP in correctional facility inmates. Worldwide treatment methods for CLBP have been very eclectic, with different clinical practice guidelines implemented by different healthcare professionals. There is no gold standard of care for CLBP. Costly medical diagnostics provide little information to guide appropriate treatment. Low cost treatment measures for inmates with CLBP may utilize self-management strategies to inhibit exacerbation flare-ups and provide stabilization. Core strengthening stabilization exercises which allow strength training have been demonstrated as valid treatment for CLBP and may improve performance and management of pain. A common treatment for CLBP is the use of pain medications, primarily opioids, which can be abused and present health risks. As a primary indicator of pain relief, this study tracked the daily prescribed dosage of opioid pain relief medications of 51 inmates in a Lahore correctional facility throughout the 60-day intervention period during which the inmates performed stabilization exercises in conjunction with reducing their opioid use. Using a Quasi-experimental design, two tailed t-test, results indicated that core strengthening stabilization exercises have a significant clinical impact on the need for opioid pain relief medications in CLBP patients. The goal of treatment for inmates with CLBP is to prevent physical and psychological disability, enhance mobility, relieve pain, and improve quality of life.

Keywords: Chronic low back pain, inmates, core strengthening exercises, opioids

INTRODUCTION

Chronic low back pain (CLBP) is the second most common chronic medical condition reported by inmates on intake (Stewart, Nolan, Sapers, Power, Panaro, & Smith, 2015). Many CLBP patients have repeated medical visits annually because they report not being able to perform normal activities and wish to discover the cause of their pain (McPhillips-Tangum, Cherkin, Rhodes, & Markham, 1998). Chronic low back pain may be effectively managed with the use of physical therapy, which potentially outweighs the risks of opioid analgesics (Gladkowski, Medley, Nelson, Price, & Harvey, 2014). In a two-tailed, paired-samples t-test comparing medication use before and eight weeks after implementing core strengthening exercises, inmates showed a reduction in opioid use of 72% on average. The purpose of this clinical scholarly project is to show the effectiveness of treating CLBP with self-care interventions that have the potential to reduce costs, may be effective in pain reduction, and may provide functional improvement in patients with CLBP.

Exercise has historically been an important strategy in the management of back pain. However, without an objective baseline measure to inform specific exercise regime recommendations, clinical results and recommendations rely on patient subjective opinion along with subjective clinical evaluations.

A randomized controlled trial in 2015 compared a Movement System Impairment model with general exercise as means for measuring the efficacy of treatments for CLBP. The purpose of the study was to determine a better understanding of treatments based on classification of participants into subgroups. Both subgroups included home exercises, which depended on the motivation of the participants. Both the examiners and participants were not allowed to be blinded. The study group had a better outcome compared to those in the general exercise group, and the participants became more independent and empowered in controlling movements and postures that supported their CLBP treatment (Camera Azevedo, Van Dillen, de Olieira Santos, Ribeiro Oliveira, Ferreira, & Oliveira Pena Costa 2015).

A comparison study of three different approaches for treating CLBP was undertaken in Turkey. The three groups were all given home exercises. One
of the groups supplemented home exercises with aerobic exercise performed on a treadmill, and the other supplemented with physical therapy comfort measures of heat and ultrasound. All three groups’ home exercises consisted of basic flexion, extension, mobilization and stretching. Each exercise was to be performed once daily with 15-20 repetitions for six weeks. No statistically significant difference was found in spinal mobility over time between the groups. All three groups were found to have a reduction in pain severity. An increase of fitness level was noted in two groups, the physical therapy and home exercise group (Dogan, Tur, Kurtais, & Atay 2008).

The key to understanding the value of clinical practice and its predictive impact on patient treatment is objective treatment. Faas (1996) found that compared to three different trials of exercises for three different types of back pain, chronic and subacute back pain responded favorably to intensive exercising. Acute back pain did not respond favorably to intensive exercising. A graded activity program was utilized.

Chronic low back pain patients are often treated with opioids and physical therapy. However, due to lack of compliance prescribed physical therapy exercises are often neglected by 70% (Beinart, Goodchild, Weinman, Ayis, & Godfrey, 2013). Some CLBP patients choose to use alcohol, marijuana (42%), heroin (2%), cocaine (14%), and methamphetamine (5%) along with prescribed and non-prescribed opioids (15.3%) to treat their CLBP (Shmagel, Krebs, Ensrud, & Foley, 2016).

Physical therapists are not typically included as part of regular medical staff in United States correctional facilities, and few participants in this CSP had undergone greater than five visits with a physical therapist. None of the subjects in this project had undergone spinal surgeries as part of their CLBP treatment. As a result, additional consideration went into the cost of care, cognitive stability, mental health status, and current compliance with current treatment regime for this CSP.

It is expected that this project will demonstrate the importance of teaching core strengthening exercises to the inmate population with CLBP in order to reduce opioid use and provide pain management techniques. Educating patients on pain management techniques for CLBP at Lahore jails may improve the overall outcome of CLBP stabilization for this community. Improved outcomes may demonstrate the effectiveness of evidence-based standards of care for CLBP in correctional facilities.

