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The Impact of Spinal Manipulation Therapy (SMT) for Nonspecific Low Back Pain in the Military Population: An Integrative Review with Presentation of the SMT Toolkit to Primary Care Providers

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Abstract

Background: Nonspecific Low Back Pain (NLBP) continues to be a frequent cause for medical care and creates significant direct and indirect costs for the patient and healthcare system. Military members are a unique patient population that is at increased risk for experiencing NLBP. Evidence supports spinal manipulation therapy (SMT) for the treatment of NLBP and clinical practice guidelines (CPG) recommend the use of SMT in the treatment of NLBP. ***Purpose***: The purpose of this integrative review was to determine if SMT is an effective intervention for the military population experiencing NLBP. ***Presentation and Toolkit***: An educational presentation and SMT Toolkit were created, formally presented, and distributed to providers that treat and manage active duty military. The SMT Toolkit is a comprehensive yet consolidated practice guide that includes current evidence, the CPG, local SMT referral options and criteria, provider resources, and patient education information. The DNP student created the SMT algorithm and patient education handout, which are embedded within the toolkit. ***Outcomes/Discussion***: Based on the project's outcomes, ultimately the integrative review with educational presentation, and SMT Toolkit succeeded in increasing providers' knowledge and awareness and influenced their practice behaviors. ***Conclusion:*** The need to determine the most beneficial, conservative, and cost effective treatment options for NLBP like SMT is more important than ever. Users would benefit from using this DNP project, either through utilization in patient care, replication, or expanding further in a similar quality improvement project. Future investigators should consider factors that improve utilization and sustainment of practice toolkits.

Keywords: low back pain, military, spinal manipulation, chiropractic

The Impact of Spinal Manipulation Therapy (SMT) for Nonspecific Low Back Pain in the Military Population: An Integrative Review with Presentation of the SMT Toolkit to Primary Care Providers

Introduction and Background

Low back pain (LBP) has been identified as a global burden on society that negatively impacts both physical and mental wellbeing (Duthey, 2013; Vos et al., 2010). Although extensive research has been dedicated to the appropriate diagnosis, treatment and management of LBP, consensus is lacking on the most effective treatment modalities, especially for populations uniquely susceptible to experiencing LBP (Irvine et al., 2015). Spinal manipulation therapy (SMT) offers distinct benefits to the military patient population. For instance, it is important to find practical and conservative treatments for LBP to preserve function and ensure military readiness. Unlike other treatment options, SMT can be done in austere, combat environments and offers an alternative for military patients who do not have access to or cannot take pain medications due to personal, medical, or professional regulations.

The aim of this quality improvement project was to improve primary care provider's knowledge, awareness, and behaviors on the use of SMT for nonspecific low back pain (NLBP) for military patients. An integrative review was completed to identify the impact of SMT in the military population with nonspecific low back pain. Upon completion of the integrative review, a Spinal Manipulation Therapy (SMT) Toolkit was created, presented, and distributed to medical providers that serve active duty military patients. The toolkit provided current, evidence-based information regarding the use of SMT for NLBP, practice algorithms, local referral information and criteria, provider resources, and patient education information.

Low back pain is a common yet distressing ailment that affects people all over the world regardless of age, race, or gender (Duthey, 2013; Vos et al., 2010). It is estimated that 80% of adults seek care for LBP during their lifetime and it is one of the top ten reasons for seeking medical attention in the United States (National Institute of Health, 2014; Vos et al., 2012). In 2014, over a quarter of the American population reported experiencing LBP within the past three months (Center for Disease Control and Prevention, 2015). Understandably, medical costs related to LBP are staggering, reaching $34 billion annually (Gaskin & Richard, 2011), and it is a leading cause of disability and work absence (Bureau of Labor Statistics, 2014), all of which negatively affects both the patient and their family.

Like the civilian population, there is a high incidence of LBP in the armed forces and it has a crippling impact on daily life. Careers and wartime training in the military place a significant strain on the body, making this population uniquely susceptible to LBP (Cohen, Gallagher, Davis, Griffith, & Carragee, 2012). There is a connection between spinal pain and combat deployment due to increased psychosocial stressors, duty hours, and wearing heavy gear and equipment for extended periods of time (Cohen et al., 2012; Roy, Lopez, & Piva, 2013). Specific military careers are at greater risk due to experiences like g-force exposure in pilots and Airmen, falls during airborne, air assault, shock and vibration, and urban dismount ground operations. Additionally, due to the high incidence of mental health disorders in the military (Blakeley & Jansen, 2013), service members may be at a greater risk for developing chronic LBP (Shaw et al., 2010). Overall, LBP is among the most common cause of medical visits and lost duty days in the armed forces (Armed Forces Health Surveillance Center, 2015) and was the third highest service-connected disability in 2015 (Department of Veterans Affairs, 2015). Furthermore, LBP is the fourth highest service-connected disability of all veterans (Department

of Veterans Affairs, 2015), and has the lowest return-to-unit rate among deployed service members (Cohen et al., 2011).

The U.S. military consists of young and physically active members, both on and off duty. The average age of all active duty members is 28.6 years (Office of the Deputy Assistant of Defense, 2014). All military branches have standard physical fitness requirements and most members are required to pass a physical fitness test every six months. Musculoskeletal injuries are endemic in the armed forces and negatively impact combat readiness (Cameron & Owens, 2014; Jones, Canham-Chervak, & Sleet, 2010). Sports, recreation, and exercise are the leading causes of musculoskeletal injuries and other medical conditions in the U.S. military (Burnham, Copley, Shim, Kemp & Jones, 2010a; Burnham, Copley, Shim, Kemp & Jones, 2010b; Burnham, Copley, Shim, Kemp & Jones, 2010c; Copley, Burnham, Shim, & Kemp, 2010), with back pain being a leading cause of morbidity (Armed Forces Health Surveillance Branch, 2015). During their research, Snowbridge and Burgess (2003) found that the most common condition seen at a rehabilitation center for British military was LBP, with the top cause being work followed closely by recreation, military training/PT, and sport activities. The U.S. military is primarily comprised of young, active personnel that are at an increased risk for experiencing NLBP from both their professional and recreational endeavors.

Of all LBP presentations, 85-90% are nonspecific LBP (NLBP), which is defined as pain in the lower back without an underlying medical cause such as infection, cancer, osteoporosis, fracture, inflammatory process, or herniated disc (Goertz et al., 2012; Walker, French, Grant, & Green, 2010). NLBP is identified as acute (symptoms occurring for four to six weeks), subacute (symptoms for seven to twelve weeks) and chronic (symptoms greater than twelve weeks) (Goertz et al., 2012). Only 10% of NLBP is chronic (National Institute of Health, 2014). During

the time this DNP project was written, the Department of Veterans Affairs (VA) adopted Chou et al.'s (2007) clinical practice guideline (CPG) for the diagnosis and treatment of NLBP. Clinical practice guidelines adopted by the VA offer guidance and recommendations for practitioners in the Department of Defense (DoD), including Military Healthcare Systems (MHS) that serve and treat active duty military patients. Per this guideline, only a few interventions are recommended for all categories of NLBP, one of which is spinal manipulation therapy (Chou et al., 2007).

Spinal manipulation therapy (SMT) includes mobilization, manipulation, or both interventions (Rubinstein et al., 2012). Mobilization uses low-grade velocity and small or large amplitude passive movement techniques to a spinal joint's range of motion while manipulation uses high-velocity thrusts at a short amplitude during range of motion and is often accompanied by an audible crack (Sandoz, 1969). A Chiropractic Doctor, Physical Therapist, or Osteopathic Physician can perform spinal manipulation techniques although philosophies and treatment objectives between the practices differ (van de Veen et al., 2005). However, evidence has shown that benefits of manipulation do not vary between the different professions or techniques (Assendelft, Morton, Yu, Suttorp, & Shekelle, 2003; Rubinstein et al., 2013).

Spinal Manipulation Therapy is recommended in several CPGs internationally and continues to be a focus in current research studies. As of 2010, national CPGs in the United States, Austria, Italy, Netherlands, Canada, Finland, Norway, Germany and New Zealand recommend SMT for the treatment of NLBP (Koes et al., 2010). Rubstein and team (2012; 2013) conducted extensive systematic reviews and meta analyses on the effect of SMT for acute NLBP and chronic NLBP. For the treatment of acute NLBP, the authors concluded that the quality of evidence was too low and with a high risk of bias to make specific conclusions or recommendations for the use of SMT (Rubstein et al., 2012). It was postulated that because

acute NLBP naturally resolves on its own in a short amount of time, it is difficult to find clinically significant results. However, reviewed studies did show improvements in pain relief (Cherkin, Deyo, Battié, Street & Barlow, 1998), function when added to another intervention, and recovery (Childs, Flynn & Fritz, 2004; MacDonald & Bell, 1990). In their systematic review of SMT effect on chronic NLBP, Rubstein and colleagues (2013) determined SMT is equally effective as other treatment modalities. No serious complications related to SMT were noted in either systematic review (Rubstein et al., 2012; Rubstein et al., 2013). Similar findings were found in CPGs for osteopathic manipulation (Seffinger et al., 2010) and spinal manipulation by physical therapists (Delitto et al., 2012). Seffinger and team (2010) reviewed the effect of SMT for NLBP from osteopathic physicians and found a statistically significant decrease in pain that may persist through the first year of treatment, however, the researchers did not specify whether the cases were acute, subacute, chronic NLBP or mixed. Delitto and team (2012) recommended SMT for all categories of NLBP.

The Department of Defense (DoD) has made significant improvements toward increasing access to SMT for military service members. Worldwide there are currently 210 military healthcare facilities, 170 of which offer physical therapy and 65 have integrated chiropractors (Tricare, n.d.). There are 90 federal and contracted chiropractors (United States Government Accountability Office, 2013), and more than 2,200 Osteopathic Physicians in the military and federal service (Association of Military Osteopathic Physicians, n.d.). Of the three professions that provide SMT for NLBP, there has been significant controversy related to the integration of chiropractors in the military over the past twenty years.

Chiropractic care was first integrated into the military healthcare system in 1985 when the DoD conducted a demonstration project to evaluate the effectiveness of providing

chiropractic care to military service members and beneficiaries (United States Government Accountability Office, 2013). In 1995, chiropractic care was officially offered at specific military healthcare sites and over the next fifteen years the program was continually evaluated and enhanced. In 2000, the DoD deemed the program feasible but not fiscally practical yet the Chiropractic Health Care Program was established in 2001 with expansion to eleven sites in 2009. In order for service members to receive chiropractic care they must receive a referral from their primary care provider. If the member is not located at a military healthcare site with an established chiropractor, the patient must pay entirely out of pocket for care and treatment. Tricare, the healthcare insurance program for the DoD, does not cover chiropractic services even if NLBP is related to wartime training and combat (Brooks, Agochukwu, Arrington, and Mok, 2013; Cohen et al, 2012; Tricare, 2016).

Military members are a unique patient population that are at increased risk for experiencing NLBP related to their personal and professional endeavors and exposures (Cohen et al., 2012; Roy et al., 2013; Snowbridge & Burgess, 2003). There is evidence that SMT is beneficial for the treatment of NLBP (Cherkin et al., 1998; Childs et al., 2004; McDonald & Bell, 1990; Rubinstein et al., 2012; Rubinstein et al., 2013). The current Veterans Affairs CPG recommends SMT as a treatment option for all three presentations of NLBP (Chou et al., 2007). Healthcare and military operation costs related to NLBP are enormous. Utilizing effective and conservative interventions to treat pain and improve disability in service members with NLBP could improve healthcare costs and help maintain a mentally and physically fit and wartime ready military workforce. However, no integrative review has been done to determine the effectiveness of SMT for NLBP in the military population. Therefore, the aim of this DNP project was to comprehensively review the evidence to determine the impact of SMT for military

members experiencing NLBP. The information gained from the integrative review and focus group meetings was used to create the SMT Toolkit, which was presented and disseminated to medical providers that treat and manage active duty military with NLBP. The aim of the SMT Toolkit is to compile the most current evidence-based recommendations with provider and patient resources to improve provider's knowledge, awareness, and behaviors regarding the use of SMT for military members experiencing NLBP.

Integrative Review

Methods

During the integrative review the DNP student considered studies that included males and females 18 years or older who are in the United States military with acute, subacute, or chronic nonspecific low back pain (NLBP) who have received spinal manipulation therapy (SMT) as an intervention for their condition. Inclusion criteria included full text peer reviewed articles in English. Studies that include patients who were pregnant, had major neurological deficits, or had specific causes for their back pain including infection, cancer, osteoporosis, rheumatoid arthritis, fracture, inflammatory processes, caudina equina syndrome, or herniated disc were not included. The databases searched included PubMed, Cumulative Index of Nursing and Allied Health Literature (CINAHL), and Academic Search Premier. Initial keywords used were be *low back pain, back pain, lumbago, military, armed forces, Army, Air Force, Navy, Marines, spinal manipulation, chiropractic manipulation, osteopathic manipulation, spinal adjustment,* and *chiropractic*. There were no date limitations for inclusion in the review.

Results

The eight selected articles included two randomized controlled trials (RCTs), four quasi-experimental studies, and two case reports. Osteopaths, Chiropractors, and Physical Therapists

were the three specialties performing SMT with the majority of interventions being conducted by Physical Therapists. There was variability between the studies' tools used to measure patient outcomes. Of the eight studies, seven noted improvements in pain from SMT. Four studies noted improvements in functioning from SMT while three studies found no improvement. Additionally, two studies found an increase in overall improvement and patient satisfaction. Studies were rated using the Johns Hopkins Nursing Evidence-based Practice Rating Scale (Newhouse, Dearholt, Poe, Pugh, & White, 2005).

Provider specialties and treatment modalities. Osteopaths, Chiropractors, and Physical Therapists were the three provider specialties carrying out the study interventions. Two studies had Osteopaths (Andicochea, Fulkerson, Taylor, & Portouw, 2015; Cruser, Maurer, Hensel, Brown, White, & Stoll, 2012), one study used Chiropractors (Goertz, et al., 2013), three studies used Physical Therapists (Flynn, Fritz, Wainner, & Whitman, 2003; Flynn, et al., 2002; Sutlive, et al., 2009), and two used both Chiropractors and Physical Therapists (Green, Sims, & Allen, 2006; Koppenhaver, et al., 2011). All eight studies used the high velocity low amplitude (HVLA) spinal manipulation technique in their intervention. Five studies used HVLA as the sole SMT technique (Andicochea, et al, 2015; Cruser, et al., 2012, Goertz, et al., 2013; Koppenhaver, et al., 2011; Sutlive, et al., 2009). However, because SMT is rarely performed alone, many studies included other common treatment modalities. For instance, osteopathic manipulative treatment and chiropractic treatment may also include soft tissue stretching, myofascial release, counterstrain, muscle energy, sacro-iliac articulation, heat packs, and pelvic-tilt exercise education (Cruser, et al., 2012; Flynn, et al., 2003; Flynn, et al., 2002; Green, et al., 2006). Two studies used HVLA in conjunction with additional osteopathic treatments (Andicochea, et al, 2015; Cruser, et al., 2012), one study used HVLA in conjunction with

chiropractic treatments (Green, et al., 2006), and three studies used HVLA in conjunction with pelvic tilt exercise instructions (Flynn, et al., 2003; Flynn, et al., 2002; Sutlive, et al., 2009).

Impact of spinal manipulation therapy on nonspecific low back pain. Two RCTs (Cruser, et al, 2012; Goertz, et al., 2013), three quasi-experimental studies (Flynn, et al., 2002; Flynn, et al., 2003; Sutlive, et al., 2009), and two case reports (Andicochea, et al., 2015; Green, et al., 2006) noted improvements in NLBP pain after SMT. One quasi-experimental study found no improvement in NLBP pain after SMT (Koppenhaver, et al., 2011). All eight studies used the Visual Analog Scale to assess pain before and after SMT.

Impact of spinal manipulation therapy on nonspecific low back pain function. Patients from one RCT (Goertz, et al., 2013), two quasi-experimental studies (Flynn, et al., 2003; Sutlive, et al., 2009), and one case report (Green, et al., 2006) found improvements in NLBP function post SMT. Contrarily, one RCT and two quasi-experimental studies found no improvements in function related to NLBP post SMT (Cruser, et al., 2012; Flynn, et al., 2002; Koppenhaver, et al., 2011). To assess function, four studies used the Oswestry Disability Questionnaire (Flynn, et al., 2003; Flynn, et al., 2002; Koppenhaver, et al., 2011; Sutlive, et al., 2009) and three used the Roland Morris Disability Questionnaire (Goertz, et al., 2013; Green, et al., 2006, Cruser, et al., 2012). Goertz and colleagues (2013) also included the Back Pain Functioning Scale.

Other impacts of spinal manipulation on nonspecific low back pain. The two RCT studies created their own questionnaires to address overall improvement and patient satisfaction with SMT (Cruser, et al., 2012; & Goertz, et al., 2013). Neither questionnaire was adapted from previously tested tools to ensure validity and reliability. Both RCTs noted patients rated an overall improvement related to their NLBP after SMT. Additionally, participants in both studies

rated an increase in treatment satisfaction with SMT.

Synthesis Discussion

There is a significant range in the quality of evidence, spanning from the lowest rating Level VC to the highest Level IA. While case reports add to the growing body of research, they originate from an expert opinion based on non-research evidence, therefore, both studies, Andicochea, et al., 2015 and Green, et al., 2006, were given a rating of Level VC. The majority of the evidence in Flynn, et al., 2003, Flynn, et al., 2002, Koppenhaver, et al., 2011, and Sutlive, et al., 2009 was rated Level IIB because of their quasi-experimental study designs that lacked randomization, a control group, had a high risk of bias, and/or lacked a sufficient sample size. While Cruser et al. (2012) is a RCT, it was rated Level IB because it lacked a sufficient sample size and had the potential for bias. Goertz et al. (2013) was given the highest rating of Level IA due to its RCT study design, rigor, sufficient sample size, and use of reliable and valid measures.

Significant variation was found related to the type of NLBP studied and the duration of SMT interventions in the evidence. Three studies focused on SMT response with patients experiencing acute NLBP (Cruser, et al., 2012; Goertz, et al., 2013; & Sutlive, et al., 2009), two investigated chronic NLBP (Andicochea, et al., 2015; Green, et al., 2006), and three included a mixture of acute and chronic NLBP patients (Flynn, et al., 2002; Flynn, et al., 2003; & Koppenhaver, et al., 2011). The evidence in the review also had meaningful differences related to the intervention duration. The majority of studies had short-term interventions that were less than or equal to one week (Andicochea, et al., 2015; Flynn, et al., 2003; Flynn, et al., 2002; Koppenhaver, et al., 2011; Sutlive, et al., 2009). Goertz et al. (2013) and Cruser et al.'s (2012) interventions were slightly longer at four to five weeks and Green et al. (2006) was the longest duration of SMT lasting twenty-six weeks.

Inclusion of several types of NLBP presentations and variations of intervention duration make it difficult to determine which type of military patient with NLBP would most benefit or to determine recommendations for duration and may negatively skew the true benefit of SMT. For instance, half of the studies reviewed include patients experiencing acute NLBP and the intervention timeframe was only one week or less (Flynn, et al., 2002; Flynn, et al., 2003; Koppenhaver, et al., 2011; Sutlive, et al., 2009). Rubstein et al. (2012) recognized that acute NLBP commonly resolves on its own within six weeks, making it significantly more difficult to determine the overall impact of SMT with short-term interventions. Furthermore, the benefits of SMT may take seven to twelve visits for upwards of three to ten weeks (Eisenberg, et al., 2007; Hondras, Long, Cao, Rowell, & Meeker, 2009; Rundell, Davenport, & Wagner, 2009), which is a stark difference compared with the majority of the reviewed studies.

Overall, the evidence clearly demonstrates that SMT is beneficial for active duty military patients experiencing NLBP. As previously stated, the prevalence of NLBP is high in the military due to recreational, training, and combat related activities. Spinal manipulation therapy improves pain and functioning for acute, subacute, and chronic NLBP and is an important treatment modality to consider and utilize while caring for military patients. Improvements in disability decrease the return-to-duty timeframe of the military workforce, which is an important focus for the military Medical Corps (Cohen, et al., 2012). Moreover, SMT is noninvasive and will not further limit the military member's ability to do his/her job or maintain wartime deployment readiness.