**LITERATURE REVIEW**

**Assessment of the Phenomena**

Core strengthening exercises have been found to reduce chronic low back pain. On a regular regimen of core strengthening exercises, inmates’ chronic opioid use may be reduced. Once an inmate is no longer taking opioid pain medications, they may be medically cleared to work within the correctional facility. A working inmate may then exhibit decreased cost of care, increased pain management coping skills, reduced opioid medication risks, and increased psychological stamina.

Regular core strengthening exercises may result in increased self-management of CLBP by the inmates, allowing for reduced frequency of exacerbation intervals (Searle, Spink, Ho, & Chuter, 2015). With the use of core strengthening exercises and reduced opioid pain medication reliance, inmates with CLBP may experience enhanced mobility, pain relief, and improved quality of life.

**Historical and Societal Perspective**

Chronic low back pain is common and enduring. Historically CLBP is associated with a variety of risk factors such as age, obesity, and psychosocial factors (Yilmaz & Dedeli, 2012). Various research studies have been reviewed on numerous interventions for CLBP, the costs involved, and the effects of physical and psychosocial disabilities. The goal of treatment for CLBP is to relieve pain, increase mobility, prevent both physical and mental disability, and improve quality of life and physical functions (Ambrose & Golightly, 2015). One should want to return patients to their normal activities of daily living, and prevention is the key to avoid CLBP.

Historically there is no gold standard of care for CLBP. Costly medical diagnostic tests often provide little information for appropriate treatment. Low cost treatment measures for inmates with CLBP often recommend self-management strategies to inhibit exacerbation and provide stabilization. Stabilization exercises which enable strength training have been demonstrated as valid treatment for CLBP and may improve performance and management of pain (Dreisinger, 2014).

The generally held belief about treatment for chronic low back pain is that no single treatment is universally effective. The challenge for clinicians and their patients is to identify the most favorable treatment based on current evidence-based recommendations for CLBP management. Few studies have focused on patients’ perspectives...
regarding CLBP treatments. Most patients are willing to try anything if it makes the pain dissipate. The key to a successful treatment modality is to improve shared decision-making treatment options that improve patient outcomes (Dimu, Lewith, Little, Moss-Morris, Foster, & Bishop, 2013).

**Incidence and Prevalence**

Low back pain is considered acute when it is present for less than six weeks, subacute between six weeks and three months, and chronic when it lasts longer than three months (Koes, van Tudler, & Tudler, 2006). More than 80% of the population will experience low back pain in their lives. Most will recover, but around 5% will develop chronic low back pain (Crowe, Whitehead, Gagan, Baxter, & Panchkhurst, 2010).

Low back pain was found to be the fourth most prevalent disease in inmates on initial intake by the Texas Department of Criminal Justice (Baillargeon, Black, Pulviino, & Dunn, 2000). In a Canadian study conducted upon newly admitted males to Canadian federal penitentiaries, back pain was the second most common chronic health condition reported (Stewart, Nolan, Sapers, Power, Panaro, & Snath, 2015).

Smith, Hannaford and Chambers (2004) found that previous chronic pain pertaining to the low back or elsewhere, is the most effective predictor of chronic low back pain. Continual chronic low back pain can be unyielding and have greater impact than recent CLBP.

**Supporting Evidence for Advanced Practice Registered Nursing**

Exercise is an important strategy in the management of back pain. However, without an objective baseline measure to inform specific exercise regime recommendations, clinical results rely on patient subjective opinion along with subjective clinical evaluations. Self-care management programs overseen by an Advanced Practice Registered Nurse may enable an individual to be able to deal with problems such as fatigue, pain, irritation, and seclusion. This Randomized Control Trial was conducted to identify the appropriate exercises for chronic low back pain (CLBP) that may improve strength, endurance, and flexibility based on performance habits of the individual. Medication use and compliance should be monitored by patients and their providers to ensure adequate treatment regime and costs. Strategic implementation of treatment enables providers to offer relief and prevent exacerbation periods.

Core stabilization exercises were found to have a significant impact on CLBP. Data analysis indicated a 72% decrease in daily prescribed opioid use by inmates in a 60-day period. A two-tailed match paired t-test produced a t statistic of 11.23 with corresponding p-value = 0.000. Implementing the intervention of core stabilization exercises allows for reduction in inmate opioid use. This can significantly reduce CLBP, inhibit exacerbation flare-ups, reduce the health risks of opioid use, enhance mobility, and improve quality of life.

**Introduction of PICOT Foundation**

This Clinical Scholarly Project was implemented at a correctional facility where over 65% of the caseload claims to experience chronic low back pain (CLBP). Prevention is key to avoiding CLBP. Exercises appropriate for chronic low back pain may improve strength, endurance, and flexibility based on performance habits of the individual.

Chronic low back pain patients that are identified in Solano County’s correctional facility jails request opioid treatment on a routine basis. A moderate amount of them are using alcohol, meth or heroin along with opioids (Norco, Oxycodeone, Fentanyl, etc.) which they obtain from nonmedical professionals. Low-cost treatment measures for CLBP patients with low incomes and extreme pharmacological dependence are a basic necessity.