The clinical practice guideline supported by the Veterans Affairs and Department of Defense recommends the use of SMT for the treatment of acute, subacute, and chronic NLBP. However, there continues to be a staggering prevalence of NLBP in the military, suggesting

suboptimal coordination of care for spinal manipulation therapy and ultimately, ineffective quality of care (Carey et al., 2009; Penney, et al., 2016). In order to optimize care for military patients experiencing NLBP and improve patient outcomes, the creation, presentation, and distribution of a standardized, evidence-based SMT Toolkit was warranted.

Several factors were considered when selecting the type of intervention for this DNP project. The intervention had to be administered in a way that would maximize participation, be long enough to cover essential information and education but short enough to fit into the busy schedules of primary care providers, and be the appropriate format to meet project objectives. Educational interventions have been shown to improve medical providers' behavior (Boom, Nelson, Laufman, Kohrt, & Kozinetz, 2007; Cabana et al., 2014; Coleman & Fromer, 2015; Dacey, Arnstein, Kennedy, Wolfe, & Phillips, 2013; Katz, Shuval, Comerford, Faridi, & Njike, 2008), attitudes (Cabana et al., 2014), confidence (Cabana et al., 2014; Dacey et al., 2013) and knowledge (Coleman & Fromer, 2015; Dacey et al., 2013). Furthermore, Cabana and team (2014) found that educational training directed toward medical providers improve patient outcomes.

Benefits are seen with a wide variety of education intervention programs. Educational interventions that range from one to three hours positively impact providers' awareness (Cabana et al., 2014), confidence (Cabana et al., 2014), and behavior (Boom et al., 2007; Cabana et al., 2014; Coleman & Fromer, 2015). Educational interventions that are longer, ranging from one to two days or administered for short sessions but consistently over several months improve provider knowledge (Dacey et al., 2013), confidence (Dacey et al., 2013), and behavior (Dacey et al., 2013; Katz et al., 2008). Moreover, educational interventions that utilize teaching/learning material and guides, like a practice toolkit, improve providers' confidence when making

treatment decisions (Gulati et al., 2015). Considering the evidence, the feasibility of the DNP project, and in an effort to maximize participation, the DNP student chose to create and present an educational presentation and practice toolkit.

Theoretical Framework

Innovation and change are essential for optimal patient care. Today's healthcare system is constantly evolving as new evidence is introduced, however, new evidence-based processes are often not adopted in a timely manner (Issel, 2014). Change can be challenging and multiple barriers may preclude successful implementation (Mitchell, 2013). Thoughtful use of frameworks during project planning can help identify solutions to obstacles, like increasing buy in from stakeholders to ensure project sustainability (Manchester et al., 2014). For the DNP project, Lewin's Theory of Change (1947) was used to guide development and implementation and is depicted in Appendix A. Lewin's Theory of Change is perfectly suited for environments that are stable and not addressing an emergent situation, thereby eliminating the opportunity for planning (Shirey, 2013), and for projects aiming to anticipate and identify obstacles to normal provider patterns while caring for patients (Manchester et al., 2014).

Lewin's theory is comprised of three stages of change before system adoption- unfreezing, transition or moving, and refreezing. Unfreezing occurs when change is needed, transition begins when change is initiated, and refreezing occurs when equilibrium is established. Concepts within the Theory of Change include driving forces, restraining forces, and equilibrium. Driving forces are the catalyst for change, while restraining forces oppose change and equilibrium results when both forces driving forces and restraining forces are equal (Lewin, 1947; Lewin, 1951).

For the DNP project, unfreezing would include examining current provider practices,

conducting focus group meetings regarding the use of Spinal Manipulation Therapy (SMT) for NLBP at the project site, identifying current clinic needs, and gaps in knowledge and practice. During the unfreezing stage, the DNP student acts as the change agent by recognizing the problem and need for change, identifying a solution through interdisciplinary collaboration with clinic staff, and planning and creating the SMT Toolkit. In this circumstance, the presentation and SMT Toolkit served as the driving force for change. New knowledge, behaviors, and procedures cause disequilibrium in an organization, which sets the stage for organizational change (Manchester et al., 2014). According to Lewin's theory, transition is a process rather than an event (Shirey, 2013). Movement occurs when providers are educated on current SMT evidence-based practice recommendations, referral options, and practice resources. As obstacles to change decrease and new practices become adopted, resistance declines and movement continues (Manchester et al., 2014). Once new knowledge is gained and SMT is effectively incorporated in the routine treatment and management of military patients with NLBP, refreezing is established. New practices ultimately become the norm and stabilization occurs (Manchester et al., 2014; Shirey, 2013). During refreezing, it is important to recognize that reinforcement of new knowledge and behavior are essential so the organization does not fall back into status quo and the change is sustained (Manchester et al., 2014; Shirey, 2013).

Goals, Objectives, and Expected Outcomes

The overarching goal of the DNP project was to create and present a toolkit, for medical providers who serve active duty personnel, with the most up-to-date evidence-based recommendations and guidance in the use of spinal manipulation therapy (SMT) for nonspecific low back pain (NLBP). Subset goals include completing the integrative review, conducting focus group meetings with key players, creating the SMT Toolkit, presenting the SMT Toolkit,

and evaluating immediate impacts of the educational presentation and delayed impacts of the educational presentation and SMT Toolkit. The specific objectives and expected outcomes pertaining to each goal are displayed in Table 2 below. The DNP student was solely responsible for creating, presenting, and evaluating the educational presentation and SMT Toolkit.

Table 2.
Goals, Objectives, and Expected Outcomes

Goals	**Objectives**	**Expected Outcomes**
1. Complete integrative review.	1. Appropriately select, review, and analyze the evidence on the use of SMT for military members experiencing NLBP.	1. Integrative review is successfully completed based on objectives. Based on the evidence, SMT is a beneficial treatment option for military members experiencing NLBP.
2. Conduct focus group meetings with key players at DNP project site.	1. Determine the site's current practices regarding the use of SMT for NLBP. 2. Determine the sites needs related to the use of SMT for NLBP. 3. Recognize current gaps in practice. 4. Collect referral options available at project site and each option's contact information and specific criteria.	1. All focus group meetings completed effectively with three providers, Physical Therapists, the Chiropractor, and a member from the hospital's referral office. Focused group meetings are informative and insightful. Information obtained is used to create the SMT Toolkit.
3. Creation of evidence-based SMT Toolkit for providers caring for military members experiencing NLBP.	1. Creation of SMT Toolkit based on the information gained from integrative review and the focus group meetings. SMT Toolkit is tailored to local site's needs and will provide referral options as well as each option's referral criteria. It will also provide provider resources and patient education on SMT.	1. SMT Toolkit created and meets all objectives.

4. Present and distribute SMT Toolkit to clinic providers during staff meeting.	1. Coordinate presentation with clinic leadership to improve staff attendance. 2. Effective presentation of current evidence-based information and recommendations regarding topic. Effective summarization and demonstration on use of SMT Toolkit. Effective articulation of local referral options and their specific criteria. 3. Effective distribution of SMT Toolkit to appropriate clinic providers.	1. Presentation coordinated during staff meeting to optimize attendance. 2. Presentation meets all objectives. 3. SMT Toolkit distributed to clinic providers electronically.
5. Administer post presentation questionnaire and evaluate effectiveness of educational presentation based on questionnaire feedback.	1. All participants complete the post presentation questionnaire.	1. The educational presentation increases providers' knowledge and awareness regarding NLBP in the military patient population, benefits of SMT for NLBP based on clinical practice guideline recommendations, and local referral options for SMT for appropriate patients. 2. Providers feel they will utilize the SMT Toolkit in practice.
6. Administer two-month post presentation questionnaire and evaluate effectiveness of SMT Toolkit based on questionnaire feedback.	1. All participants completed the two-month post presentation questionnaire.	1. Providers independently review the SMT Toolkit after the presentation. 2. Providers find the SMT Toolkit is helpful in improving knowledge and awareness of SMT for military patients with NLBP, clinical practice guidelines recommendations, local

		referral options and their specific criteria. 3. Providers use the SMT Toolkit in practice and it improvers their ability to effectively recognize patients that would benefit from SMT and appropriately refer these patients for SMT based on guideline recommendations.

Project Design and Methods

This Quality Improvement Project was developed using an integrative review process with an educational presentation design including a toolkit that will be left onsite for future reference. Both qualitative and quantitative methods were incorporated in the project. Qualitative methods included focus group meetings held prior to the creation of the Spinal Manipulation Therapy (SMT) Toolkit and the post-presentation debrief sessions. Information gained from the integrative review and focus group meetings were then used to create the educational presentation and SMT Toolkit. Quantitative methods included two post presentation questionnaires, the first administered after the presentation and the second two months after the presentation. Both questionnaires were analyzed to assess how the presentation and SMT Toolkit influenced providers' knowledge, awareness, and behavior.

Population, Setting and Resources

Fort Bragg, North Carolina is the most populated Army post in the world and is comprised of ten percent of the Army's active forces (Fort Bragg, n.d.) There are approximately 52,280 military personnel working on Fort Bragg (Army-technology, 2013). The educational presentation took place at Clark Health Clinic on Fort Bragg. The clinic serves approximately

28,000 patients, including active duty Army soldiers (Womack Army Medical Center, n.d.). Many of the active duty patients are from the 82nd Airborne Division, an airborne infantry division specializing in joint forcible entry operations by parachuting from military aircraft into specific locations (Fort Bragg, 2013). The participants were a convenience sample of the medical providers employed at Clark Health Clinic. The providers were active duty military, civilian Department of Defense (DoD) employees, and civilian contractor Nurse Practitioners, Physician Assistants, and Medical Doctors.

Facilitators and Barriers

Assessment of project facilitators and barriers is an imperative step in the planning process. Before implementation, the DNP student obtained the Key Stakeholder Letter of Agreement with the DNP project site, Womack Army Medical Center (Appendix B). A summary of the DNP project and objectives were also presented to the Clark Health Clinic's leadership staff during a meeting in August 2016. After the summary presentation, the clinic's leadership verbally supported the DNP project and authorized the DNP student to create and present the toolkit to the clinic providers. Finally, the DNP student conducted focus group meetings with key players. Support from the project site, clinic leadership, and focus group members were essential facilitators for creation of the Spinal Manipulation Therapy (SMT) toolkit. Furthermore, the project site supports evidence-based medicine and uses clinical practice guidelines (CPG). Because the intervention is based on research and CPG recommendations, this also served as a facilitator for the DNP project. Finally, the DNP student sought to improve the nonspecific low back pain return-to-duty timeframe and overall readiness of the military workforce through this quality improvement project. This also served as a project facilitator because it is an important focus for the military Medical Corps (Cohen, et al., 2012).

Few barriers were encountered during the DNP project implementation. The projected barriers included lack of support from the clinic's leadership and involvement of key members in focus group meetings. However, key players were supportive during the implementation process and willing to share their insight for the SMT Toolkit. Other projected barriers included providers not attending the SMT Toolkit presentation and not actively using the SMT Toolkit post presentation. Because the toolkit was presented during the clinic's staff meeting, more participants attended than originally anticipated; therefore, this was not a project barrier. Provider utilization of the toolkit in practice is examined more in-depth within the Discussion section.

Presentation and Toolkit Implementation Plan Summary

Pre-toolkit preparation.

An integrative review was conducted on the use and impact of spinal manipulation therapy (SMT) for military members experiencing nonspecific low back pain (NLBP). Eight studies were included in the integrative review. There was a significant range in the quality of evidence, spanning from Level VC to Level IA (Newhouse et al., 2005). Based on the review, SMT is beneficial and an important treatment modality for active duty military patients experiencing nonspecific low back pain.

After completion of the integrative review, the DNP student conducted focus group meetings with key players at the project site including three primary care providers, the clinic's acute care physical therapist, the clinic's chiropractor, two physical therapists from the hospital's physical therapy department, and one administrator from the hospital's referral office. During the focus group meetings, the DNP student gathered information regarding the site's current treatment and management practices for military members experiencing NLBP, gaps in practice,

and the clinic's current needs regarding SMT information and guidance. The DNP student also simultaneously gathered information regarding local SMT referral options. Contact information, qualifications, and specific referral criteria and guidelines were obtained for each referral option.

Toolkit Development.

Needs of the project site and information gained from the integrative review and focus group meetings were combined and utilized to construct the Spinal Manipulation Therapy (SMT) Toolkit. The Agency for Healthcare Research and Quality (2016) defines a toolkit as a compilation of information, tools, and resources that, when combined, guides users to follow evidence-based recommendations. Toolkits help translate research into policy and practice. Specifically, the SMT Toolkit is a comprehensive yet consolidated practice guide aimed to help providers make efficient and effective treatment decisions and provides evidence-based recommendations regarding SMT for nonspecific low back pain (NLBP). The SMT Toolkit is not prescriptive, recommendations and resources can be selected and tailored based on patients' needs.

The table of contents is located at the beginning of the toolkit with active links for each section. Each section within the toolkit has its own cover page so the user can easily navigate through the contents. Definitions of NLBP and SMT are given within the toolkit's introduction, as well as the benefits of SMT for military patients experiencing NLBP based on the integrative review. The clinical practice guideline (CPG) is embedded in the toolkit and the CPG's NLBP treatment algorithm is conveniently separated within the toolkit's algorithm section for easy access. The DNP student used the CPG and the referral options available at the project site to create the SMT Algorithm, which is also conveniently located within the toolkit's algorithm section. Each referral option has its own section with contact information, specific criteria, and

additional information to improve and streamline the referral process. The project site's SMT referral options include the Acute Care Physical Therapist, the Physical Therapy department, the Chiropractor, and the Pain Management Clinic (for qualifying patients). Additionally, the DNP student created a patient education handout on SMT and its benefits with NLBP and embedded it within the toolkit. The last section of the toolkit contains several additional resources, including links to low back pain examination videos, link to the Veteran Affairs (VA) /Department of Defense (DoD) low back pain clinical practice guideline website, and the VA/DoD Patient Education Packet on managing low back pain. Most pages in the toolkit have an active link at the bottom that will bring the user back to the table of contents or the SMT Algorithm.

Presentation.

After development of the Spinal Manipulation Therapy (SMT) Toolkit, the DNP student created an educational PowerPoint presentation. The presentation served as a training method and summarized the current evidence, integrative review, and the SMT Toolkit. The DNP student coordinated the presentation date with the clinic's medical director. The educational presentation was given to the clinic's providers on December 7, 2016 during their clinic staff meeting. It was offered to all providers regardless if it was directly applicable to their role within the clinic (i.e. clinical pharmacists, pediatricians). At the end of the presentation, the SMT Toolkit was displayed and the DNP student navigated through each section and briefly discussed important components. The presentation lasted approximately forty-five minutes and was immediately followed by a question and answer debrief that lasted approximately ten minutes. The DNP student provided the clinic providers with an electronic version of the SMT Toolkit after completion of the educational presentation.

Evaluation.

At the end of the presentation and explanation of the Spinal Manipulation Therapy (SMT) Toolkit and its components, applicable participants were asked to complete the post presentation questionnaire (Appendix C). The post presentation questionnaire comprised of six questions with the following answer options: yes, no, somewhat. Providers were asked whether the presentation increased their awareness about the benefits of SMT for nonspecific low back pain (NLBP), knowledge about the benefits of SMT for NLBP, benefits of SMT for military patients with NLBP, and clinical practice guideline recommendations on the use of SMT for NLBP. Participants were also asked if the presentation effectively discussed referral options and specific criteria and if they thought they would use the SMT Toolkit in practice. The goal of the initial questionnaire was to evaluate the impact of the educational presentation on providers' knowledge and awareness and if they felt the toolkit would be useful in practice.

Two months after the presentation and distribution of the SMT Toolkit, the same participants were asked to complete a second questionnaire (Appendix D). The two-month post presentation questionnaire comprised of seven questions with the following answer options: yes, no, or somewhat. Providers were asked if they reviewed the SMT Toolkit after the presentation and if they used the SMT Toolkit in practice. Additionally, participants were asked if the SMT Toolkit increased their knowledge and awareness about the benefits of SMT for military patients with NLBP and about clinical practice guideline recommendations on the use of SMT for NLBP. The final two questions addressed if the SMT Toolkit effectively provided referral options available and if the presentation or SMT Toolkit affected their practice behavior.

The goal of the second questionnaire was to evaluate the impact of the presentation and SMT Toolkit on actual practice and referral behaviors. Specifically, did participants use

knowledge gained from the educational presentation and use the SMT Toolkit to correctly identify, refer, and manage patients with NLBP based on the clinical practice guideline? The DNP student collected and reviewed completed questionnaires and information gained from the post presentation debrief session.

Outcomes

Prior to implementation of the DNP project, six goals with specific objectives and expected outcomes were identified (see Goals, Objectives, and Expected Outcomes section). Below are the same goals with discussion of the DNP project's actual outcomes.

Goal 1. Complete Integrative Review

The integrative review was conducted and completed successfully according to the determined objectives. Based on the review criteria, eight studies were selected, reviewed, analyzed, and synthesized. Spinal manipulation therapy (SMT) was shown to be beneficial in the treatment of military patients with all three presentations of nonspecific low back pain (NLBP). The review served as the solid foundation for the DNP project.

Goal 2. Conduct Focus Group Meetings With Key Players at DNP Project Site

All focus group meetings were completed effectively. Information gained and relationships established through the focus group meetings were pivotal for the development and creation of the SMT Toolkit. Focus group meetings occurred during September and October 2016 and included three primary care providers from the local site (two Nurse Practitioners and one Physician-assistant), the Acute Care Physical Therapist from the local site, two Physical Therapists from the hospital, the Chiropractor from the local site, and an administrator from the hospital's referral office.

Goal 3. Creation of Evidence-Based Spinal Manipulation Therapy Toolkit For Military Members Experiencing Nonspecific Low Back Pain

The SMT Toolkit (Appendix E) was created based on the information gained from integrative review and the focus group meetings. The toolkit was tailored to the local site's needs and gaps in practice. The toolkit clearly depicts the current evidence, referral options available as well as each option's referral criteria. It contains provider resources as well as educational information for patients regarding SMT for NLBP. Additionally, the DNP student created and embedded the SMT algorithm and the patient education handout on SMT and its benefits with NLBP within the toolkit.

Goal 4. Present and Distribute Spinal Manipulation Therapy Toolkit to Clinic Providers During Staff Meeting

The educational presentation (Appendix F) was conducting during the clinic's staff meeting and met all objectives. Seventeen providers participated in the presentation. Participants included three Medical Doctors, two Osteopaths, four Family Nurse Practitioners, two Physician Assistants, one Chiropractor, one Acute Care Physical Therapist, two Clinical Pharmacists, and three Pediatricians. After the presentation, the electronic version of the SMT Toolkit was placed within a shared computer network folder to improve ease of access. A follow-up email was sent one week after the presentation to remind clinic staff about the SMT Toolkit and its location on the shared computer network.

Goal 5. Evaluate Effectiveness of the Educational Presentation and Spinal Manipulation Therapy Toolkit Based on Feedback From Post Presentation Questionnaire

The intended audience for the DNP project included primary care providers who care for active duty military patients. Ten out of the seventeen medical professionals that attended the

presentation met the intended audience criteria. Three osteopaths were excluded from the evaluation because providing spinal manipulation is within their scope of practice. Therefore, questionnaires were only collected from seven primary care providers.

Of the seven providers that completed the post presentation questionnaire, six out of seven or 86% stated the presentation increased their knowledge and awareness about the benefits of SMT for NLBP, increased their knowledge about the benefits of SMT for military patients with NLBP and about the current clinical practice guideline recommendations. One participant selected "somewhat" for the first five questions. Five out of seven or 71% of the participants stated the presentation effectively discussed local referral options and their specific criteria; two participants selected "somewhat". Seven out of seven or 100% of the participants stated they would likely use the SMT Toolkit in practice. Providers also verbalized positive feedback toward the SMT algorithm and patient education brochure. A summarization graph on the questionnaire's results is depicted below in Figure 1.