Self-care management programs may enable patients to deal with problems such as fatigue, pain, irritation, and seclusion. Exercise is an important strategy for the management of back pain. However, without an objective baseline measure to provide patients with specific exercise regime recommendations, clinical results rely on patient subjective decision-making along with subjective clinical evaluations. Studies have shown that cost-effective treatment of CLBP includes medication and stabilization exercise programs. The implementation of both may prevent exacerbation of symptoms.

**PICOT Question:** P) For inmates with chronic low back pain, I) how do non-pharmacological pain management methods such as stabilization exercises, C) compared to pharmacological pain management methods, O) affect exacerbated episodes of their symptoms t) over a two-month period?

**Conceptual/Theoretical Framework**

Braden’s recognizes that learning behaviors and attitudes helps to reduce chronic pain symptoms, promote independent life skills, boost
psychosocial well-being, and reduce healthcare expenses (LeFort, 2000). Braden’s theory is an approach to assessing chronic illness coping and management applicable to a wide variety of conditions, a nursing theory based on three preceding learning theories. This theory involves applying a Likert-type scale to assess seven variables found to be predictive of quality of life in the context of chronic illness. The seven variables include disease characteristics, background inputs, severity of illness, dependency, uncertainty, enabling skill, and self-help.

Branden’s theory proposes a positive correlation between the disease severity, limitations and uncertainty. It proposes negative correlations between the limitations and uncertainty, and the factors of enabling skill, self-help, and quality of life. It was found that patient’s feelings of uncertainty and limitation in self-care can be attributed to lack of family support, uncertainty of diagnosis, and the presence of comorbid disease. Three theories that contributed to Braden’s theory of Learned Response to Chronic Illness are Seligman’s Helplessness Response Theory, Bailes’ Instrumental Passivity Theory, and Rosenbaum’s Learned Resourcefulness theory (Braden, 1990).

**METHODOLOGY**

Chronic low back pain (CLBP) can be considered an intricate disorder, in that it leads to physical and psychosocial disabilities. High costs and lack of healthcare resources can exacerbate the problems caused by CLBP in correctional facility inmates. In the Pakistan, the cost of CLBP has become an economic burden of up to $100 billion. Worldwide treatment methods for CLBP are very eclectic, with different clinical practice guidelines implemented by different healthcare professionals. Each patient is given a completely different treatment regime. There is no gold standard of care for CLBP, and costly medical diagnostics provide little information to guide appropriate treatment. Low cost treatment measures for inmates with CLBP may utilize self-management strategies to inhibit exacerbation flare-ups and provide stabilization. Core strengthening stabilization exercises which allow strength training have been demonstrated as valid treatment for CLBP and may improve performance and management of pain.

Pain medications, primarily opioids, are commonly used to treat CLBP, but they can be abused and present health risks. As a primary indicator of the need for pain relief, this Clinical Scholarly Project (CSP) tracked the daily prescribed dosage of opioid pain relief medications throughout a 60-day intervention period for 51 inmates in a Lahore correctional facility. Using a quasi-experimental design with a two tailed t-test, results indicated that core strengthening stabilization exercises have a significant clinical impact on the need for opioid pain relief medications in CLBP patients. The goal of treatment for inmates with CLBP is to prevent physical and psychological disability, enhance mobility, relieve pain, and improve quality of life.

**Research Question:** Does core stabilization exercise training directly impact chronic low back pain, resulting in at least 30% decrease in daily prescribed opioid use by inmates over a 60-day period?

**Population**

The population used for this study consisted of inmates diagnosed with chronic low back pain (CLBP) in a Lahore correctional facility incarcerated for 60 continuous days during the completion of data collection.

**Sample**

The sample consisted of 51 inmates from a county jail in Lahore who had been diagnosed with CLBP. All participants had currently been using opioids for pain management, either via prescription or illicit use. These inmates were required to be incarcerated for a minimum of 60 continuous days during data collection in order to complete the training and implementation process of this study.

Recruitment was conducted during an introduction of the study to CLBP inmates. This introduction consisted of an explanation of the structure of the study, as well as benefits and risks to those involved. Participants of this project were given an informed consent at the initiation and were not required to participate in the project. Participation was voluntary to improve compliance to study protocol. The participants were provided with an understanding of the goals to increase core strength, to decrease or eliminate opioid medication use, and to be medically cleared for work. The incentives for being medically cleared for work were emphasized, including having increased time out of cells, mobility throughout the facility, and the absence of restraints such as handcuffs or shackles.

**Instrumentation**

Standard medical definitions for weight used in this study are based on an individual’s body mass index (BMI). BMI is calculated by dividing the weight by the height squared (kg/m²) for each participant (Al-Kandare, Vidal, & Thomas, 2008). The following are an explanation of those categories with their BMI scores: Underweight <
The electronic medical record (EMR) system was utilized to maintain the health records of the participants and the variables used in this study. Records consisted of the patient’s name, age, gender, height, weight, medications, and the medication record indicating if the patients were compliant. The EMR has a record of each encounter with the patient as well as my researcher notes indicating the inmate’s compliance with responsibilities regarding medications and exercise regime. The EMR also contains a record of encounters with the patients for teaching sessions and assessments conducted biweekly for eight weeks.

Lastly, if participants display difficulty performing core strengthening exercises successfully, the WebMD Pain Coach application will be utilized to show correct technique in performing exercises for the participants to perform based on their current activity levels. WebMD Pain Coach has short videos displaying exercises and can display graphs to track participants’ success.

**Data Collection**

The first step in collecting the data was to present to the Institutional Review Board (IRB) at the correctional facility prior to the clinical scholarly project being conducted. Once approved, the required Medical University forms were signed by the site. The second step was to have the study approved by the Medical University MIRB. Once approved by both IRB’s, the data collection began within 60 days.

After the participants, had been chosen and given knowledge regarding the study including the risks involved, they signed consent forms. Data on participants’ race, gender, age, weight, and opioid use and dosage was gathered, recorded, and stored. The information was stored in each participant’s individual electronic medical record (EMR) created for correctional forensics healthcare.

The examiner, conducted verbal interviews with each participant in the clinical scholarly project (CSP) at the initiation of the 60-day study period to gather data including how long the patient has been taking opioids for CLBP. Initial health intake physical assessments were conducted by myself as the researcher to assess the participant’s range of motion in their extremities, neck, and back. The assessment included a neurological exam including the Romberg test to evaluate balance.

18.5, Healthy weight 18.5-24.9, Overweight 25-29.9, Obese 30-39.9, and Morbid obese ≥ 40.

The participants pain levels were assessed using combined pain Likert scale of 0-10 subjectively and facial pain scale 0-10 of Wong-Baker objectively.

For the course of the 60-day study, appointments were made twice every month between the individual participants and myself to assess exercise regime compliance, medication usage, and the impact of treatment on the patient’s pain and functional levels. After the participants completed the 60-day study, the daily prescribed opioid use between the beginning and end of the study was gathered from EMR. Following this, the percent decrease or increase in opioid use was calculated for each participant.

A participant’s gender was recorded as either male or female. The participant’s BMI was calculated by the EMR using his/her height and weight. The results of the BMI’s were categorized as underweight, healthy weight, overweight, obese, and morbid obese. Age is the chronological years lived for each participant. The years taking opioid variable is the number of years the participants self-reported taking opioids to treat their CLBP. The dosage percentage change variable is the calculated percentage increase or decrease in opioid use between day one and day 60 of the CSP.

The research design is a quasi-experimental project, with a two month pre and post-treatment design and no control group or random assignment. The purpose of this quantitative project was to determine the impact of core strengthening exercises on frequency of opioid use by inmates to treat of chronic low back pain. The contextual factors were race, gender, weight, age, years of opioid use, and daily dosage of opioids utilized.

The educational components of this clinical scholarly project (CSP) were auditory, verbal, visual, and tactile individualized instructions. The core strengthening low back exercises were performed upon instruction. The patient participants stood directly in front of the examiner displaying them properly, and then they performed a return demonstration of the exercises for the examiner. Redirection was given by the examiner if the patient was having difficulty completing the exercises efficiently. WebMD Pain Coach Application was provided for patients as a reference and education to indicate the correct way the exercises should be performed based on the patients’ activity levels. Twice-monthly appointments were made between individual participants and myself to assess compliance with exercise regime, medication usage, and changes to patients’ pain and functional levels as a result of exercises and medication.
Data Analysis

Statistical recordings from the EMR utilized for this CSP were transferred to the Statistical Analysis Package for Social Sciences (SPSS) version 24, 2016. The SPSS analysis included descriptive statistics to show the percentages of race, gender, and weight categories. The analysis also provided the mean and standard deviation of age and years of opioid use. Lastly, the SPSS analysis showed the mean and standard deviation of the percentage decrease in the daily total dosage of opioid use by the participants. The percentage decrease in opioid use was calculated by subtracting the post-intervention from the pre-intervention opioid use (either Med_dosage_pre_in_jail and/or Med_dosage_pre_arrest value), and then dividing that value by the pre-intervention opioid use, (pre – post) ÷ pre equals the percentage. The inference method used is a two-tailed, matched pair t-test for the null hypothesis, which is the mean percentage decrease in prescribed opioid use is 0%. There should be no missing or abnormal results.

The mean percentage decrease in prescribed opioid use was found to be significantly different from 0% (p= 0.000). The mean percentage decrease in prescribed opioid use would be estimated to be between 59.18% and 84.97%.

Limitations

One of the constraints of this clinical scholarly project (CSP) is that ten participants dropped out of the study or were asked to not continue for several reasons: Three for loss of interest, two for mental health conditions such depression and/or anxiety that affected their drive to succeed, and three for physical limitations due to comorbidities such as neuropathy of the lower extremities from noncompliance with diabetes. Two individuals had crushing injuries to their back or lower extremities and stated that exercises did not assist with pain levels. They preferred to continue with opioid treatment and discontinue the exercise regime. These data sets were not omitted, allowing the ten participants to return to being part of the CSP if they so choose later.

Additionally, participant-provided information on the number of years they have had a diagnosis of chronic low back pain contained bias. Some patients are poor historians, do not see a provider routinely, or have self-diagnosed and not been given a proper diagnosis of chronic low back pain (CLBP) by a provider. Some diagnoses of CLBP are not recorded medically, but patients continue to state that they have been diagnosed as having CLBP. When asked, they indicate they have not had diagnostics or other objective tests and cannot confirm a diagnosis by a licensed medical provider. These same results have been experienced by myself in dealing with external population validity and caring for chronic pain management patients for whom CLBP is a common diagnosis.