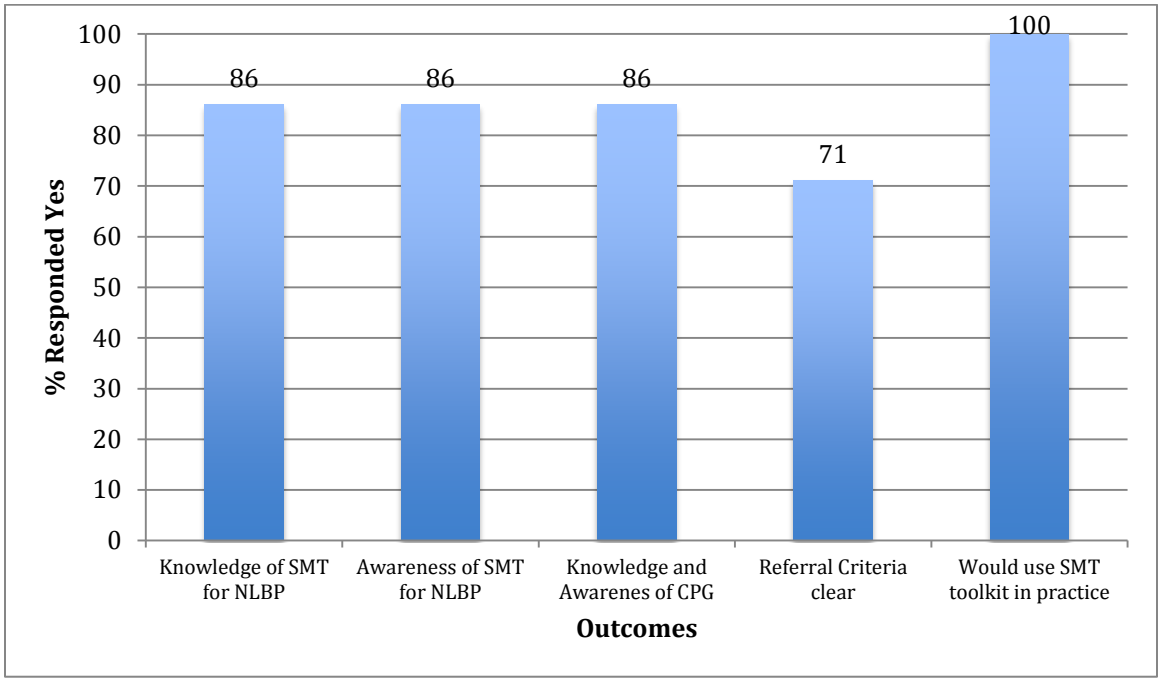

Figure 1. Results of Post Presentation Questionnaire. Percent of participants who responded yes from yes, no, somewhat answer options. SMT= Spinal Manipulation Therapy, NLBP= Nonspecific Low Back Pain, CPG= Clinical Practice Guideline.

6. Evaluate Effectiveness of Spinal Manipulation Therapy Toolkit Based on Feedback From Two-Month Post Presentation Questionnaire

Five out of the seven providers completed the two-month post presentation questionnaire. Three out of five or 60% of the participants stated they reviewed the Spinal Manipulation Therapy (SMT) Toolkit after the presentation and that the SMT Toolkit increased their knowledge and awareness about SMT for nonspecific low back pain (NLBP), for military patients with NLBP, and about current clinical practice guidelines recommendations. Additionally, 60% of the participants also noted the SMT Toolkit effectively presented local referral options and their specific criteria. Of the five participants, 40% stated the presentation and SMT Toolkit affected their practice behavior. A summarization graph on the questionnaire's results is depicted in below in Figure 2.

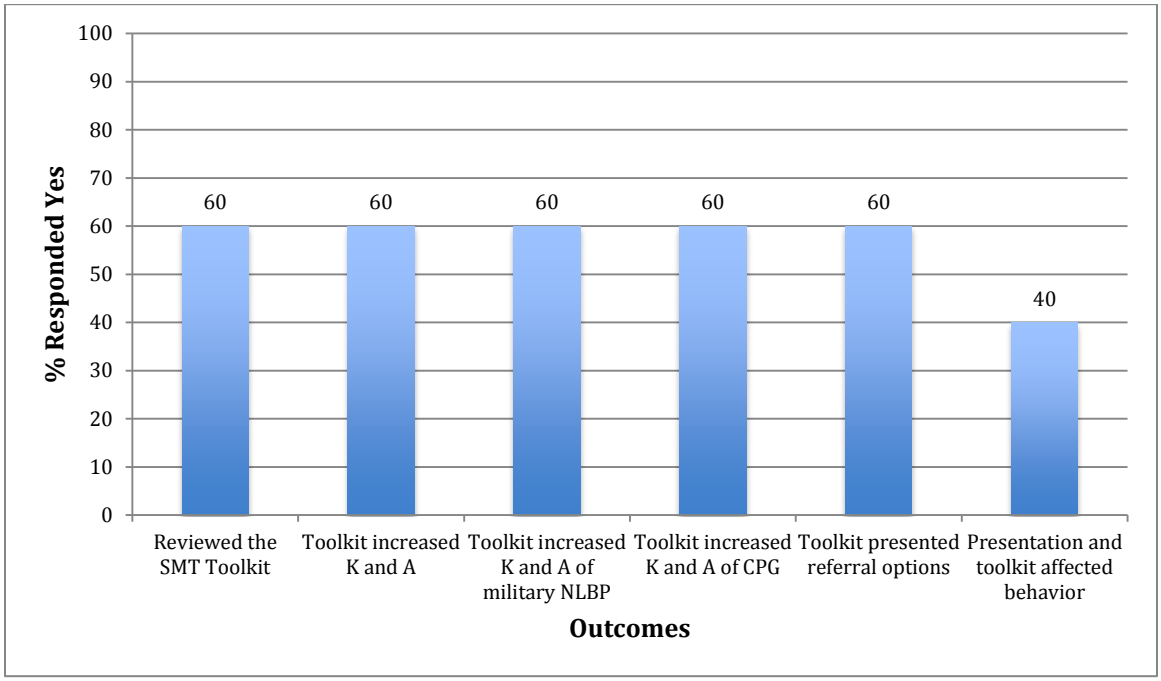

Figure 2. Results of Two-Month Post Presentation Questionnaire. Percent of participants who responded yes from yes, no, somewhat answer options. SMT= Spinal Manipulation Therapy, K= Knowledge, A= Awareness, NLBP= Nonspecific Low Back Pain, CPG= Clinical Practice Guidelines.

A projected barrier for the DNP project included providers not actively using the toolkit in practice. This barrier was realized in the short-term post presentation evaluation. For the two-month post presentation questionnaire, results showed project participants had not actively used the SMT Toolkit in practice, as yet. When asked to give feedback regarding reasons for non-use of the toolkit, responses included: “no time to review”, “no opportunity, have been on vacation”, “have reviewed it only.” Major barriers cited were increase in the number of daily patient appointments and lack of time during the workday to review and use the evidence-based practice recommendations and toolkits. Only two providers replied that they were already knowledgeable regarding the use of SMT for NLBP and appropriately referred patients for treatment.

Discussion

Influence on Knowledge, Awareness, and Behavior

Based on the project’s outcomes, ultimately the integrative review with educational presentation, and Spinal Manipulation Therapy (SMT) Toolkit succeeded in increasing providers’ knowledge and awareness and influenced their practice behaviors. The majority of the providers believed the educational presentation increased their knowledge about benefits of SMT for nonspecific low back pain (NLBP), benefits of SMT for military patients with NLBP, and clinical practice guideline recommendations. All of the providers responded that they would use the SMT Toolkit in practice, even the two who initially replied that they were already knowledgeable regarding the use of SMT for NLBP and appropriate referred patients for treatment. Two-months after the educational presentation, the majority of the providers responded that they reviewed the SMT Toolkit and it increased their knowledge and awareness

about SMT for NLBP, benefits of SMT for military patients suffering from NLBP, and clinical practice guideline recommendations.

This information is especially important for nurse investigators interested in improving patient care and outcomes with a cost-effective and easily replicable intervention. Utilization of educational interventions and practice toolkits has the potential to improve evidence-based practice thereby decreasing healthcare costs. Furthermore, the SMT Toolkit guides practitioners in the appropriate referral for a noninvasive treatment option for NLBP.

The SMT Toolkit is a product of professionals from several different disciplines successfully working together for a common goal, improving patient care. This highlights the importance of a multidisciplinary team approach in meeting organizational objectives and patients' needs. Working collaboratively with key players in focus group meetings improved the toolkit's accuracy, usability, and credibility. This important step in the implementation process had a direct impact on achieving project goals, improving providers' knowledge, awareness, and behaviors.

Interestingly, 100% of the providers believed they would utilize the SMT Toolkit in practice after the educational presentation but at the two-month follow-up, none of the providers had used the toolkit. One hypothesis to explain this early lack of use is that the follow-up timeframe was too short. Changes in behavior take time. Also, providers may not have seen a patient with NLBP within that timeframe. The DNP student could have followed-up with providers at the two-month mark to reinforce knowledge gained from the integrative review and emphasize utilization of the SMT Toolkit. Then, a six-month post presentation questionnaire could have been administered to providers. Reinforcement at two months may have acted as a driving force for change and improved project goals at the six-month follow-up.

Use of Integrative Review and Spinal Manipulation Toolkit

A variety of users will benefit from using this DNP project's integrative review and Spinal Manipulation Therapy (SMT) Toolkit. Healthcare professionals on the frontline actively seeing military patients can use information learned from the review and resources from the SMT Toolkit to improve their care of patients with NLBP. The SMT Toolkit aids in recognizing, treating, referring, and managing patients who would benefit from SMT.

Administrators interested or responsible for improving the use of evidence-based guidelines (EBG) within their organization could use the integrative review and present and distribute of the SMT Toolkit to their clinicians. In turn, this would add to the growing body of knowledge regarding the use of SMT for military patients with NLBP. Investigators or clinicians could also take the project one step further and utilize the integrative review and SMT Toolkit in a follow-up or similar Quality Improvement Project. Researchers could analyze providers' knowledge and awareness before and after completion of the education presentation and distribution of the SMT Toolkit. Researchers could also investigate change in providers' referral behaviors and patterns after presentation and receipt of toolkit through repeated measures analysis over time. Another area of interest would involve evaluating patients' satisfaction with providers' care before and after the SMT Toolkit is distributed to providers.

Benefits

The educational presentation effectively summarized the current trends regarding nonspecific low back pain (NLBP) in the military population, the current clinical practice guideline, and evidence that supports the use of SMT for military patients with NLBP. The SMT Toolkit also summarized the same information in an understandable, easy to follow format that is visually appealing. The toolkit includes practice algorithms to help guide providers in their

treatment decisions and referral guides are clearly marked with specific information provided in a straightforward layout. Lastly, it is inexpensive to implement both the educational presentation and SMT Toolkit.

The SMT Toolkit provided essential education for both the provider and the patient. For the provider, the toolkit discusses contraindications to SMT, identifies two websites that present vital information on managing patients with NLBP, and a website that contains NLBP physical examination videos. Additionally, a validated clinical predictor rule is presented within the toolkit that can be used in practice to identify patients that would more benefit from SMT. For patient education, the user has access to the Veterans Affairs/Department of Defense educational packet on managing low back pain as well as the patient education handout created by the DNP student on SMT for low back pain.

Future Recommendations

As nonspecific low back pain (NLBP) continues to negatively impact both patient wellbeing and hamper our healthcare spending, future investigative work should continue to focus on the most beneficial, conservative, and cost effective treatment options like spinal manipulation therapy (SMT). In order for educational interventions to change providers' practice behaviors, future studies should address gaps in practice, clinic and staff needs, be interactive, and multifaceted. The importance of the needs assessment should not be taken lightly for educational projects (Davis & Davis, 2010). Expanding the amount of focus group meetings with clinic staff can aid in identifying and addressing essential site needs. Furthermore, it may be beneficial to obtain pre-intervention data on provider referral patterns and if referrals are appropriate based on the clinic practice guideline. This data could be used to compare with post-intervention referral characteristics and patterns. Lacking data on local site's referral

patterns may decrease providers' motivation for making changes (Boom et al., 2007). Therefore, it would be prudent for future inquires to include this step in the implementation process. Data comparison would have been helpful to further evaluate the impact of the intervention, as self-report questionnaires may contain biases.

It was difficult to ascertain how to increase use of the toolkit by providers who already felt overwhelmed with their current patient care duties and responsibilities. Assessing current clinic processes may help identify areas of improvement and ultimately foster the use of evidence-based interventions in everyday practice. Process examples include adjusting workflow, making use of evidence-based medicine a clinic priority, and modifying attitudes toward new additions of evidence-based processes. Future investigators should consider factors that improve utilization and sustainment, like weekly email reminders (Barnes, Theeke, & Mallow, 2015), hanging an algorithm poster in patient rooms (Barnes et al., 2015), and incorporating support staff (Boom et al., 2007). The DNP student was unable to alter the electronic health record to use electronic reminders or alter NLBP templates, however, if investigators are able to make such alterations these may serve to improve utilization and sustainability as well. Lastly, future improvement projects should consider increasing the sample size of the educational intervention and include an evaluation questionnaire post presentation that assesses the presenter's success with presentation and/or impact of the project on the participants. Issel (2014) asserts that program evaluation is vital to determine if the project was implemented as the investigator had planned.

Ethics and Human Subjects Protection

The University of Massachusetts, Amherst Internal Review Board (IRB) approval was obtained prior to initiating the DNP project (Appendix G). The integrative review and Spinal

Manipulation Therapy (SMT) Toolkit presentation was an educational intervention to improve the knowledge of medical providers regarding the use of SMT for military patients experiencing Nonspecific Low Back Pain (NLBP). The participants were clinic staff. Information collected from the focus group meetings and post presentation questionnaires were aggregated and did not include any potential participant identifiers.

Conclusion

Like the civilian population, there is a high prevalence of Nonspecific Low Back Pain (NLBP) within the military population, which negatively impacts the patient's quality of life and drains healthcare resources. Spinal Manipulation Therapy (SMT) is recommended as a treatment option in NLBP clinical practice guidelines; however, no integrative review has been done to determine the specific impact of SMT for military patients with NLBP. After completion of the integrative review, it was determined that SMT is, in fact, an effective intervention for military members experiencing NLBP. Information obtained from Lewin's Theory of Change, the integrative review, and focus group meetings were used to create an educational presentation and the SMT Toolkit for providers that treat and manage active duty military members with NLBP. The SMT Toolkit provided evidence-based recommendations regarding SMT for nonspecific low back pain (NLBP), local referral options, educational resources for providers, as well as the SMT algorithm and patient educational handout. The toolkit was distributed to appropriate participants and questionnaires were collected to determine if the presentation and toolkit were effective and beneficial. Based on the post presentation questionnaires, both the presentation and toolkit improved participants' knowledge and awareness about clinical practice guideline recommendations and the benefits of SMT for military patients experiencing NLBP and influenced their practice behavior. Future investigations should analyze the toolkit's overall

impact on practice behaviors and consider further avenues to increase utilization of practice toolkits in today's busy primary care clinics.

The need to determine the most beneficial, conservative, and cost effective treatment options for nonspecific low back pain, like SMT, is more important than ever. Due to the rise in opioid addiction, there is a need to find effective treatment alternatives other than drug therapy, especially with chronic low back pain. As new research continues to evolve, healthcare professionals should determine a treatment plan with their patients that meets their needs but appropriately reflects current clinical practice guidelines. Educational interventions and practice toolkits are vessels available to improve providers' knowledge and awareness on current gaps in practice and in effective use of newer evidence-based practice recommendations.

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Appendix A

Theoretical Framework: Lewin's Theory of Change

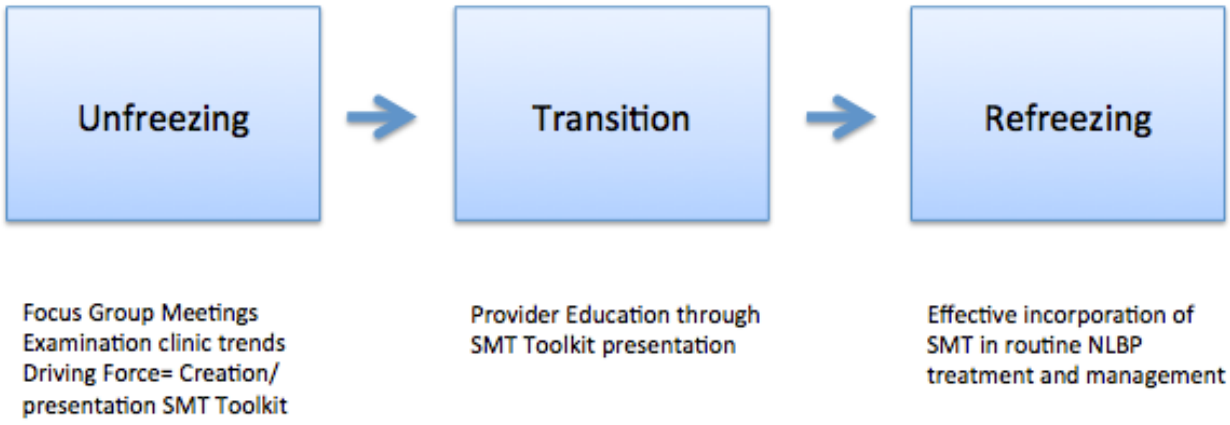

Figure 3. Adapted from Kurt Lewin, 1951

Appendix B

Key Stakeholder Support

UNIVERSITY OF MASSACHUSETTS AMHERST **College of Nursing**
Skinner Hall
651 North Pleasant Street
Amherst, MA 01003-9304 413-545-5089

[date]

To Whom It May Concern:

I am the Director of the DNP Program at the University of Massachusetts, Amherst, College of Nursing. I am writing this letter on behalf of Kelsey Ress, your student preceptee. Your student is planning to complete the pinnacle requirement for the Degree, a DNP Capstone Project, in your facility. Your student will be designing, implementing, and evaluating the impact of translating a programmatic intervention into your practice or setting. As these projects are considered performance improvement, quality improvement, or program evaluation projects and not research studies, the University does not require Institutional Review Board (IRB) permission for this student to actualize the project as outlined by the student and approved by preceptor/s within your facility. I am using this letter as a "Key Stakeholder" commitment letter for the student to use in the DNP Capstone Project Proposal. A Graduate faculty member of the College of Nursing will also be working directly with your student as Chair of the DNP Capstone Project Committee.

Thank you in advance for allowing this student to actualize the DNP Capstone Project in your facility. If you have any questions, please call me at 413-545-5089 or email paselton@nursing.umass.edu.

Ida Montgomery, DNP-BC
ITC, AN

Key Stakeholder Signature: _____ **Date:** 23 Aug 2016

Student Signature: Kelsey Ress **Date:** 23 Aug 2016

Sincerely,

Pamela Aselton

Pamela Aselton, PhD, FNP-BC
Associate Professor
Director DNP Program

Appendix C

Post Presentation Questionnaire

1. Do you feel the Spinal Manipulation Therapy (SMT) Toolkit presentation has increased your **awareness** about the benefits of spinal manipulation for nonspecific low back pain?
    a. Yes
    b. No
    c. Somewhat
2. Do you feel the SMT Toolkit presentation has increased your **knowledge** about the benefits of spinal manipulation for nonspecific low back pain?
    a. Yes
    b. No
    c. Somewhat
3. Do you feel the SMT Toolkit presentation has increased your **knowledge** about the benefits of spinal manipulation for **military patients** with nonspecific low back pain?
    a. Yes
    b. No
    c. Somewhat
4. Do you feel the SMT Toolkit presentation has increased your **knowledge** about the **clinical practice guideline recommendations** on the use of spinal manipulation for NLBP?
    a. Yes
    b. No
    c. Somewhat
5. Do you feel the SMT Toolkit presentation effectively discussed the referral options available for SMT and the specific criteria for each option?
    a. Yes
    b. No
    c. Somewhat
6. Do you think you will use the SMT Toolkit in practice?
    a. Yes
    b. No

If no, please explain why:

_____
_____
_____

If you would like to elaborate on any of your answers, please do so below:

_____
_____
_____

Thank you for your participation.