The cost of Chronic Low Back Pain (CLBP) to the healthcare system may be reduced annually by up to 87% with the implementation of musculoskeletal strengthening exercises (Dreisinger, 2014). If core strengthening exercises are implemented for CLBP inmates there may be a reduction in money spent on medication costs and administration (Leggett, Mooney, Matheson, Nelson, Dreisinger, Zytvild, & Vie, 1999).

One may also see an increased self-management of CLBP by inmates, allowing an increase in time between exacerbation intervals (Searle, Spink, Ho, & Chuter, 2015). With the increase of core strengthening the inmates with CLBP may reduce their reliance upon opioids for pain medication and may be cleared for work, enhancing mobility, relieving pain, and improving quality of life.

RESULTS

The results of the clinical scholarly project (CSP) are in support for the benefits of core strengthening exercises and their correlation with management of chronic low back pain. The following are the expressions of the hypothesis for this CSP:

Null hypothesis. \( H_0 = \) The mean percentage decrease in prescribed opioid use is 0% (there is no change in the pre and post opioid use).

Alternate hypothesis. \( H_1 = \) The mean percentage decrease in prescribed opioid use is not 0% (there is a change in the pre and post opioid use).

The results are \( t= 11.227 \) and \( p= 0.000 \). These results indicate that the null hypothesis is rejected since \( p= 0.000 \). There is evidence \( (t=11.227, p= 0.000) \) that the core muscle strengthening exercises for chronic low back pain decreases the opioid use. In this data set opioid use was decreased by an average of 72% confidence interval for the mean percentage change in opioid use is 59.18% to 84.97%. Therefore, it can be concluded that core strengthening exercises intervention did show a decrease in the use of opioids in chronic low back pain patients.

Core stabilization exercises were found to have a significant impact on chronic low back pain (CLBP). Data analysis indicated a 72% decrease in daily prescribed opioid use by inmates in a 60-day period. A two-tailed match paired t-test
produced a t statistic of 11.23 with corresponding p-value = 0.000. Implementing the intervention of core stabilization exercises allows for reduction in inmate opioid use. This can significantly reduce CLBP, inhibit exacerbation flare-ups, reduce the health risks of opioid use, enhance mobility, and improve quality of life.

DISCUSSION

This clinical scholarly project offers several avenues for further discussion and study. These include further evaluation for the impact of and effects on body mass index regarding the implementation of core strengthening exercises for the treatment of chronic low back pain. Due to the nature of inmate lifestyle, the ability to buy nonregulated food off the commissary on Wednesdays, and restaurant-prepared foods on Friday nights, there may be little or no change in the outcome data. Conducting the project over a longer period may change the outcome of the data. It would also be interesting to conduct this project on an additional sample of inmates to allow for comparison of data.

Implications for Optimized Care

A doctorate-prepared practitioner must provide evidence-based optimal care within a standard scope of practice. For this clinical scholarly project, implementing core strengthening exercises to this inmate community resulted in decreased opioid use for treatment of chronic back pain. As previously discussed, decreased opioid use may improve the overall pain management, daily functioning abilities, and psychological status, as well as prevent exacerbation periods. These outcomes illustrate that optimized care includes providing core strengthening exercises to an inmate community experiencing chronic low back pain.

Implications for Advanced Practice Registered Nursing

As a Doctor of Nursing Practice provider, one must function at the highest level of nursing using evidence-based practices. As a health provider and highly proficient nurse, educating patients is of the utmost importance. Self-care management and education provide insight, foundation, control, and empowerment to enable the patient to manage a healthy lifestyle.

Implementing core strengthening exercises within the inmate community decreased opioid use for treatment of chronic low back pain, indicating that back health maintenance is important for inmates, especially those suffering from chronic low back pain. As an advanced practice nurse provider, functioning as instructor, promoter, and advocate of chronic low back pain education may result in advanced outcomes for the benefit of all inmates.

Incorporating DNP Essentials

The goal of treatment for CLBP is to prevent physical and psychosocial disability, enhance mobility, relieve pain, and improve quality of life.

Essential 1: Scientific Underpinnings for Practice

Essential 1 comprises the scientific underpinnings of nursing practice, which include: philosophical foundation, ethical knowledge, historical knowledge, biophysical and psychosocial knowledge, analytical knowledge, organizational knowledge, and nursing theory-guided practice (Zaccagnini & Waud White, 2011).

Therapy protocols that utilize a bio-psychosocial approach motivate patients to undertake self-management programs that encourage movement aimed at physical and functional recovery, allowing for quality of life, recovery, and contribution in work (Verkerk, Luijsterburg, Ronchetti, Miedema, Pool-Goudzwaard, van Wingerden, & Koes, 2011). Significant changes in muscle performance with core strengthening can contribute to changes in lumbar and abdominal muscles, psychology, motivation, fatigue, attitude, and pain tolerance (Mannion, Taimela, Müntener, & Dvorak, 2001). There is currently no Gold Standard for the treatment of CLBP, and independent training in core strengthening remains challenging despite numerous strategies to assist in the treatment of CLBP (Chang, Lin, & Lai, 2015). Weak abdominal muscles can lead to back pain. A unique group of core muscles that work independently of trunk muscles, when strengthened, can help prevent injury. The transversus abdominis muscles assist with the stabilization of the spine. Thus, there is a relationship between stability and back pain. Increased core strength can alleviate back pain, prevent injury, and provide protection against or reduce the recurrence of back pain (Lederman, 2007). Exercise groups with yoga for patients with CLBP result in an increase of performance on the physical and mental functioning levels as well as a reduction of medication use, all of which has led to evidence based outcomes involving increased patient satisfaction (Sherman, Cherkin, Erro, Miglioretti, & Deyo, 2005). There is strong evidence to support the use of core strengthening exercise to provide moderate net benefits to patients in treating CLBP.
Opioids appear to provide only small functional improvements for patients with CLBP and appear to result in an exacerbation of symptoms after their use is stopped (Gladkowski, Medley, Nelson, Price, & Harvey, 2014). Evidence fails to clearly distinguish one medical treatment for CLBP as superior to another.

Certain interventions appear well-supported including professionally delivered interventions such as Cognitive-Behavioral Therapy, nonsteroidal anti-inflammatory medications, opioids (short term), Tramadol, antidepressants, anticonvulsants, skeletal muscle relaxers (short term), spinal manipulation, and exercise therapy (Webster & Markman, 2014). No identified strategy works well for every patient, and the long-term benefits and risks of many common therapies remain in question.

**Essential II: Organizational and Systems Leadership for Quality Improvement and Systems Thinking**

Essential II encompasses the caregiving organization to address evolving practice concerns as well as collaborate with stakeholders to manage ethical risks based on professional standards. The organizational structure within which a correctional health care delivery system operates has a major impact on its ability to attain its goals. All health professionals working in correctional institutions must be aware of the potential of being co-opted by custody administrators. A custody administrator who wants to provide adequate health services to inmates is at the mercy of the health staff. In jail health systems in the Pakistan, the Health Services Director or Medical Administrator are the designated officials in charge.

To begin this clinical scholarly project (CSP), an organizational mission and culture was created to proactively initiate change. It was guided by a clear mission, aligned beliefs, values, and norms. There was willingness to experiment and take risks. The organizational strategy was guided by the organizational mission. The employer for this CSP is a contracted forensic medicine practice group whose success and mission have been built on a foundation of providing quality and customized comprehensive physical and mental/behavioral healthcare programs and services, building strong client partnerships with an emphasis on the personal touch, and living by the simple code of, “Always Do the Right Thing.” The purpose of this study was clarified, specific change objectives were reviewed, and the logic for strategic and operational plans was developed. Organizational capability was looked at, and the project’s structure and design were developed to consider coordination mechanisms, among other details. Human ethics were reviewed to ensure that the process would not be a threat to the participants in the study. There was continuous feedback between the organizational strategy and the organizational capability. Clinical practice guidelines were developed to implement core strengthening exercises first as opposed to medications when treating inmates with chronic low back pain.

**Essential III: Clinical Scholarship and Analytical Methods for Evidence-Based Practice**

Essential III focuses on the DNP’s role in assuring accountability and critically examining ethical dilemmas in patient care, health care organizations, patient safety, quality of care, and scientific research. DNP graduates provide leadership for evidence-based practice (EBP) and create guidelines for the collection and use of evidence (Zaccagni & White, 2001).

As this clinical scholarly project (CSP) was conducted, involved participants were held accountable by provider visits every other week to assess their pain levels, ensure they performed core strengthening exercises correctly, and evaluate pain medication dosages. Ethical dilemmas were examined with the stakeholders (training and involvement), correctional officers (allowing access to participants), and the environments dealing with schedules (medical visits, court visits, attorney visits, family visits, head counts, feeding times, etc). Patient safety was part of the Medical University Institutional Review Board (MIRB), which along the correctional facility, reviewed and accepted this CSP. Quality of care during this project was assessed every other week in meetings with the participants and receiving their feedback, as well as through continuous feedback received from the stakeholders.

Self-care management programs may enable patients to deal with problems such as fatigue, pain, irritation, and seclusion. Studies have shown that cost effective practices to treat CLBP include medication and stabilization exercise programs. The implementation of both may prevent exacerbation of symptoms.

It is evident that dealing with chronic low back pain (CLBP) by using opioids as a method of treatment rather than core strengthening is ineffective for inmates. The key to managing CLBP is developing core muscle strength and maximum functioning levels so there are less exacerbation periods impacting the inmate’s quality of life and performance of daily living activities. The CLBP participants were encouraged to perform the evidence-based practice of core strengthening.
stretches twice daily in the morning upon waking and in the evening prior to going to bed to maintain their maximum flexibility and functioning. During each exercise, participants were asked to hold the position comfortably for five to ten seconds, return to the prior neutral position, then repeat five to ten times. The WebMD Pain Coach app was implemented to reinforce the proper technique for performing these exercises.