Appendix D

Two-Month Post Presentation Questionnaire

1. Did you review the SMT Toolkit after the presentation?
    a. Yes
    b. No
2. Have you used the SMT Toolkit in practice? If not, please explain why:

_____

_____

3. If you did review the SMT Toolkit and/or use it in practice, please answer the following questions:
    a. Do you feel the SMT Toolkit has increased your **knowledge and awareness** about the benefits of spinal manipulation for nonspecific low back pain?
        i. Yes
        ii. No
        iii. Somewhat
    b. Do you feel the SMT Toolkit has increased your **knowledge and awareness** about the benefits of spinal manipulation for **military patients** with nonspecific low back pain?
        i. Yes
        ii. No
        iii. Somewhat
    c. Do you feel the SMT Toolkit has increased your **knowledge and awareness** about the **clinical practice guideline recommendations** on the use of spinal manipulation for NLBP?
        i. Yes
        ii. No
        iii. Somewhat
    d. Do you feel the SMT Toolkit effectively presented the **referral options available** for SMT and the specific **criteria** for each option?
        i. Yes
        ii. No
        iii. Somewhat
    e. Do you feel the presentation and/or the SMT Toolkit **affected your practice** (i.e. referral behavior, physical assessment, use of provided patient education forms, etc.)?

    If no, please explain why:

    _____

    _____

If you would like to elaborate on any of your answers or provide feedback, please do so here:_____

_____

_____

Thank you for your participation.

Spinal Manipulation Therapy (SMT)

For Clark Health Clinic Primary Care Managers

Toolkit Prepared By:
Kelsey Ress, DNPc, RN

Toolkit

Intended to efficiently and effectively provide information on SMT evidence-based recommendations, local referral guidelines, and practice resources.

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Introduction

What is Nonspecific Low Back Pain?

Of all LBP presentations, 85-90% are nonspecific LBP (NLBP), which is defined as pain in the lower back without an underlying medical cause such as infection, cancer, osteoporosis, fracture, inflammatory process, or herniated disc. NLBP is identified as acute (symptoms occurring for four to six weeks), subacute (symptoms for seven to twelve weeks) and chronic (symptoms greater than twelve weeks).

What Is Spinal Manipulation Therapy?

Spinal manipulation therapy (SMT) includes mobilization, manipulation, or both interventions. Mobilization uses low-grade velocity and small or large amplitude passive movement techniques to a spinal joint's range of motion while manipulation uses high-velocity thrusts at a short amplitude during range of motion and is often accompanied by an audible crack. Common professionals that perform SMT include a Chiropractic Doctor, Physical Therapist, or Osteopathic Physician although philosophies and treatment objectives between the practices may differ.

Why is SMT an important treatment modality for active duty military?

There is a high prevalence of nonspecific low back pain (NLBP) in the active duty patient population. High performance careers, training, and military combat place a significant strain on the body, making this population uniquely susceptible to NLBP.

- Connection between spinal pain and deployment due to combat injuries, increased psychosocial stressors, duty hours, and wearing heavy gear and equipment for extended periods of time.
- Specific careers places active duty at great risk for NLBP- airborne, air assault, g-force exposure in pilots, shock and vibration, and urban dismounted ground operations
- High incidence of mental health disorders in the military places members at greater risk for developing chronic NLBP.
- Third higher service-connected disability in 2015 and lowest return-to-unit rate among deployed service members

SMT is recommended in the current practice guideline for acute, subacute, and chronic presentations of NLBP. It is essential to effectively utilize treatment modalities available that are supported by the evidence, noninvasive, and cost effective to ensure mission readiness. SMT is feasible in an array of environments (deployed locations, austere environments, duty station). Furthermore, SMT is an appropriate option for those patients who are unable or unwilling to take therapeutic medications like NSAIDs, APAP, muscle relaxants or narcotics. It is an important treatment option to help prevent opiate dependence and deaths in chronic pain management.

Click **HERE** to view Low Back Pain algorithm.
Click **HERE** to view SMT algorithm.

Click **HERE** to view the Low Back Pain Clinical Practice Guideline or see page 30.

Click **HERE** to view reference for sources

Evidence

- Impact of SMT for nonspecific low back pain
  - Acute Nonspecific Low Back Back
    - Cochrane systematic review 2012
      - Quality of evidence was too low and with a high risk of bias to make specific conclusions or recommendations for the use of SMT
      - Difficult to find clinically significant results because acute NLBP naturally resolves on it's own in a short amount of time
      - However, studies did show improvements in pain, function when added to another intervention, and recovery
  - Chronic Nonspecific Low Back Pain
    - Cochrane systematic review 2013
      - SMT is equally effective as other treatment modalities
    - Similar findings found in clinical practice guidelines for spinal manipulation by Physical Therapy and Osteopathic manipulation
  - No serious complications related to SMT were noted in any systematic review

Delitto, et al., 2012; Rubinstein et al., 2012; Rubinstein et al., 2013; Seffinger, et al., 2010

Evidence

2. Impact of SMT for nonspecific LBP in active duty military population

- Overall, the evidence shows that SMT is beneficial for active duty military patients experiencing NLBP
  - Comprehensive review of evidence found 8 articles-
    - 2 randomized controlled trials, 4 quasi-experimental studies, and 2 case reports
  - Quality of evidence ranged from low quality to high quality, majority of evidence rated good
    - Assessed using Johns Hopkins Nursing EBP Rating Scale
  - Quality and quantity of data is lacking, there is a need for further evaluation and studies

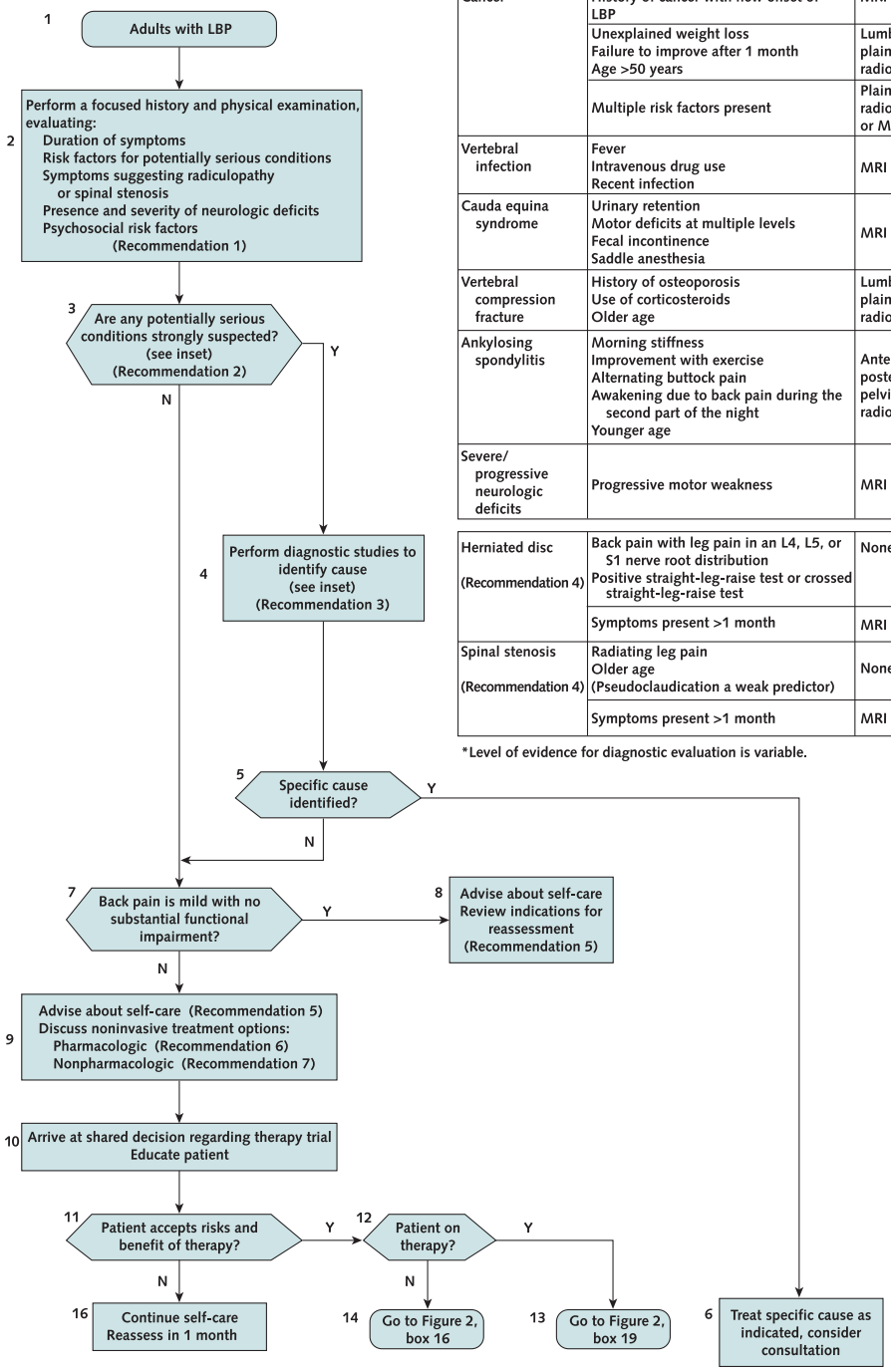
Provider specialty	Physical Therapist, Chiropractor, Osteopath
Treatment modality	High velocity low amplitude (HVLA) alone (5/8), HVLA+ osteopathic treatments (2/8), HVLA + chiropractic treatments (1/8)
Impact on Pain	Improvements in pain (7/8), no improvements in pain (1/8)
Impact on Function	Improvements in function (4/8), no improvements in function (3/8), no assessment of function post SMT (1/8)
Other impacts from SMT	Overall improvement and improvement in patient satisfaction (2/8)

Click **HERE** to view reference for sources

Algorithms

- Nonspecific Low Back Pain Algorithm
  - From Low Back Pain Clinical Practice Guideline
- SMT Algorithm For Clark Health Clinic
  - Adapted from Low Back Pain Clinical Practice Guideline

Figure 1. **Initial evaluation of low back pain (*LBP*).**



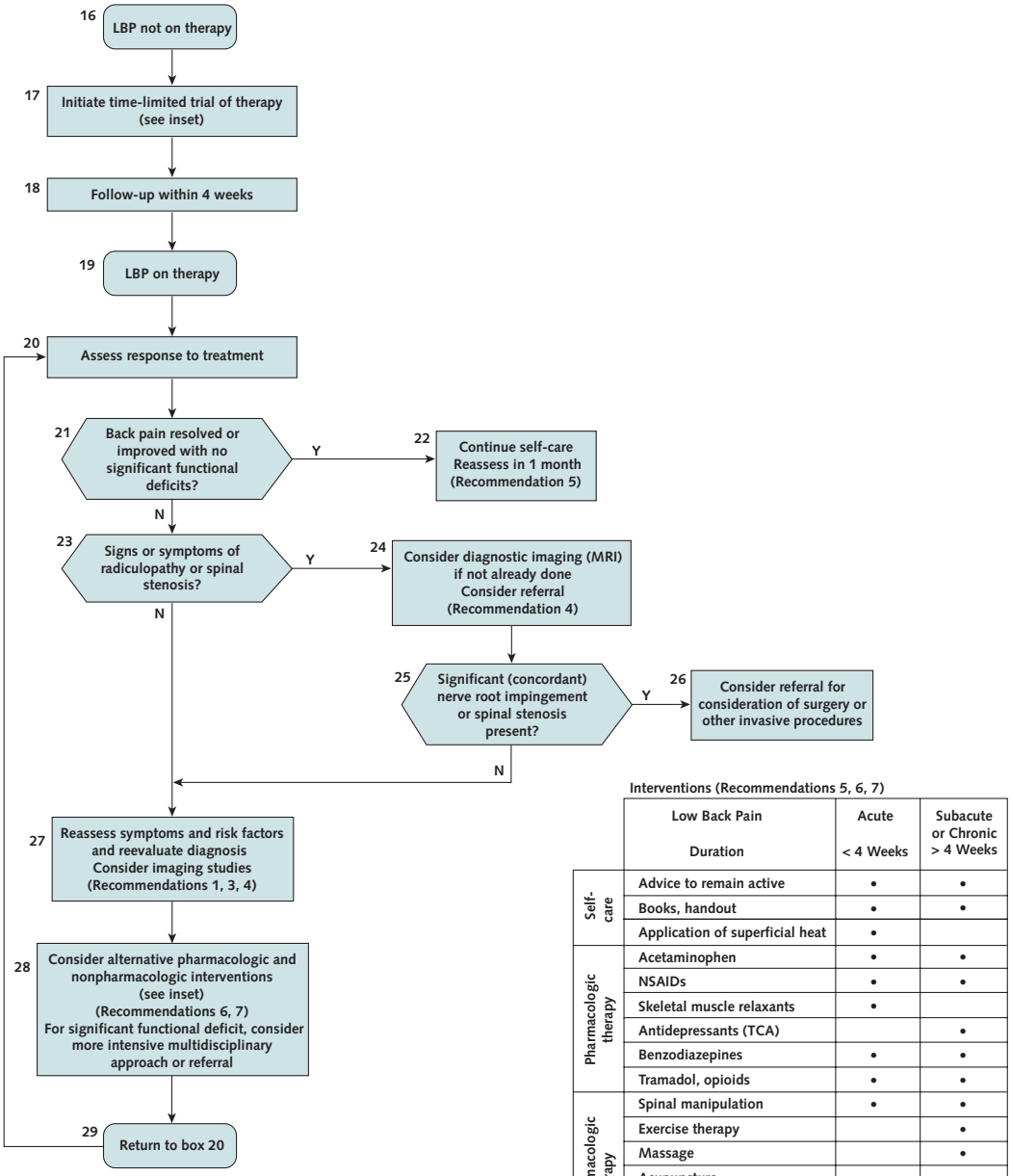
Diagnostic Work-up

Possible cause	Key features on history or physical examination	Imaging*	Additional studies*
Cancer	History of cancer with new onset of LBP	MRI	ESR
	Unexplained weight loss Failure to improve after 1 month Age >50 years	Lumbosacral plain radiography	
	Multiple risk factors present	Plain radiography or MRI	
Vertebral infection	Fever Intravenous drug use Recent infection	MRI	ESR and/or CRP
Cauda equina syndrome	Urinary retention Motor deficits at multiple levels Fecal incontinence Saddle anesthesia	MRI	None
Vertebral compression fracture	History of osteoporosis Use of corticosteroids Older age	Lumbosacral plain radiography	None
Ankylosing spondylitis	Morning stiffness Improvement with exercise Alternating buttock pain Awakening due to back pain during the second part of the night Younger age	Anterior-posterior pelvis plain radiography	ESR and/or CRP, HLA-B27
Severe/ progressive neurologic deficits	Progressive motor weakness	MRI	Consider EMG/NCV
Herniated disc (Recommendation 4)	Back pain with leg pain in an L4, L5, or S1 nerve root distribution Positive straight-leg-raise test or crossed straight-leg-raise test	None	None
	Symptoms present >1 month	MRI	Consider EMG/NCV
Spinal stenosis (Recommendation 4)	Radiating leg pain Older age (Pseudoclaudication a weak predictor)	None	None
	Symptoms present >1 month	MRI	Consider EMG/NCV

*Level of evidence for diagnostic evaluation is variable.

Do not use this algorithm for back pain associated with major trauma, nonspinal back pain, or back pain due to systemic illness. CRP = C-reactive protein; EMG = electromyography; ESR = erythrocyte sedimentation rate; MRI = magnetic resonance imaging; NCV = nerve conduction velocity.

Figure 2. **Management of low back pain (*LBP*).**



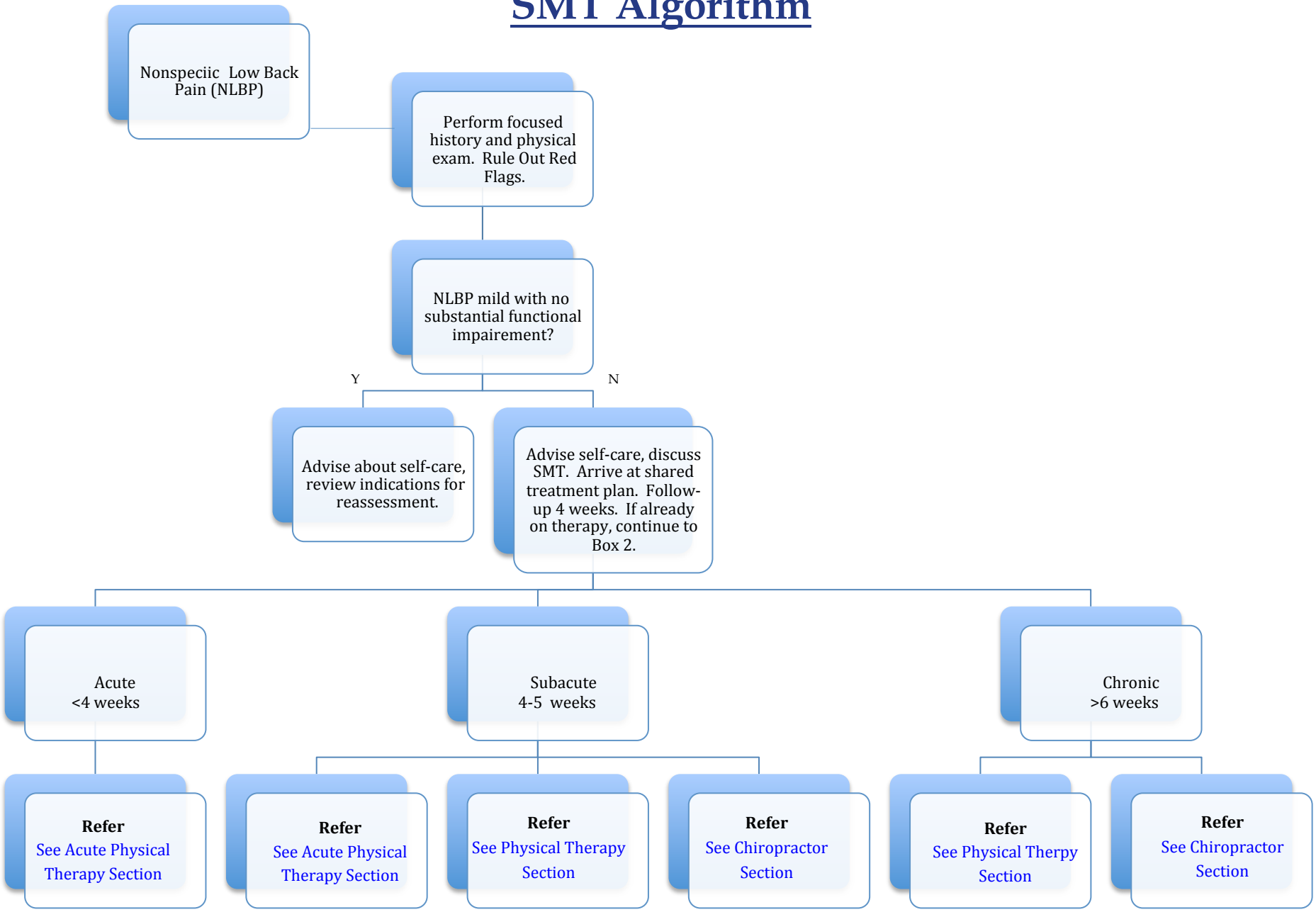
Interventions (Recommendations 5, 6, 7)

	Low Back Pain Duration	Acute < 4 Weeks	Subacute or Chronic > 4 Weeks
Self-care	Advice to remain active	•	•
	Books, handout	•	•
	Application of superficial heat	•	
Pharmacologic therapy	Acetaminophen	•	•
	NSAIDs	•	•
	Skeletal muscle relaxants	•	
	Antidepressants (TCA)		•
	Benzodiazepines	•	•
	Tramadol, opioids	•	•
Nonpharmacologic therapy	Spinal manipulation	•	•
	Exercise therapy		•
	Massage		•
	Acupuncture		•
	Yoga		•
	Cognitive-behavioral therapy		•
	Progressive relaxation		•
	Intensive interdisciplinary rehabilitation		•