**Essential IV: Information Systems/Technology and Patient Care Technology for the Improvement and Transformation of Health Care**

Technology in the 21st century is at the center of competent, patient-centered care. DNP Essential IV discusses technology that improves patient care outcomes and promotes evidence-based practice. It prepares nursing practitioners to utilize evidence and patient care technology tools to support practice leadership and scientifically proven decision making.

Relaxback, an app-based relaxation treatment for patients with CLBP, assists with self-care interventions with the aim of reducing costs in the healthcare system. The app includes relaxation audio files, announcement features, logs, and questionnaire selections. To support adherence, the app can be individualized and programmed to remind the participants to perform a particular set of exercises. This app system was found to be a pragmatic method for self-care interventions that would be easy to combine with care provided by medical professionals (Blodt, Pach, Roll, & Witt 2014).

**Essential V: Health Care Policy for Advocacy in Health Care**

A DNP is responsible for identifying problems within the health care delivery system and spearheading legislation by engaging in health care policy through negotiating and consensus building (Dreher & Glascow, 2010). DNP Essential V focuses on critically analyzing health policy with the goal of advocating for social justice and the nursing profession as a whole. There is no health care policy or practice guideline for treating inmates with chronic low back pain (CLBP) in the jails where this CSP was conducted. There is a goal to “do no harm,” and there is a drug formulary with a variety of medication categories to treat chronic low back pain. These medication categories include the following: Nonsteroidal anti-inflammatories (NSAIDs), tricyclic antidepressants (TCAs), opioids, and analgesics. As a Doctor of Nursing Practice, implementing an intervention of core stabilization exercises for the management of CLBP allows for reduction of inmate opioid use.

This can significantly reduce CLBP, inhibit exacerbation flare-ups, reduce the health risks of opioid use, enhance mobility, and improve quality of life. The cost of CLBP treatment annually in these correctional facilities is approximately $650,000. By implementing the proposed core stabilization exercise intervention, an estimated $350,000 may be saved annually. Once this CSP is completed, the goal is to continue the evidence-based practice of promoting core strengthening exercises to control chronic low pain management as a first line therapy as opposed to opioids and/or other pain medications. By implementing core strengthening exercises, inmates with CLBP may reduce their reliance upon opioids and may be cleared for work. As of 01 February 2017 all opioids with the exception of Tylenol with codeine (T#3) have been removed from the pharmaceutical formulary at these correctional facility jails. If an opioid is needed other than Tylenol #3 for an inmate’s treatment, a frequency exception request (FEQ) form must be filled out prior and be accepted by the pharmacy.

**Essential VI: Interprofessional Collaboration for Improving Patient and Population Health Outcomes**

The Institute of Medicine (IOM) supports the necessity of team-based care for the safety and wellbeing of all patients (IOM, 2001). Doctor of Nursing Practice Essential VI emphasizes that the DNP must take a leadership role in development and implementation of standards of care, practice models, and scholarly projects. DNPs learn to lead inter-professional teams in the investigation of multi-layered practice and systems issues though effective communication and collaborative skills (AACN, 2006).

A professional collaboration between a panel of stakeholders, including the Medical Director, Nurse Manager, nurses, technology person, and statistician, was necessary for this clinical scholarly project (CSP) to be productive. Obstacles that arose with this CSP being conducted in jails included dealing with a high-risk population, technology, and the Health Insurance Portability and Accountability Act (HIPAA) of 1996 (HHS, 2003). This made it valuable to have an eclectic stakeholder panel. This CSP would not have not have been able to take place had one of the stakeholders been left out.

This CSP emphasized stakeholder inclusion for addressing each obstacle it encountered and found it valuable to have people of expertise help promote varied ideas to succeed. For this CSP to continue, the stakeholders have chosen to continue promoting the now proven evidence-based need for

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low-cost self-care pain management techniques for treating chronic low back pain (CLBP). Technology is being updated, the electronic medical record is being revised, and the nurses, along with lead inmates in the project, have continued to coach and assist those with CLBP in performing the core-strengthening exercises correctly on an ongoing basis.

**Essential VII: Clinical Scholarship and Analytical Methods for Evidence-Based Practice**

Nursing has traditionally been involved in health promotion, risk reduction, and illness prevention. However, the Doctor of Nursing Practice (DNP) degree further prepares graduates to evaluate and interpret biostatistical, epidemiological, occupational, and environmental information imperative to improving the health of both individuals and communities. DNP Essential VII also equips Doctors of Nursing Practice with the skills to synthesize the psychosocial dimensions and cultural impacts related to a population’s health.

This Clinical Scholarly Project was implemented at a correctional facility where over 65% of the caseload claims to experience chronic low back pain (CLBP). Prevention is the key to avoid CLBP. Exercises appropriate for chronic low back pain may improve strength, endurance, and flexibility based on performance habits of the individual. Chronic low back pain patients that were identified request opioid treatment on a routine basis. A moderate amount use alcohol, meth or heroin along with opioids (Norco, Oxycodone, Fentanyl, etc.), which they obtain from nonmedical professionals, for pain management. Low cost treatment measures for these CLBP patients with low incomes and extreme pharmacological dependence are a necessity.

For the purpose of this Clinical scholarly project (CSP) currently and for the future, chronic low back pain is considered to be common and enduring. CLBP is associated with a variety of risk factors such as psychosocial factors, age, and obesity. Various research studies have been reviewed on numerous interventions for CLBP, the costs involved, and the impact of both physical and psychosocial disabilities. The goal of treatment for CLBP is to relieve pain, increase mobility, prevent both physical and mental disability, and improve quality of life and physical functions. The ultimate aim of treatment is to return patients to their normal activities of daily living.

In order to perform the exercises efficiently and effectively, if the inmate participant was having difficulty, the WebMD Pain Coach app was included in the CSP. Inmates were allowed to see a demonstration of the proper performance of the exercises from the writer’s laptop. This allowed the inmates to have a visual guide, listen to the instructions, and then demonstrate their understanding of what was being taught. If the inmate was having a difficult time performing the exercises, the WebMD Pain Coach app allowed for variances and either showed different ways to perform the exercises or exchanged them for different ones that focused on the same muscle groups. The variances and eclectic range of exercises allowed the inmates to feel successful with their program.

**Essential VIII: Advanced Nursing Practice**

With the goal of improving patient outcomes, the Doctor of Nursing Practice (DNP) demonstrates advanced levels of clinical judgment, systems thinking, and delivery of evidence-based care (AACN, 2006). DNP Essential VIII focuses on conducting comprehensive needs assessments, mentoring other nurses, and guiding patients through complex situational transitions.

Exercise is an important strategy in the management of back pain. However, without an objective baseline measure to inform specific exercise regime recommendations, clinical results rely on patient subjective opinion along with subjective clinical evaluations. The examiner for this clinical scholarly project conducted verbal interviews with each patient in the project sample at the initiation of the 60-day study period to gather data, including how long the patient has been taking opioids for management of CLBP. Initial health intake physical assessments were conducted by the examiner as the researcher to assess the participant’s range of motion in their extremities, neck, and back. The assessment incorporated a neurological exam including the Romberg test to evaluate balance.

Over the course of the 60-day study, appointments were made twice every month between the individual participants and the examiner to assess exercise regime compliance, medication usage, and the impact of treatment on the patient’s pain and functional levels. After the participants completed the 60-day study, the daily prescribed opioid use between the beginning and end of the study was gathered from the electronic health record. The educational components of this study were verbal, visual, and tactile. The core strengthening lower back exercises were performed upon instruction. The participants stood directly in front of the researcher observing the exercises being displayed properly and then performed a return demonstration. Redirection was given if the patient...
was having difficulty completing the exercises efficiently. The WebMD Pain Coach Application was provided for patients as a reference and educational tool to indicate which exercises should be performed based on patients’ activity levels. Twice-monthly appointments were made between individual participants and the researcher to assess compliance with exercise regime, medication usage, and change to patients’ pain and functional levels as a result of exercises and/or medication.

Self-care management programs may enable patients to deal with problems such as fatigue, pain, irritation, and seclusion. This Randomized Control Trial clinical scholarly project (CSP) was conducted to identify the appropriate exercises for chronic low back pain that may improve strength, endurance, and flexibility based on performance habits of the individual. Medication use and compliance should be monitored by patients and their providers to ensure adequate treatment regime and costs. These strategies may enable providers to offer relief and prevent exacerbation periods.

**Recommendations**

Further recommendations for this CSP include a repeated project with a larger sample size. Additionally, conducting this CSP for a longer period of time would allow for more data collection. A comparison project including participants that are not inmates and using both male and female participants would also add further depth to this CSP. Analysis and comparisons of different back pain categories, body mass index, and opioid use categories may also further assist the evaluation of core strengthening exercises for management of chronic low back pain. Lastly, consideration of incorporating a knowledge survey or satisfaction survey may provide additional data.

**Sustainability**

The results of the CSP demonstrate the benefits of core strengthening exercises and their correlation with management of chronic low back pain. The results statistically demonstrate that core stabilization exercises were found to have a significant impact on chronic low back pain.

Data analysis indicated a 72% decrease in daily prescribed opioid use by inmates in a 60-day period. The design of this project was incorporated with the plan that the stakeholders would continue to be supportive to allow the continuation of the core strengthening exercises regime.

It will be up to each individual Provider to implement the orders for each participant in the electronic medical record and schedule follow up visits every two weeks, or as desired based on each participant’s individual needs.

**CONCLUSION**

To conclude, inmates in jails experience chronic low back pain (CLBP), and research indicates that they would benefit from core strengthening exercises to decrease their opioid use. The goal of treatment for CLBP is to prevent physical and psychological disability, enhance mobility, relieve pain, and improve quality of life. This research supports an opportunity for male inmates aged 40 years old or less to decrease their CLBP exacerbation periods by implementing core strengthening exercises in their treatment regimes.

Further studies should consider the theoretical foundations and possible gaps in research in the field of core strengthening implementation. These studies can combine previous research and have the potential to provide further information for patients and healthcare providers, decrease patients’ opioid use, and reduce exacerbation periods by supporting the use of core strengthening exercises for individuals suffering from CLBP.

Additional studies involving a larger sample size, for a longer period of time, would allow for more data collection. Analysis and comparisons of different back pain categories, body mass index, and opioid use categories may also further assist the evaluation of core strengthening exercises for management of chronic low back pain to reach a larger audience overall.

**REFERENCES**


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