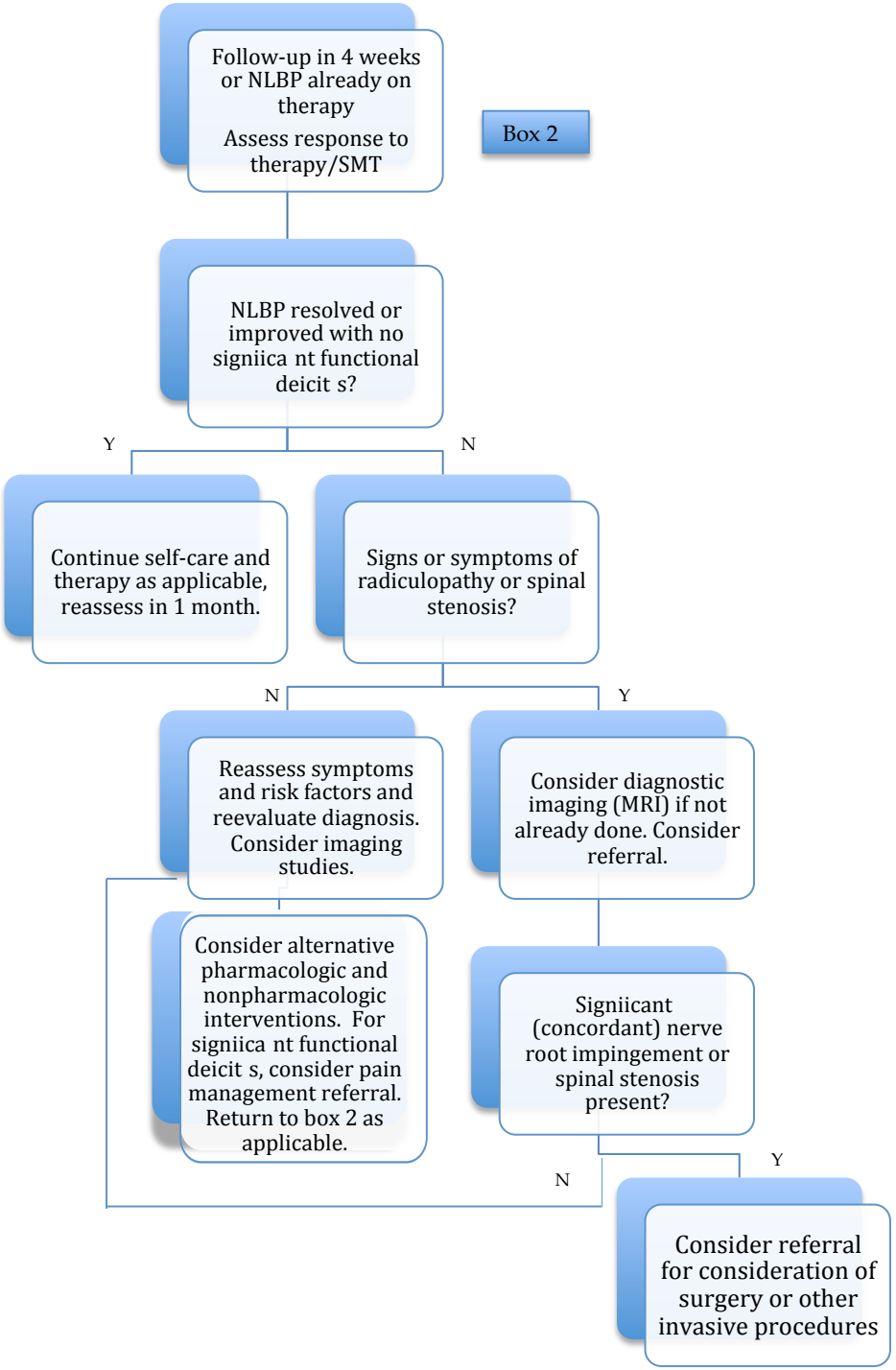
• Interventions supported by grade B evidence (at least fair-quality evidence of moderate benefit, or small benefit but no significant harms, costs, or burdens). No intervention was supported by grade A evidence (good-quality evidence of substantial benefit).

MRI = magnetic resonance imaging; NSAIDs = nonsteroidal anti-inflammatory drugs; TCA = tricyclic antidepressants.

SMT Algorithm



Click **HERE** to return to TOC



Adapted from Chou, R., Qaseem, A., Snow, V., Casey, D., Cross, T., Shekelle, P.,...Owens, D. (2007). Diagnosis and treatment of low back pain: A joint clinical practice guideline from the American College of Physicians and the American Pain Society. *American College of Physicians, 147*(7), 478-491.

Contraindications to Spinal Manipulation

1. Acute fracture
2. Spinal cord tumor
3. Acute infection such as osteomyelitis, septic discitis, and tuberculosis of the spine
4. Meningeal tumor
5. Hematomas, whether spinal cord or intracanalicular
6. Malignancy of the spine
7. Frank disc herniation with accompanying signs of progressive neurological deficit
8. Basilar invagination of the upper cervical spine
9. Arnold-Chiari malformation of the upper cervical spine
10. Dislocation of a vertebra
11. Aggressive types of benign tumors, such as an aneurismal bone cyst, giant cell tumor, osteoblastoma, or osteoid osteoma
12. Internal fixation/stabilization devices
13. Neoplastic disease of muscle or other soft tissue
14. Positive Kernig's or Lhermitte's signs
15. Congenital, generalized hypermobility
16. Signs or patterns of instability
17. Syringomyelia
18. Hydrocephalus of unknown etiology
19. Diastematomyelia
20. Cauda equina syndrome

Source: World Health Organization. (2005). WHO guidelines on basic training and safety in chiropractic. Retrieved from http://www.who.int/medicines/areas/traditional/Chiro-Guidelines.pdf.

Acute Care Physical Therapy Referral Guideline

Jennifer Evans, PT/ATC
Location: removed for publication
Clinic Office Phone Number- removed for publication
Email: removed for publication

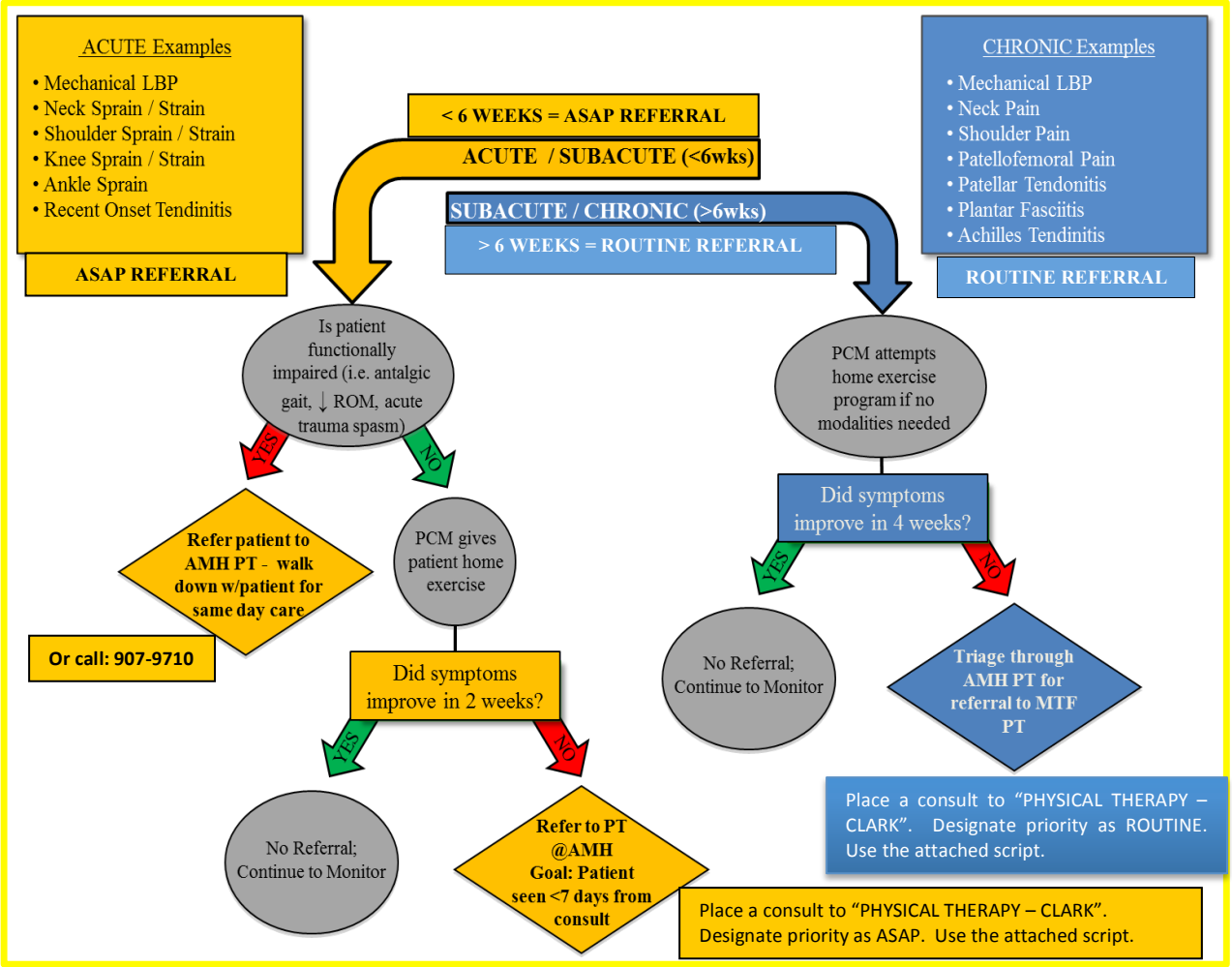
- **Consider including in referral if patient had PT/SMT in the past and response**
- **Consider including Clinical Predictor Rule (CPR) score**
  - **Click HERE to view 5 criteria CPR**
  - **Click HERE to view 2 criteria CPR**

Please click **HERE** for specific guidance on using the CPR.

ACUTE CARE PHYSICAL THERAPY REFERRAL GUIDELINES (PROVIDERS)

TRIAGE GUIDELINES FOR PROVIDER PT REFERRALS, ASAP vs ROUTINE:

****** NOTE: if patients have access to THOR3 for PHYSICAL THERAPY, they MUST GO TO THOR3 for PHYSICAL THERAPY. Please enter a standard physical therapy consult and indicate in the text that the patient has THOR3 access.******



SEE NEXT PAGE FOR FURTHER EXPLANATION AND FOR SPECIAL CASES NOT SHOWN HERE.

The following are generally NOT APPROPRIATE FOR ASAP REFERRAL:

- Patient has access to THOR3 physical therapy.
- Patient needs to be seen for multiple conditions (may be seen on a case-by-case basis, call me).
- Patient has a diagnosis of chronic pain or fibromyalgia.
- Neurologic diagnoses.
- Women's health referrals.
- Patient has significant psychosocial issues which would likely extend PT course of care.
- Younger or older than 18-65 years old (may be seen on a case-by-case basis, call me).
- Concurrent chiropractic or orthopedic referrals.
- If you're unsure of have a special case, contact me directly.

Form Created by Jen Evans, PT

TRIAGE GUIDELINES FOR PROVIDER PT REFERRALS, ASAP vs ROUTINE:

TWO TYPES of CLARK PT CONSULTS – (ASAP and ROUTINE):

SEE DIAGRAMS & ILLUSTRATIONS ON PREVIOUS PAGES

1. ASAP CONSULT, TO BE SEEN BY PT AT CHC (3 SUB-TYPES):

a. **Patient is SEVERELY FUNCTIONALY IMPAIRED** (antalgic gait, ROM limits, acute trauma / spasm). Condition is significantly limiting basic movements. No fracture present.
   i. Locked knee
   ii. Lateral lumbar shift (unable to stand up straight)
   iii. Others depending upon severity of patient presentation check with PT directly.

THESE PATIENTS WILL BE SEEN THE SAME OR THE NEXT DAY.
CALL CHC PT IMMEDIATELY RE: THESE PATIENTS: 907-9712 (desk) or 303-229-7352 (cell)

b. SUBACUTE PATIENTS:
   i. Less than 6 weeks in duration
   ii. Single joint or body region
   iii. Mild functional limitations
   iv. Patient does not respond to 2 weeks of conservative care by PCM

THESE PATIENTS WILL BE SEEN WITHIN 7 BUSINESS DAYS (per patient schedule).
PLACE A "PHYSICAL THERAPY – CLARK" REFERRAL. DESIGNATE THE REFERRAL PRIORITY AS "ASAP" and use the attached referral script (next page).
If the patient cannot be seen by CHC PT within 7 business days, the referral will be deferred to the main Womack PT clinic or off post.

c. OTHER SITUATIONS:
   i. Appointment for disposition only (not sure what to do with patient)
   ii. Acute on chronic presentation for a patient who's situation is time-sensitive for some reason (pending training, PCS, or other need that precludes the patient waiting up to 28 days for a standard PT referral).

THESE PATIENTS WILL BE SCHEDULED ASAP BASED ON APPOINTMENT AVAILABITIY AND THEIR SITUATION/SCHEDULE.
Please call or email CHC PT directly re: these patients. 907-9712 (desk) or 303-229-7352 (cell)

2. ROUTINE CONSULT, TO BE REFERRED TO WOMACK PT w 28 DAY ACCESS TO CARE STANDARD. If the 28 day standard to care cannot be met, patient will be referred off post.

a. Chronic (> 6 weeks) conditions that have not responded to a trial of conservative care
   i. Conservative care should be provided based on joint/region-specific SRT's (Screening Referral Tools) and CPG's (Clinical Practice Guidelines)

To place a STANDARD REFERRAL: Place a "PHYSICAL THERAPY – CLARK". DESIGNATE THE REFERRAL PRIORY as ROUTINE. Use attached script (next page).

form created by Jen Evans, PT

ACUTE CARE PHYSICAL THERAPY REFERRAL GUIDELINES (MSA's, SICK CALL)

SAME DAY SELF REFERRALS (SICK CALL OR WALK IN, PRESENTING DIRECTLY TO FRONT DESK FOR APPOINTMENT): Patients MAY BE given the option to self-refer to PT via sick call or walk in. These patients will be identified by the front desk and/or medic running sick call. The PCM will receive an email from PT on the same day alerting them to the fact that their patient is being seen in by CLARK AMH PT.

MSA/MEDIC GUIDELINES FOR SAME DAY SELF REFERRAL TO PHYSICAL THERAPY:

1) Patient presents for bone, joint or muscle condition only (shoulder pain, knee pain, low back pain, ankle pain, etc.)
2) Injury is less than 4 weeks old.
3) Patient does not have any other medical conditions they would like to be treated for today.
4) Patient has not been treated by anyone previously for this condition (excluding ER follow ups).
5) Patient agrees to see a provider other than their PCM.
6) Patient does not have access to THOR3 physical therapy.

IF ALL CONDITONS ARE MET, PLEASE CALL PHYSICAL THERAPY DIRECTLY FOR SCHEDULING: 907-9712 (desk) or 303-229-7352 (cell)

***** NOTE: if patients have access to THOR3 for PHYSICAL THERAPY, they MUST GO TO THOR3 for PHYSICAL THERAPY. They will need to see a provider for profile if needed, and for a referral to be placed. If a provider is not available, please contact .***

PLEASE do not distribute physical therapy phone numbers directly to patients.

form created by Jen Evans, PT

Physical Therapy Referral

Location: WAMC
Clinic Hours: Monday-Friday 0730-1630
Clinic Phone Number (not for patients): removed for publication

New Patients

- Profile and medications managed by PCM
- Trial of PCM directed conservative therapy prior to referral
- Consider including in referral if patient had PT/SMT in the past and response

Generic Evaluate and Treat Template

Required Information: Demographic information (Age, Sex, Location of Primary Care, Military Status), provisional diagnosis, chronicity of the diagnosis, mechanism of injury, treatment attempted thus far, pertinent medical information, ongoing physical therapy (Y/N). If yes, where and how long?

Age: Sex:
Military Status: AD NG RES
Length of Symptoms/Condition:
Treatment thus far:
Physical Therapy Ongoing: Y N
Request: Please evaluate and treat.

Location of Primary Care:
Dx:
MOI:
Pertinent Medical Info:
Access to THOR3?

EXAMPLE

Age: 31 Sex: M
Military Status: AD
Length of Symptoms/Condition: 4 weeks
Treatment thus far: Stretches, rest, Motrin
Physical Therapy Ongoing: N
Request: Please evaluate and treat.

Location of Primary Care: Clark
Dx: Low Back Pain
MOI: Loading gear during duty
Pertinent Medical Info: Pain left and right paraspinal muscles mostly while sitting and with flexion, no radiculopathy.
Access to THOR3? No.

Physical Therapy Referral

Network Continuity of Care

- Profile and medications managed by PCM

Generic Evaluate and Treat Template

Required Information: Demographic information (Age, Sex, Location of Primary Care, Military Status), provisional diagnosis, location of current treatment, progress towards functional goals, number of visits already completed.

Age: Sex: Location of Primary Care:
Military Status: AD NG RES Dx:
Name of Network Clinic: Progress Towards Goals:
# of visits already attempted:
Request: Evaluate and continued treatment

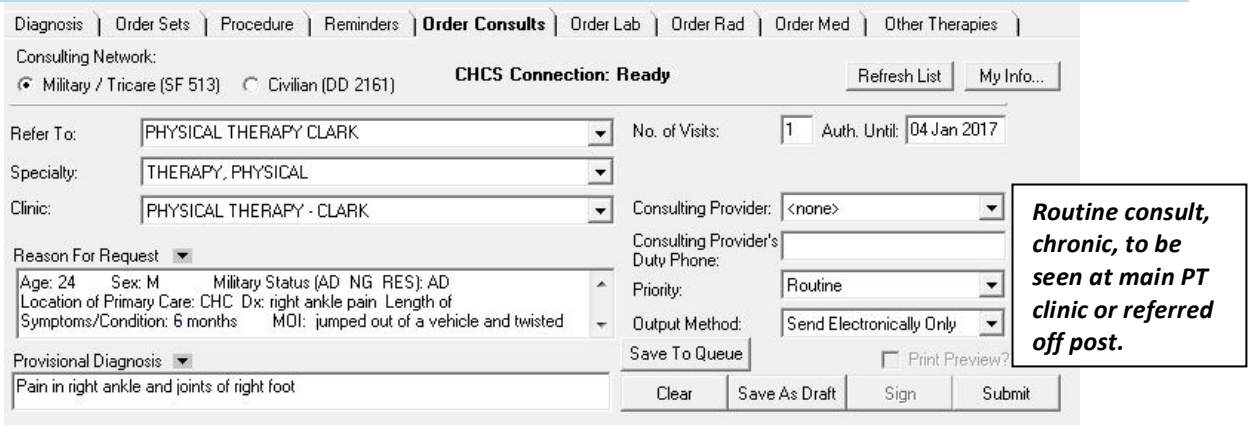
EXAMPLE

Age: 35 Sex: F Location of Primary Care: WAMC
Military Status: Dependent Dx: ACL reconstruction
Location of Current Tx: Pivot PT Progress Towards Goals: Pt now ambulating without
# of visits already attempted: 12 assistive device but not yet able to fully squat
Request: Evaluate and continued treatment.

HOW TO PLACE A CHC PT REFERRAL in AHLTA:

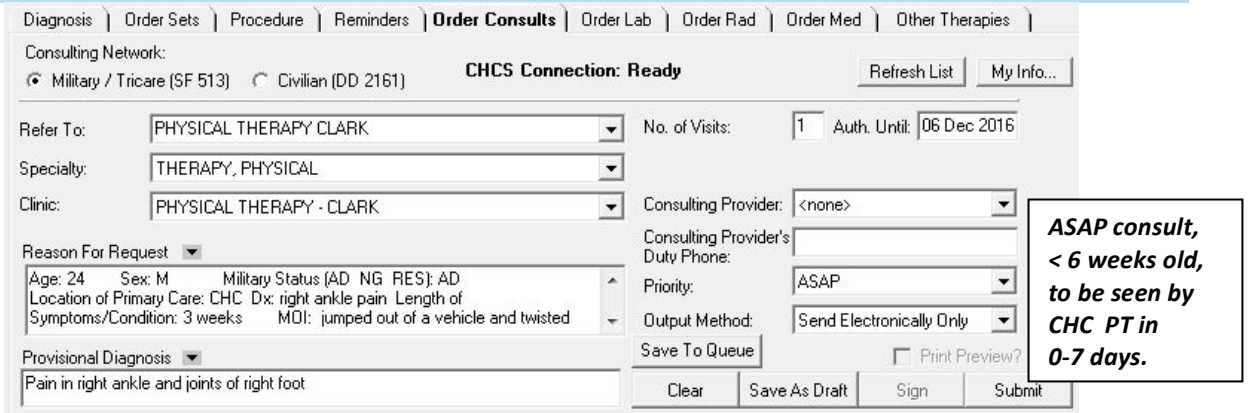
- **ALL PT REFERRALS FROM CLARK PROVIDERS SHOULD USE "PHYSICAL THERAPY – CLARK" when placing your referral (in the "Refer To:" box).**
- **REFERRAL PROIORITY: please use ASAP and ROUTINE only.**
  - **ASAP Patients:** will be seen by PT at CHC in 0-7 days, pending patient presentation (see diagram on page 2 and details on page 3).
  - **ROUTINE patients:** will BE REFERRED TO WOMACK PT w 28 DAY ACCESS TO CARE STANDARD. If the 28 day standard to care cannot be met, patient will be referred off post.
  - All "Physical Therapy – Clark" consults will be reviewed by Clark PT.
  - **If you are unsure if a patient is ROUTINE vs ASAP:** mark it ASAP, but explain in consult and it will be reviewed and dispositioned appropriately.
  - **Do NOT use: 24 hour, 48 hour, 72 hour, Pre-Op, Today, or STAT.**
  - **Only use ASAP and ROUTINE.**

Example: Clark Routine physical therapy consult



Routine consult, chronic, to be seen at main PT clinic or referred off post.

Example: Clark ASAP physical therapy consult



ASAP consult, < 6 weeks old, to be seen by CHC PT in 0-7 days.

form created by Jen Evans, PT

HOW TO PLACE A CHC PT REFERRAL in CHCS:

- **ALL PT REFERRALS FROM CLARK PROVIDERS SHOULD USE "PHYSICAL THERAPY CLARK" when placing your referral (in the "CONSULT PROCEDURE:" field).**
- **PROIORITY: please use ASAP and ROUTINE only.**
  - **ASAP Patients:** will be seen by PT at CHC in 0-7 days, pending patient presentation (see diagram on page 2 and details on page 3).
  - **ROUTINE patients:** will BE REFERRED TO WOMACK PT w 28 DAY ACCESS TO CARE STANDARD. If the 28 day standard to care cannot be met, patient will be referred off post.
  - All "Physical Therapy – Clark" consults will be reviewed by Clark PT.
  - **If you are unsure if a patient is ROUTINE vs ASAP:** mark it ASAP, but explain in consult and it will be reviewed and dispositioned appropriately.
  - **Do NOT use: 24 hour, 48 hour, 72 hour, Pre-Op, Today, or STAT.**
  - **Only use ASAP and ROUTINE.**

Example: How to select Clark Physical Therapy

```
Select CONSULT PROCEDURE: physical
     1   PHYSICAL MEDICINE CONSULT
     2   PHYSICAL THERAPY - RHC
     3   PHYSICAL THERAPY 0-3 EIS
     4   PHYSICAL THERAPY CLARK
     5   PHYSICAL THERAPY CONSULT
     6   PHYSICAL  NEUROREHAB PHYSICAL THERAPY
Choose 1-6: 4
```

When asked for **CONSULT PROCEDURE:** type the word "physical"

Select Option 4,
"PHYSICAL THERAPY CLARK"

Example: Clark Routine physical therapy consult

```
TEST,SAM            Age:46   20/0310   DoD ID:              CONSULT ORDER
PHYSICAL THERAPY CLARK                                        161202-03449
================================================================================
Clinic Specialty:  THERAPY, PHYSICAL
Consulting Clinic: PHYSICAL THERAPY - CLARK
Reason for Consult:
 SM has had back pain for about 6 months. Has tried stretching, NSAID's
 and has been on/off profile.  Pain episodes are intermittent, but are
+becoming more severe/requent over the last 2 months.  Jen Evans,907-9712
Provisional Diagnosis:
Low back pain

Priority:          ROUTINE
No. of Visits:     10     Referral Authorized until: 31 Jan 2017
Request Advice From Specialist Only: NO
```

Example: Clark ASAP physical therapy consult

```
TEST,SAM            Age:46   20/0310   DoD ID:              CONSULT ORDER
PHYSICAL THERAPY CLARK                                        161202-03166
================================================================================
Clinic Specialty:  THERAPY, PHYSICAL
Consulting Clinic: PHYSICAL THERAPY - CLARK
Reason for Consult:
 This patient sprained his ankle 2 weeks ago, has tried rest, ice, ROM,
 NSAID's, but is not progressing.  Patient is leaving for TDY in 2 weeks and
 needs to be seen quickly if possible.  Thanks! Jen Evans, PT 907-9712
Provisional Diagnosis:
Ankle sprain, right

Priority:          ASAP
No. of Visits:     10     Referral Authorized until: 31 Jan 2017
Request Advice From Specialist Only: NO
```

form created by Jen Evans, PT

Chiropractor Clark Health Clinic Referral Guideline

Ron Braun, DC
Location: Clark Health Clinic Office
Phone Number- removed for publication
Email: removed for publication

Chiropractic Care Criteria

- Active duty military only
- Lumbosacral spine x-ray within the past 6 months
- No contraindications to spinal manipulation
- If applicable, profiles are completed by PCM
- Preferably not separating, retiring, or deploying soon

NOTE: A new referral is not needed until 6 months after referral date. Within that timeframe patient can call clinic directly.

Patients are booked for 2 appointments a week for 8 weeks. Afterwards, patients are seen on an as needed basis. They can call clinic directly to schedule an appointment if within 6 months from original referral date.

If no improvement is seen after 8 weeks of treatment, patients are referred back to their PCM for further management.

Typical appointment includes: adjustment, stretches, heat, TENs, cold laser treatment, and home exercise recommendations.

It is helpful to include if patient has had chiropractic care in the past and their response.

SMT Clinical Predictor Rule

5 Criteria Clinical Predictor

Consider Spinal Manipulative Therapy: Use Clinical Prediction Rule

The clinical prediction rule is used to identify a subgroup of patients by several criteria (see Table 2, "Clinical Prediction Rule"). The rule which projects successful treatment of low back pain with spinal manipulative therapy at greater than 90%. Although much work has been done related to the clinical prediction rule *(Fritz, 2007; Fritz, 2005; Childs, 2004; Flynn, 2002)*, at this point, evidence is not sufficient to strongly recommend it. However, studies currently underway may add further support. Therefore, we suggest consideration of this rule in this category of early low back pain patients.

Table 2. Clinical Prediction Rule

Patients with four or more of the following criteria have a greater likelihood of success with manipulation:
Durations of symptoms < 16 days
At least one hip with less than 35 degrees of medial (internal) rotations
Lumbar hypomobility
No symptoms distal to the knee
Fear-Avoidance Beliefs Questionnaire work subscale score < 19. (See Appendix D)

Source: Institute for Clinical Systems Improvement. (2012).

Click **HERE** to return to the
Acute Care Physical Therapy Referral Guideline

SMT Clinical Predictor Rule

2 Criteria Clinical Predictor

Pragmatic Criteria (both criteria must be present)

Criterion	Definition of Positive
Duration of current episode of low back pain	<16 days
Extent of distal symptoms	Not having symptoms distal to the knee

Fritz, Childs, & Flynn. (2005).

- This option may be more pragmatic in primary care
- Validated in one nonrandomized study with 141 patients
  - 48% female, mean age 35.5
  - Sensitivity 0.56, Specificity 0.92

Click **HERE** to return to the
Acute Care Physical Therapy Referral Guideline

Appendix 1: Methods for Assessing a Patient's Status on Each Criterion in the Spinal Manipulation Clinical Prediction Rule

1. Duration of Current Episode of Symptoms Less than 16 Days

Patients are asked to report the number of days since the onset of their current episode of low back pain.

2. Location of Symptoms Not Extending Distal to the Knee

A body diagram is used to assess the distribution of symptoms (19, 50, 51). We categorize the location of symptoms as being in the back, buttock, thigh, or leg (distal to knee) by using the method described by Werneke and colleagues (52), who found high inter-rater reliability ($\kappa = 0.96$).

3. Score on the FABQ Work Subscale Less than 19 Points

The FABQ (21) is subdivided into 2 subscales, a 5-item physical activity subscale (questions 1 to 5) and a 16-item work subscale (questions 6 to 16). Decision making using the rule requires only the FABQ work subscale score. However, all items on the questionnaire should be completed since they were included when the psychometric properties of the instrument were established. Each item is scored from 0 to 6; however, not all items within each subscale contribute to the score. Four items (items 2, 3, 4, and 5) are scored for the FABQ physical activity subscale, and 7 items (items 6, 7, 9, 10, 11, 12, and 15) are scored for the FABQ work subscale. Each scored item within a particular subscale is summed; thus, possible scores range from 0 to 42 and 0 to 28 for the FABQ work and FABQ physical activity subscales, respectively. Higher scores represent increased fear–avoidance beliefs.

4. At Least 1 Lumbar Spine Segment Judged To Be Hypomobile

Segmental mobility of the lumbar spine is tested with the patient prone and the neck in neutral rotation. Testing is performed over the spinous processes of the vertebrae (53, 54). The examiner stands at the head or side of the table and places the hypothenar eminence of the hand (that is, the pisiform bone) over the spinous process of the segment to be tested. With the elbow and wrist extended, the examiner applies a gentle but firm, anteriorly directed pressure on the spinous process. The stiffness at each segment is judged as normal, hypomobile, or hypermobile. The examiner interpreted whether a segment is hypomobile on the basis of the examiner's anticipation of what normal mobility would feel like at that level and compared with the mobility detected in the segment above and below. Some authors have reported poor inter-rater reliability for judgments of spinal segmental mobility on scales with 7 to 11 levels of judgments (55–57). Studies using mobility judgments similar to those in our study have reported adequate inter-rater reliability ($\kappa = 0.40$ to 0.68) (58, 59).

5. At Least 1 Hip with More than 35 Degrees of Internal Rotation Range of Motion

Hip range of motion is tested bilaterally with the patient lying prone and with the cervical spine at the midline. The examiner places the leg opposite that to be measured in approximately 30 degrees of hip abduction to enable the tested hip to be freely moved. The lower extremity of the side to be tested is kept in line with the body, and the knee on that side is flexed to 90 degrees. A gravity inclinometer is placed on the distal aspect of the fibula in line with the bone. Internal rotation is measured at the point in which the pelvis first begins to move. Ellison and colleagues (60) reported excellent inter-rater reliability with these procedures (intraclass correlation coefficients, 0.95 to 0.97).

Appendix 2: Procedures Used To Perform the

Testing lumbar spine mobility

- https://www.youtube.com/watch?v=xlz0dKndiFc

Testing and measuring internal hip rotation

- http://at.uwa.edu/gon/hip.htm
- https://www.youtube.com/watch?v=UYtAJ2ZCZ7w&t=9s

Click **HERE** to return to the
Acute Care Physical Therapy Referral Guideline

Source: Childs, Fritz, Flynn, Irrgang, Johnson, Majkowski, & Delitto, 2004

Pain Management Referral Guideline

IPMC Recommendations – Referrals, Basics, Opioids
March 2016

** PAIN MANAGEMENT REFERRAL – do not use physical medicine **

DO NOT ORDER PAIN and ORTHO and SPINE surgeon simultaneously. Consider IPMC first!!

Indication for Referral to IPMC/Pain Consultant (off and on post)

- Active duty – all will be seen either at medical home or at IPMC, unless continuity off post
- Case by case basis for retirees and dependents for on post care, otherwise off post
- Symptoms lasting longer than 3 months ***and*** failed course of physical therapy and primary care management. ** Sooner for select conditions such as CRPS **
- Neurological deficits
- Persistent radiculopathy
- Fit for Duty evaluation ***after*** failing conservative treatment ***and*** interventional pain management

Initial Diagnosis

- Thorough history and physical examination
- Rule out conditions including diminishing neurologic function including bowel or bladder dysfunction, gait disturbance, loss of fine motor skills. **If any of these conditions exist, immediately refer patient to a spine surgery clinic.**
- Range of motion
- Palpation of the spine
- Neurological exam including strength assessment, sensory exam, deep tendon reflexes, and assessment of distal pulses.

Initial Treatment Recommendations

- First 6 weeks
    - Reassurance, most episodes resolve uneventfully within 6-12 weeks
    - Maintain as close to normal activity as possible
    - Avoid prolonged bed rest greater than 24 hours
    - use of NSAIDS, muscle relaxants (consider robaxin, tizanadine initially) and/ or acetaminophen should be encouraged unless contraindicated, opiates in limited cases and only for a short period (write for titrating dosing)
    - consider topical therapy – capsaicin, diclofenac, Lidoderm patches
    - Neuropathics- examples neurontin titrated up to 1800-2400mg's divided three times daily
    - Passive modalities such as ice or heat for symptomatic relief
    - Careful stretching and activity modification
    - Consider early physical therapy (make specific recommendations for modalities including myofascial care, manipulation, dry needling)
    - Consider chiropractic and/or osteopathic manipulation – referral is potentially available
    - Consider battlefield acupuncture

- Active duty personnel should be provided appropriate duty limitation via e-profile to allow for recovery during acute phase – consider 60 to 90 days

Sub-acute and Chronic Pain Treatment Options

- If symptoms do not improve within 6 weeks, routine radiographic imaging of the spine should be ordered (IF SPINE CONDITION). If other chronic issues or consideration this is fascia or muscular then contact IPMC provider to discuss and see if imaging is warranted.
- Referral to physical therapy, chiropractic care if not done already
    - be specific with physical therapy request – consider specific modalities (myofascial release, TENS unit, dry needling, etc)
- Complete referral to IBHC for pain counseling – education regarding pain, etc
- Provide education regarding anti-inflammatory diets (direct to below links)
    1. http://www.drweil.com/drw/ecs/pyramid/press-foodpyramid.html/
    2. http://www.painpathways.org/nutrition-pain/

BELOW to be *completed prior to visit with IPMC (outreach or clinic)*

- Document complaints, history, and physical examination
- Aggravating and alleviating factors must be documented in consult and history
- Routine plain film imaging of the affected area (cervical, thoracic, lumbar, etc)
- *MRI* of the appropriate area of the spine or complaint (exceptions exist). **Ordering provider MUST review with patient prior to generating consult**
- CBC, ESR, other labs, bone scan, and EMG/NCS as indicated
- Check Vitamin D levels (**25,OH Level only**). Optimize to levels 40-50 for darker skin individuals and 50-60 for lighter skin individuals. Recheck levels after 3 months.
    - For optimization of vitamin D consider following based on the level:
        1. Vitamin D level <20 then start 50000 units vitamin D2 one cap twice per week for 12 weeks
        2. Vitamin D level 20-30 vitamin D2 one cap per week for 12 weeks
        3. Vitamin D level 30-40 vitamin D3 2000 units OTC daily
    - Long term vitamin D3 OTC should be advised – typical 2000-4000 units daily (can start along with vitamin D2 prescription noted above

The purpose of this program is to help the PCM better diagnose and manage pain, to get your patients to intervention sooner and to decrease the use of opiates in the active duty and dependent population.
Through co-management of these patients we can be successful in all of these objectives.

Consultation can be obtained by speaking to or email to the Primary Care Pain Champions or IPMC Outreach providers Mr. Tim Phillips (RHC and JHC), Ms. Emily Brooks (CHC, WFM, HMMH) or Dr. Robert Agnello (TFMC, FMH).

It is encouraged that the PCM will attempt to be present during the consultation period for recommendations in the treatment of your patients when seen in an outreach environment.

If the patient will need intervention, they MUST complete a "New Patient" packet ***prior to discussing with the consultant***. If the patient is currently taking an opiate please have them fill

out the COMM portion of the packet, otherwise, this can be eliminated. Always consider using these packets with any of your pain patients that you manage alone.

REGARDING OPIOID MANAGEMENT:

IF ACTIVE DUTY -- make sure opioid profile placed in e-profile system.

For ALL patients on long term opioid medications use at least ONE the following codes:
Opioid Use – F11.9
Opioid Abuse F11.1
Long term use of opiate analgesic Z79.891

IF long term opioid management for all patients–make sure all mitigation strategies considered:

a) Complete intake packets, reviewed, scan to AHLTA
b) Medication use agreement, forwarded to pharmacy
c) Pain Management Urine Panels (type PAIN in AHLTA to order) – frequency based on risk
d) Random Pill counts
e) If 90 tablets or greater of opioid medication than consider only two weeks prescription at a time
f) Must see monthly until stable dosing – always document the following:
    a. Pain levels with and without medication
    b. Quality of life with medication
    c. Functional status with medication
g) Clinical pharmacy consult for naloxone (EVZIO) if >100 MED per day or combination of opioid and benzodiazepine or other medium to high risk issues
h) Involvement with clinical psychology and/or IBHC

Below are questions PRIMARY CARE MANAGER should have answered ***prior to discussing with the consultant or with the local pain champion***:

Do not order an MRI and put in the consult that it is pending. Imaging and labs must be reviewed with patient by PCM.

1) How long has the problem existed?

2) What was the cause of injury/pain?

3) Findings of imaging and labs?

4) Aggravating/alleviating factors?

5) Have they seen pain management in the past? Where?

6) What treatment was performed?

7) What treatment has helped/failed?

Referral Status (providers should check CHCS):

APPOINT – will initially be seen at IPMC Group Orientation, call removed for publication to schedule. Direct appointments to procedure can be considered based on experience of provider. Other exception is direct to OMT with removed for publication.

NO APPOINT (should always be accompanied by email from pain consultant, possible t-con as well)

A) To be seen as part of outreach at PCMH

B) Needs to fulfill recommendations by consultant that reviewed request prior to future authorization. If provider does not agree then please contact reviewing consultant directly

REFER TO NETWORK – to be seen off post

REFER TO SUBSPECIALTY – consideration for referral to other department

Physical Medicine consults only for possible EMG alone

Continuity Referrals still need to meet the minimum information to authorize the referral. Simply typing **CONTINUITY OF CARE is not acceptable**, INCLUDE THE FOLLOWING:

1) Morphine Equivalent Daily (MED)

2) List of controlled substance medication

3) What pain management is currently providing for the patient in addition to medication

Clinical Practice Guideline

Diagnosis and Treatment of Low Back Pain: A Joint Clinical Practice Guideline from the American College of Physicians and the American Pain Society

Roger Chou, MD; Amir Qaseem, MD, PhD, MHA; Vincenza Snow, MD; Donald Casey, MD, MPH, MBA; J. Thomas Cross Jr., MD, MPH; Paul Shekelle, MD, PhD; and Douglas K. Owens, MD, MS, for the Clinical Efficacy Assessment Subcommittee of the American College of Physicians and the American College of Physicians/American Pain Society Low Back Pain Guidelines Panel*

Recommendation 1: Clinicians should conduct a focused history and physical examination to help place patients with low back pain into 1 of 3 broad categories: nonspecific low back pain, back pain potentially associated with radiculopathy or spinal stenosis, or back pain potentially associated with another specific spinal cause. The history should include assessment of psychosocial risk factors, which predict risk for chronic disabling back pain (strong recommendation, moderate-quality evidence).

Recommendation 2: Clinicians should not routinely obtain imaging or other diagnostic tests in patients with nonspecific low back pain (strong recommendation, moderate-quality evidence).

Recommendation 3: Clinicians should perform diagnostic imaging and testing for patients with low back pain when severe or progressive neurologic deficits are present or when serious underlying conditions are suspected on the basis of history and physical examination (strong recommendation, moderate-quality evidence).

Recommendation 4: Clinicians should evaluate patients with persistent low back pain and signs or symptoms of radiculopathy or spinal stenosis with magnetic resonance imaging (preferred) or computed tomography only if they are potential candidates for surgery or epidural steroid injection (for suspected radiculopathy) (strong recommendation, moderate-quality evidence).

Recommendation 5: Clinicians should provide patients with evidence-based information on low back pain with regard to their expected course, advise patients to remain active, and provide information about effective self-care options (strong recommendation, moderate-quality evidence).

Recommendation 6: For patients with low back pain, clinicians should consider the use of medications with proven benefits in conjunction with back care information and self-care. Clinicians should assess severity of baseline pain and functional deficits, potential benefits, risks, and relative lack of long-term efficacy and safety data before initiating therapy (strong recommendation, moderate-quality evidence). For most patients, first-line medication options are acetaminophen or nonsteroidal anti-inflammatory drugs.

Recommendation 7: For patients who do not improve with self-care options, clinicians should consider the addition of nonpharmacologic therapy with proven benefits—for acute low back pain, spinal manipulation; for chronic or subacute low back pain, intensive interdisciplinary rehabilitation, exercise therapy, acupuncture, massage therapy, spinal manipulation, yoga, cognitive-behavioral therapy, or progressive relaxation (weak recommendation, moderate-quality evidence).

Ann Intern Med. 2007;147:478-491. www.annals.org

For author affiliations, see end of text.

Low back pain is the fifth most common reason for all physician visits in the United States (1, 2). Approximately one quarter of U.S. adults reported having low back pain lasting at least 1 whole day in the past 3 months (2), and 7.6% reported at least 1 episode of severe acute low back pain (see Glossary) within a 1-year period (3). Low back pain is also very costly: Total incremental direct health care costs attributable to low back pain in the U.S. were estimated at $26.3 billion in 1998 (4). In addition, indirect costs related to days lost from work are substantial, with approximately 2% of the U.S. work force compensated for back injuries each year (5).

Many patients have self-limited episodes of acute low back pain and do not seek medical care (3). Among those who do seek medical care, pain, disability, and return to work typically improve rapidly in the first month (6). However, up to one third of patients report persistent back pain of at least moderate intensity 1 year after an acute episode, and 1 in 5 report substantial limitations in activity

See also:

Print
Glossary 485
Related articles 492, 505
Summary for Patients. I-45

Web-Only
Appendix Tables
CME quiz
Conversion of graphics into slides
Audio summary

* This paper, written by Roger Chou, MD; Amir Qaseem, MD, PhD, MHA; Vincenza Snow, MD; Donald Casey, MD, MPH, MBA; J. Thomas Cross Jr., MD, MPH; Paul Shekelle, MD, PhD; and Douglas K. Owens, MD, MS, was developed for the American College of Physicians' Clinical Efficacy Assessment Subcommittee and the American College of Physicians/American Pain Society Low Back Pain Guidelines Panel. For members of these groups, see end of text. Approved by the American College of Physicians Board of Regents on 14 July 2007. Approved by the American Pain Society Board Executive Committee on 18 July 2007.

(7). Approximately 5% of the people with back pain disability account for 75% of the costs associated with low back pain (8).

Many options are available for evaluation and management of low back pain. However, there has been little consensus, either within or between specialties, on appropriate clinical evaluation (9) and management (10) of low back pain. Numerous studies show unexplained, large variations in use of diagnostic tests and treatments (11, 12). Despite wide variations in practice, patients seem to experience broadly similar outcomes, although costs of care can differ substantially among and within specialties (13, 14).

The purpose of this guideline is to present the available evidence for evaluation and management of acute and chronic low back pain (see Glossary) in primary care settings. The target audience for this guideline is all clinicians caring for patients with low (lumbar) back pain of any duration, either with or without leg pain. The target patient population is adults with acute and chronic low back pain not associated with major trauma. Children or adolescents with low back pain; pregnant women; and patients with low back pain from sources outside the back (nonspinal low back pain), fibromyalgia or other myofascial pain syndromes, and thoracic or cervical back pain are not included. These recommendations are based on a systematic evidence review summarized in 2 background papers by Chou and colleagues in this issue (15, 16) from an evidence report by the American Pain Society (17). The evidence report (17) discusses the evidence for the evaluation, and the 2 background papers (15, 16) summarize the evidence for management.

Methods

The literature search for this guideline included studies from MEDLINE (1966 through November 2006), the Cochrane Database of Systematic Reviews, the Cochrane Central Register of Controlled Trials, and EMBASE. The literature search included all English-language articles reporting on randomized, controlled trials of nonpregnant adults (age >18 years) with low back pain (alone or with leg pain) of any duration that evaluated a target medication and reported at least 1 of the following outcomes: back-specific function, generic health status, pain, work disability, or patient satisfaction. The American College of Physicians (ACP) and the American Pain Society (APS) convened a multidisciplinary panel of experts to develop the key questions and scope used to guide the evidence report, review its results, and formulate recommendations. The background papers by Chou and colleagues (15, 16) provide details about the methods used for the systematic evidence review.

This guideline grades its recommendations by using the ACP's clinical practice guidelines grading system, adapted from the classification developed by the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) work group (**Appendix Table 1**, available at www.annals.org) (18). The evidence in this guideline was first evaluated by the ACP/APS panel by using a system adopted from the U.S. Preventive Services Task Force for grading strength of evidence, estimating magnitude of benefits, and assigning summary ratings (**Appendix Tables 2**, **3**, and **4**, all available at www.annals.org) (19). The evidence was independently reviewed by the ACP's Clinical Efficacy Assessment Subcommittee. The ratings for individual low back pain interventions discussed in this guideline are summarized in **Appendix Table 5** (available at www.annals.org) for acute low back pain (<4 weeks' duration) and in **Appendix Table 6** (available at www.annals.org) for chronic/subacute low back pain (>4 weeks' duration). This guideline considered interventions to have "proven" benefits only when they were supported by at least fair-quality evidence and were associated with at least moderate benefits (or small benefits but no significant harms, costs, or burdens). **Figures 1** and **2** present an accompanying algorithm.

Recommendations: Evaluation of Low Back Pain

Recommendation 1: Clinicians should conduct a focused history and physical examination to help place patients with low back pain into 1 of 3 broad categories: nonspecific low back pain, back pain potentially associated with radiculopathy or spinal stenosis, or back pain potentially associated with another specific spinal cause. The history should include assessment of psychosocial risk factors, which predict risk for chronic disabling back pain (strong recommendation, moderate-quality evidence).

More than 85% of patients who present to primary care have low back pain that cannot reliably be attributed to a specific disease or spinal abnormality (nonspecific low back pain [see Glossary]) (20). Attempts to identify specific anatomical sources of low back pain in such patients have not been validated in rigorous studies, and classification schemes frequently conflict with one another (21). Moreover, no evidence suggests that labeling most patients with low back pain by using specific anatomical diagnoses improves outcomes. In a minority of patients presenting for initial evaluation in a primary care setting, low back pain is caused by a specific disorder, such as cancer (approximately 0.7% of cases), compression fracture (4%), or spinal infection (0.01%) (22). Estimates for prevalence of ankylosing spondylitis in primary care patients range from 0.3% (22) to 5% (23). Spinal stenosis (see Glossary) and symptomatic herniated disc (see Glossary) are present in about 3% and 4% of patients, respectively. The cauda equina syndrome (see Glossary) is most commonly associated with massive midline disc herniation but is rare, with an estimated prevalence of 0.04% among patients with low back pain (24).

A practical approach to assessment is to do a focused history and physical examination to determine the likelihood of specific underlying conditions and measure the

presence and level of neurologic involvement (24, 25). Such an approach facilitates classification of patients into 1 of 3 broad categories: nonspecific low back pain, back pain potentially associated with radiculopathy (see Glossary) or spinal stenosis (suggested by the presence of sciatica [see Glossary] or pseudoclaudication), and back pain potentially associated with another specific spinal cause. The latter category includes the small proportion of patients with serious or progressive neurologic deficits or underlying conditions requiring prompt evaluation (such as tumor, infection, or the cauda equina syndrome), as well as patients with other conditions that may respond to specific treatments (such as ankylosing spondylitis or vertebral compression fracture).

Diagnostic triage into 1 of these 3 categories helps guide subsequent decision making. Clinicians should inquire about the location of pain, frequency of symptoms, and duration of pain, as well as any history of previous symptoms, treatment, and response to treatment. The possibility of low back pain due to problems outside the back, such as pancreatitis, nephrolithiasis, or aortic aneurysm, or systemic illnesses, such as endocarditis or viral syndromes, should be considered. All patients should be evaluated for the presence of rapidly progressive or severe neurologic deficits, including motor deficits at more than 1 level, fecal incontinence, and bladder dysfunction. The most frequent finding in the cauda equina syndrome is urinary retention (90% sensitivity) (24). In patients without urinary retention, the probability of the cauda equina syndrome is approximately 1 in 10 000.

Clinicians should also ask about risk factors for cancer and infection. In a large, prospective study from a primary care setting, a history of cancer (positive likelihood ratio, 14.7), unexplained weight loss (positive likelihood ratio, 2.7), failure to improve after 1 month (positive likelihood ratio, 3.0), and age older than 50 years (positive likelihood ratio, 2.7) were each associated with a higher likelihood for cancer (26). The posttest probability of cancer in patients presenting with back pain increases from approximately 0.7% to 9% in patients with a history of cancer (not including nonmelanoma skin cancer). In patients with any 1 of the other 3 risk factors, the likelihood of cancer only increases to approximately 1.2% (26). Features predicting the presence of vertebral infection have not been well studied but may include fever, intravenous drug use, or recent infection (22). Clinicians should also consider risk factors for vertebral compression fracture, such as older age, history of osteoporosis, and steroid use, and ankylosing spondylitis, such as younger age, morning stiffness, improvement with exercise (see Glossary), alternating buttock pain, and awakening due to back pain during the second part of the night only (27), as specific treatments are available for these conditions. Clinicians should be aware that criteria for diagnosing early ankylosing spondylitis (before the development of radiographic abnormalities) are evolving (28).

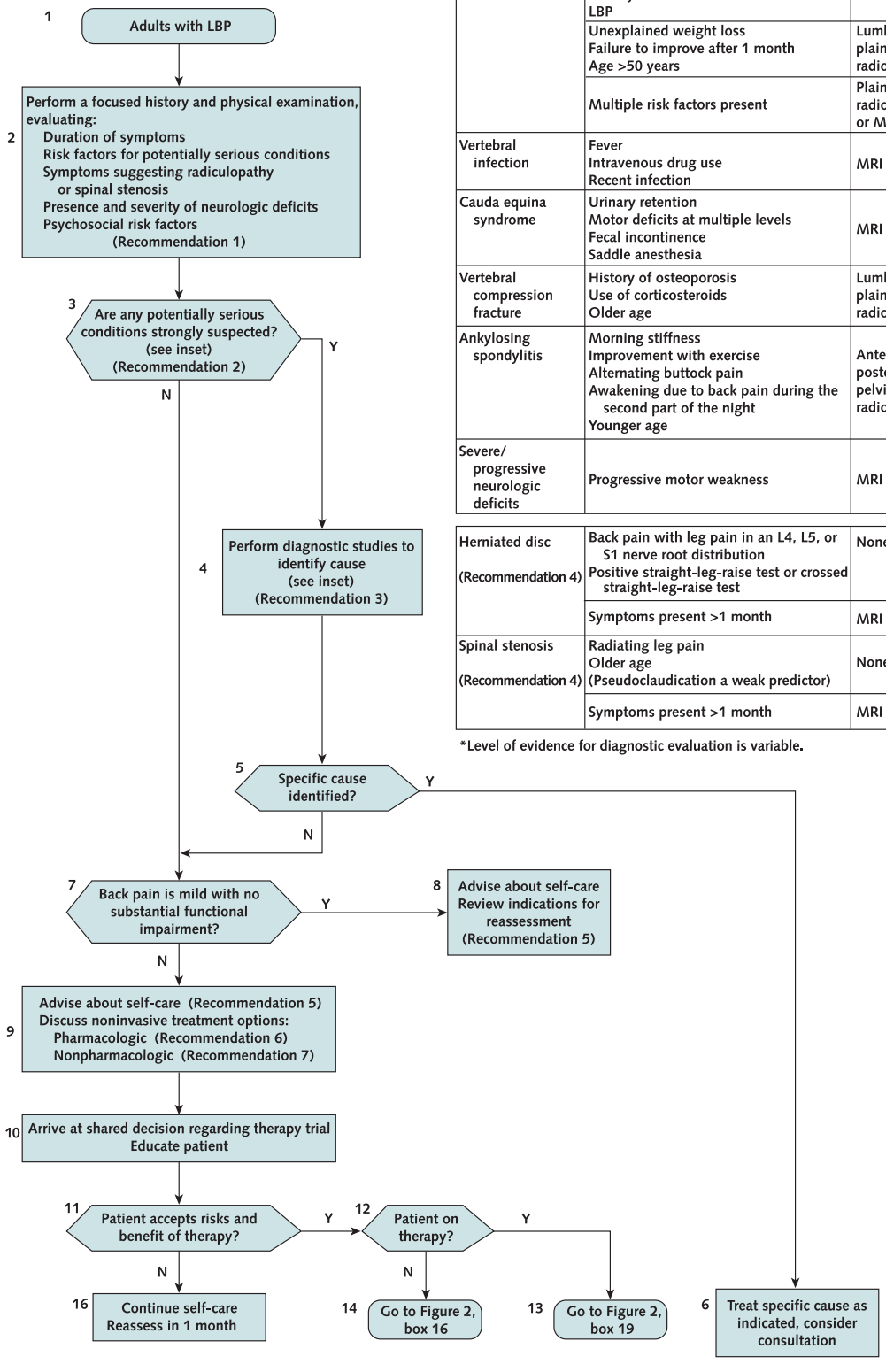
In patients with back and leg pain, a typical history for sciatica (back and leg pain in a typical lumbar nerve root distribution) has a fairly high sensitivity but uncertain specificity for herniated disc (29, 30). More than 90% of symptomatic lumbar disc herniations (back and leg pain due to a prolapsed lumbar disc compressing a nerve root) occur at the L4/L5 and L5/S1 levels. A focused examination that includes straight-leg-raise testing (see Glossary) and a neurologic examination that includes evaluation of knee strength and reflexes (L4 nerve root), great toe and foot dorsiflexion strength (L5 nerve root), foot plantarflexion and ankle reflexes (S1 nerve root), and distribution of sensory symptoms should be done to assess the presence and severity of nerve root dysfunction. A positive result on the straight-leg-raise test (defined as reproduction of the patient's sciatica between 30 and 70 degrees of leg elevation) (24) has a relatively high sensitivity (91% [95% CI, 82% to 94%]) but modest specificity (26% [CI, 16% to 38%]) for diagnosing herniated disc (31). By contrast, the crossed straight-leg-raise test is more specific (88% [CI, 86% to 90%]) but less sensitive (29% [CI, 24% to 34%]).

Evidence on the utility of history and examination for identifying lumbar spinal stenosis is sparse (32). High-quality studies showed a trade-off between sensitivities and specificities, resulting in modest or poor positive likelihood ratios (1.2 for pseudoclaudication and 2.2 for radiating leg pain) (32). Changing symptoms on downhill treadmill testing are associated with the highest positive likelihood ratio (3.1). The usefulness of pain relieved by sitting for predicting presence of spinal stenosis ranges from poor to high (32). Age older than 65 years was associated with a positive likelihood ratio of 2.5 and a negative likelihood ratio of 0.33 in 1 lower-quality study (33). Other findings have only been evaluated in lower-quality studies or are poorly predictive for lumbar spinal stenosis.

Psychosocial factors and emotional distress should be assessed because they are stronger predictors of low back pain outcomes than either physical examination findings or severity and duration of pain (6, 34, 35). Assessment of psychosocial factors identifies patients who may have delayed recovery and could help target interventions, as 1 trial in a referral setting found intensive multidisciplinary rehabilitation more effective than usual care in patients with acute or subacute low back pain identified as having risk factors for chronic back pain disability (36). Direct evidence on effective primary care interventions for identifying and treating such factors in patients with acute low back pain is lacking (37, 38), although this is an area of active research. Evidence is currently insufficient to recommend optimal methods for assessing psychosocial factors and emotional distress. However, psychosocial factors that may predict poorer low back pain outcomes include presence of depression, passive coping strategies, job dissatisfaction, higher disability levels, disputed compensation claims, or somatization (34, 35, 39).

Evidence is also insufficient to guide appropriate inter-

Figure 1. **Initial evaluation of low back pain (*LBP*).**



Diagnostic Work-up

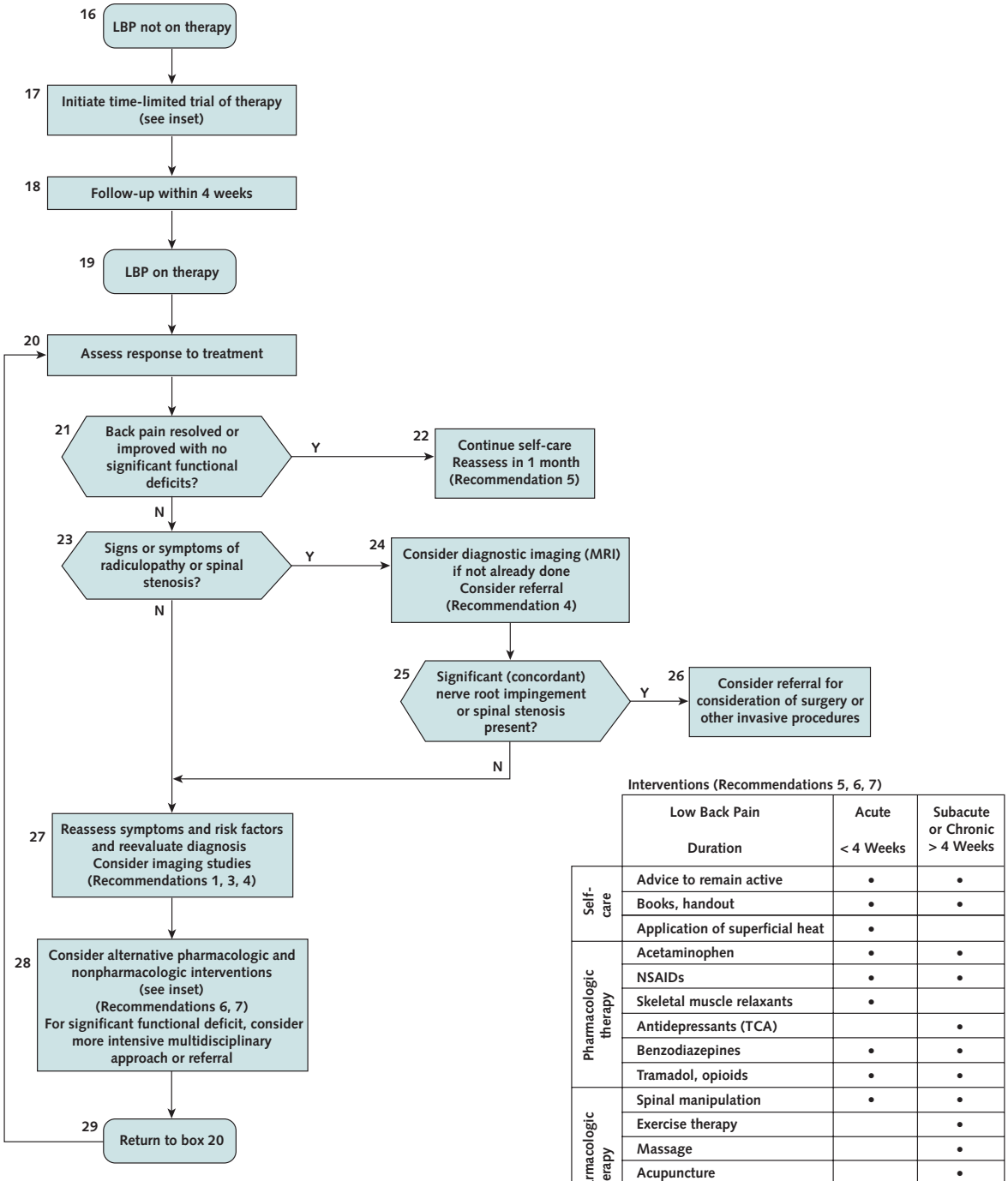
Possible cause	Key features on history or physical examination	Imaging*	Additional studies*
Cancer	History of cancer with new onset of LBP	MRI	ESR
	Unexplained weight loss Failure to improve after 1 month Age >50 years	Lumbosacral plain radiography	
	Multiple risk factors present	Plain radiography or MRI	
Vertebral infection	Fever Intravenous drug use Recent infection	MRI	ESR and/or CRP
Cauda equina syndrome	Urinary retention Motor deficits at multiple levels Fecal incontinence Saddle anesthesia	MRI	None
Vertebral compression fracture	History of osteoporosis Use of corticosteroids Older age	Lumbosacral plain radiography	None
Ankylosing spondylitis	Morning stiffness Improvement with exercise Alternating buttock pain Awakening due to back pain during the second part of the night Younger age	Anterior-posterior pelvis plain radiography	ESR and/or CRP, HLA-B27
Severe/progressive neurologic deficits	Progressive motor weakness	MRI	Consider EMG/NCV
Herniated disc (Recommendation 4)	Back pain with leg pain in an L4, L5, or S1 nerve root distribution Positive straight-leg-raise test or crossed straight-leg-raise test	None	None
	Symptoms present >1 month	MRI	Consider EMG/NCV
Spinal stenosis (Recommendation 4)	Radiating leg pain Older age (Pseudoclaudication a weak predictor)	None	None
	Symptoms present >1 month	MRI	Consider EMG/NCV

*Level of evidence for diagnostic evaluation is variable.

Do not use this algorithm for back pain associated with major trauma, nonspinal back pain, or back pain due to systemic illness. CRP = C-reactive protein; EMG = electromyography; ESR = erythrocyte sedimentation rate; MRI = magnetic resonance imaging; NCV = nerve conduction velocity.

Click HERE to return to TOC | Click HERE to return to SMT Algorithm

Figure 2. **Management of low back pain (*LBP*).**



Interventions (Recommendations 5, 6, 7)

	Low Back Pain Duration	Acute < 4 Weeks	Subacute or Chronic > 4 Weeks
Self-care	Advice to remain active	•	•
	Books, handout	•	•
	Application of superficial heat	•	
Pharmacologic therapy	Acetaminophen	•	•
	NSAIDs	•	•
	Skeletal muscle relaxants	•	
	Antidepressants (TCA)		•
	Benzodiazepines	•	•
	Tramadol, opioids	•	•
Nonpharmacologic therapy	Spinal manipulation	•	•
	Exercise therapy		•
	Massage		•
	Acupuncture		•
	Yoga		•
	Cognitive-behavioral therapy		•
	Progressive relaxation		•
	Intensive interdisciplinary rehabilitation		•

• Interventions supported by grade B evidence (at least fair-quality evidence of moderate benefit, or small benefit but no significant harms, costs, or burdens). No intervention was supported by grade A evidence (good-quality evidence of substantial benefit).

MRI = magnetic resonance imaging; NSAIDs = nonsteroidal anti-inflammatory drugs; TCA = tricyclic antidepressants.

vals or methods (such as office visit vs. telephone follow-up) for reassessment of history, physical examination, or psychosocial factors. However, patients with acute low back pain generally experience substantial improvement in the first month after initial presentation (6, 40), suggesting that a reasonable approach is to reevaluate patients with persistent, unimproved symptoms after 1 month. In patients with severe pain or functional deficits, older patients, or patients with signs of radiculopathy or spinal stenosis (see recommendation 4), earlier or more frequent reevaluation may also be appropriate.

Recommendation 2: Clinicians should not routinely obtain imaging or other diagnostic tests in patients with nonspecific low back pain (strong recommendation, moderate-quality evidence).

There is no evidence that routine plain radiography in patients with nonspecific low back pain is associated with a greater improvement in patient outcomes than selective imaging (41–43). In addition, exposure to unnecessary ionizing radiation should be avoided. This issue is of particular concern in young women because the amount of gonadal radiation from obtaining a single plain radiograph (2 views) of the lumbar spine is equivalent to being exposed to a daily chest radiograph for more than 1 year (44). Routine advanced imaging (computed tomography [CT] or magnetic resonance imaging [MRI]) is also not associated with improved patient outcomes (45) and identifies many radiographic abnormalities that are poorly correlated with symptoms (22) but could lead to additional, possibly unnecessary interventions (46, 47).

Plain radiography is recommended for initial evaluation of possible vertebral compression fracture in selected higher-risk patients, such as those with a history of osteoporosis or steroid use (22). Evidence to guide optimal imaging strategies is not available for low back pain that persists for more than 1 to 2 months despite standard therapies if there are no symptoms suggesting radiculopathy or spinal stenosis, although plain radiography may be a reasonable initial option (see recommendation 4 for imaging recommendations in patients with symptoms suggesting radiculopathy or spinal stenosis). Thermography and electrophysiologic testing are not recommended for evaluation of nonspecific low back pain.

Recommendation 3: Clinicians should perform diagnostic imaging and testing for patients with low back pain when severe or progressive neurologic deficits are present or when serious underlying conditions are suspected on the basis of history and physical examination (strong recommendation, moderate-quality evidence).

Prompt work-up with MRI or CT is recommended in patients who have severe or progressive neurologic deficits or are suspected of having a serious underlying condition (such as vertebral infection, the cauda equina syndrome, or cancer with impending spinal cord compression) because delayed diagnosis and treatment are associated with poorer outcomes (48–50). Magnetic resonance imaging is generally preferred over CT if available because it does not use ionizing radiation and provides better visualization of soft tissue, vertebral marrow, and the spinal canal (22). There is insufficient evidence to guide precise recommendations on diagnostic strategies in patients who have risk factors for cancer but no signs of spinal cord compression. Several strategies have been proposed for such patients (22, 51), but none have been prospectively evaluated. Proposed strategies generally recommend plain radiography or measurement of erythrocyte sedimentation rate (a rate $\geq$20 mm/h is associated with 78% sensitivity and 67% specificity for cancer [29]), with MRI reserved for patients with abnormalities on initial testing (22, 51). An alternative strategy is to directly perform MRI in patients with a history of cancer, the strongest predictor of vertebral cancer (51). For patients older than 50 years of age without other risk factors for cancer, delaying imaging while offering standard treatments and reevaluating within 1 month may also be a reasonable option (52).

Recommendation 4: Clinicians should evaluate patients with persistent low back pain and signs or symptoms of radiculopathy or spinal stenosis with MRI (preferred) or CT only if they are potential candidates for surgery or epidural steroid injection (for suspected radiculopathy) (strong recommendation, moderate-quality evidence).

The natural history of lumbar disc herniation with radiculopathy in most patients is for improvement within the first 4 weeks with noninvasive management (53, 54). There is no compelling evidence that routine imaging affects treatment decisions or improves outcomes (55). For prolapsed lumbar disc with persistent radicular symptoms despite noninvasive therapy, discectomy or epidural steroids are potential treatment options (56–60). Surgery is also a treatment option for persistent symptoms associated with spinal stenosis (61–64).

Magnetic resonance imaging (preferred if available) or CT is recommended for evaluating patients with persistent back and leg pain who are potential candidates for invasive interventions—plain radiography cannot visualize discs or accurately evaluate the degree of spinal stenosis (22). However, clinicians should be aware that findings on MRI or CT (such as bulging disc without nerve root impingement) are often nonspecific. Recommendations for specific invasive interventions, interpretation of radiographic findings, and additional work-up (such as electrophysiologic testing) are beyond the scope of this guideline, but decisions should be based on the clinical correlation between symptoms and radiographic findings, severity of symptoms, patient preferences, surgical risks (including the patient's comorbid conditions), and costs and will generally require specialist input.

Recommendations: Treatment of Low Back Pain

Recommendation 5: Clinicians should provide patients with evidence-based information on low back pain with regard to their expected course, advise patients to remain active,

and provide information about effective self-care options (strong recommendation, moderate-quality evidence).

Clinicians should inform all patients of the generally favorable prognosis of acute low back pain with or without sciatica, including a high likelihood for substantial improvement in the first month (6, 40). Clinicians should explain that early, routine imaging and other tests usually cannot identify a precise cause, do not improve patient outcomes, and incur additional expenses. Clinicians should also review indications for reassessment and diagnostic testing (see recommendations 1 and 4). General advice on self-management for nonspecific low back pain should include recommendations to remain active, which is more effective than resting in bed for patients with acute or subacute low back pain (65, 66). If patients require periods of bed rest to relieve severe symptoms, they should be encouraged to return to normal activities as soon as possible. Self-care education books (see Glossary) based on evidence-based guidelines, such as *The Back Book* (67), are recommended because they are an inexpensive and efficient method for supplementing clinician-provided back information and advice and are similar or only slightly inferior in effectiveness to such costlier interventions as supervised exercise therapy, acupuncture (see Glossary), massage (see Glossary), and spinal manipulation (see Glossary) (65, 66, 68–70). Other methods for providing self-care education, such as e-mail discussion groups, layperson-led groups, videos, and group classes, are not as well studied.

Factors to consider when giving advice about activity limitations to workers with low back pain are the patient's age and general health and the physical demands of required job tasks. However, evidence is insufficient to guide specific recommendations about the utility of modified work for facilitating return to work (71). For worker's compensation claims, clinicians should refer to specific regulations for their area of practice, as rules vary substantially from state to state. Brief individualized educational interventions (defined as a detailed clinical examination and advice, typically lasting several hours over 1 to 2 sessions) (see Glossary) can reduce sick leave in workers with subacute low back pain (72–74).

Application of heat by heating pads or heated blankets is a self-care option (see Glossary) for short-term relief of acute low back pain (75). In patients with chronic low back pain, firm mattresses are less likely than a medium-firm mattress to lead to improvement (76). There is insufficient evidence to recommend lumbar supports (77) or the application of cold packs (75) as self-care options.

Although evidence is insufficient to guide specific self-management recommendations for patients with acute radiculopathy or spinal stenosis, some trials enrolled mixed populations of patients with and without sciatica, suggesting that applying principles similar to those used for nonspecific low back pain is a reasonable approach (see also recommendation 4).

Recommendation 6: For patients with low back pain, clinicians should consider the use of medications with proven benefits in conjunction with back care information and self-care. Clinicians should assess severity of baseline pain and functional deficits, potential benefits, risks, and relative lack of long-term efficacy and safety data before initiating therapy (strong recommendation, moderate-quality evidence). For most patients, first-line medication options are acetaminophen or nonsteroidal anti-inflammatory drugs (NSAIDs).

Medications in several classes have been shown to have moderate, primarily short-term benefits for patients with low back pain. Each class of medication is associated with unique trade-offs involving benefits, risks, and costs. For example, acetaminophen is a slightly weaker analgesic than NSAIDs (<10 points on a 100-point visual analogue pain scale) (78–82) but is a reasonable first-line option for treatment of acute or chronic low back pain because of a more favorable safety profile and low cost (79, 82–84). However, acetaminophen is associated with asymptomatic elevations of aminotransferase levels at dosages of 4 g/d (the upper limit of U.S. Food and Drug Administration–[FDA] approved dosing) even in healthy adults, although the clinical significance of these findings are uncertain (85). Nonselective NSAIDs are more effective for pain relief than is acetaminophen (80), but they are associated with well-known gastrointestinal and renovascular risks (83). In addition, there is an association between exposure to cyclooxygenase-2–selective or most nonselective NSAIDs and increased risk for myocardial infarction (86). Clinicians should therefore assess cardiovascular and gastrointestinal risk factors before prescribing NSAIDs and recommend the lowest effective doses for the shortest periods necessary. Clinicians should also remain alert for new evidence about which NSAIDs are safest and consider strategies for minimizing adverse events in higher-risk patients who are prescribed NSAIDs (such as co-administration with a proton-pump inhibitor) (87). There is insufficient evidence to recommend for or against analgesic doses of aspirin in patients with low back pain (88).

Opioid analgesics or tramadol are an option when used judiciously in patients with acute or chronic low back pain who have severe, disabling pain that is not controlled (or is unlikely to be controlled) with acetaminophen and NSAIDs. Because of substantial risks, including aberrant drug-related behaviors with long-term use in patients vulnerable or potentially vulnerable to abuse or addiction, potential benefits and harms of opioid analgesics should be carefully weighed before starting therapy (89–91). Failure to respond to a time-limited course of opioids should lead to reassessment and consideration of alternative therapies or referral for further evaluation (92–94). Evidence is insufficient to recommend one opioid over another (95).

The term *skeletal muscle relaxants* refers to a diverse group of medications, some with unclear mechanisms of action, grouped together because they carry FDA-approved indications for treatment of musculoskeletal conditions or spasticity. Although the antispasticity drug tizanidine has

Glossary

General	
Acute low back pain	Low back pain present for fewer than 4 weeks, sometimes grouped with subacute low back pain as symptoms present for fewer than 3 months.
Cauda equina syndrome	Compression on nerve roots from the lower cord segments, usually due to a massive, centrally herniated disc, which can result in urinary retention or incontinence from loss of sphincter function, bilateral motor weakness of the lower extremities, and saddle anesthesia.
Chronic low back pain	Low back pain present for more than 3 months.
Herniated disc	Herniation of the nucleus pulposus of an intervertebral disc through its fibrous outer covering, which can result in compression of adjacent nerve roots or other structures.
Neurogenic claudication	Symptoms of leg pain (and occasionally weakness) on walking or standing, relieved by sitting or spinal flexion, associated with spinal stenosis.
Nonspecific low back pain	Pain occurring primarily in the back with no signs of a serious underlying condition (such as cancer, infection, or cauda equina syndrome), spinal stenosis or radiculopathy, or another specific spinal cause (such as vertebral compression fracture or ankylosing spondylitis). Degenerative changes on lumbar imaging are usually considered nonspecific, as they correlate poorly with symptoms.
Radiculopathy	Dysfunction of a nerve root associated with pain, sensory impairment, weakness, or diminished deep tendon reflexes in a nerve root distribution.
Sciatica	Pain radiating down the leg below the knee in the distribution of the sciatic nerve, suggesting nerve root compromise due to mechanical pressure or inflammation. Sciatica is the most common symptom of lumbar radiculopathy.
Spinal stenosis	Narrowing of the spinal canal that may result in bony constriction of the cauda equina and the emerging nerve roots.
Straight-leg-raise test	A procedure in which the hip is flexed with the knee extended in order to passively stretch the sciatic nerve and elicit symptoms suggesting nerve root tension. A positive test is usually considered reproduction of the patient's sciatica when the leg is raised between 30 and 70 degrees. Reproduction of the patient's sciatica when the unaffected leg is lifted is referred to as a positive "crossed" straight-leg-raise test.
Interventions	
Acupressure	An intervention consisting of manipulation with the fingers instead of needles at specific acupuncture points.
Acupuncture	An intervention consisting of the insertion of needles at specific acupuncture points.
Back school	An intervention consisting of education and a skills program, including exercise therapy, in which all lessons are given to groups of patients and supervised by a paramedical therapist or medical specialist.
Brief individualized educational interventions	Individualized assessment and education about low back pain problems without supervised exercise therapy or other specific interventions. As we defined them, brief educational interventions differ from back schools because they do not involve group education or supervised exercise.
Exercise	A supervised exercise program or formal home exercise regimen, ranging from programs aimed at general physical fitness or aerobic exercise to programs aimed at muscle strengthening, flexibility, stretching, or different combinations of these elements.
Functional restoration (also called *physical conditioning, work hardening,* or *work conditioning*)	An intervention that involves simulated or actual work tests in a supervised environment in order to enhance job performance skills and improve strength, endurance, flexibility, and cardiovascular fitness in injured workers.
Interdisciplinary rehabilitation (also called *multidisciplinary therapy*)	An intervention that combines and coordinates physical, vocational, and behavioral components and is provided by multiple health care professionals with different clinical backgrounds. The intensity and content of interdisciplinary therapy varies widely.
Interferential therapy	The superficial application of a medium-frequency alternating current modulated to produce low frequencies up to 150 Hz. It is thought to increase blood flow to tissues and provide pain relief and is considered more comfortable for patients than transcutaneous electrical nerve stimulation.
Low-level laser therapy	The superficial application of lasers at wavelengths between 632 and 904 nm to the skin in order to apply electromagnetic energy to soft tissue. Optimal treatment parameters (wavelength, dosage, dose-intensity, and type of laser) are uncertain.
Massage	Soft tissue manipulation using the hands or a mechanical device through a variety of specific methods. The pressure and intensity used in different massage techniques vary widely.
Neuroreflexotherapy	A technique from Spain characterized by the temporary implantation of staples superficially into the skin over trigger points in the back and referred tender points in the ear. Neuroreflexotherapy is believed to stimulate different zones of the skin than acupuncture.
Percutaneous electrical nerve stimulation (PENS)	An intervention that involves inserting acupuncture-like needles and applying low-level electrical stimulation. It differs from electroacupuncture in that the insertion points target dermatomal levels for local pathology, rather than acupuncture points. However, there is some uncertainty over whether PENS should be considered a novel therapy or a form of electroacupuncture.
Progressive relaxation	A technique which involves the deliberate tensing and relaxation of muscles, in order to facilitate the recognition and release of muscle tension.
Self-care options	Interventions that can be readily implemented by patients without seeing a clinician or that can be implemented on the basis of advice provided at a routine clinic visit.
Self-care education book	Reading material (books, booklets, or leaflets) that provide education and self-care advice for patients with low back pain. Although the specific content varies, self-care books are generally based on principles from published clinical practice guidelines and encourage a return to normal activity, adoption of a fitness program, and appropriate lifestyle modification, and they provide advice on coping strategies and managing flares.
Shortwave diathermy	Therapeutic elevation of the temperature of deep tissues by application of short-wave electromagnetic radiation with a frequency range from 10–100 MHz.

Continued on following page

Glossary—**Continued**

Spa therapy	An intervention involving several interventions, including mineral water bathing, usually with heated water, typically while staying at a spa resort.
Spinal manipulation	Manual therapy in which loads are applied to the spine by using short- or long-lever methods and high-velocity thrusts are applied to a spinal joint beyond its restricted range of movement. Spinal mobilization, or low-velocity, passive movements within or at the limit of joint range, is often used in conjunction with spinal manipulation.
Traction	An intervention involving drawing or pulling in order to stretch the lumbar spine. Various methods are used, usually involving a harness around the lower rib cage and the iliac crest, with the pulling action done by using free weights and a pulley, motorized equipment, inversion techniques, or an overhead harness.
Transcutaneous electrical nerve stimulation (TENS)	Use of a small, battery-operated device to provide continuous electrical impulses via surface electrodes, with the goal of providing symptomatic relief by modifying pain perception.
Yoga	An intervention distinguished from traditional exercise therapy by the use of specific body positions, breathing techniques, and an emphasis on mental focus. Many styles of yoga are practiced, each emphasizing different postures and techniques.

been well studied for low back pain, there is little evidence for the efficacy of baclofen or dantrolene, the other FDA-approved drugs for the treatment of spasticity (96). Other medications in the skeletal muscle relaxant class are an option for short-term relief of acute low back pain, but all are associated with central nervous system adverse effects (primarily sedation). There is no compelling evidence that skeletal muscle relaxants differ in efficacy or safety (96, 97). Because skeletal muscle relaxants are not pharmacologically related, however, risk–benefit profiles could in theory vary substantially. For example, carisoprodol is metabolized to meprobamate (a medication associated with risks for abuse and overdose), dantrolene carries a black box warning for potentially fatal hepatotoxicity, and both tizanidine and chlorzoxazone are associated with hepatotoxicity that is generally reversible and usually not serious.

Tricyclic antidepressants are an option for pain relief in patients with chronic low back pain and no contraindications to this class of medications (98, 99). Antidepressants in the selective serotonin reuptake inhibitor class and trazodone have not been shown to be effective for low back pain, and serotonin–norepineprhine reuptake inhibitors (duloxetine and venlafaxine) have not yet been evaluated for low back pain. Clinicians should bear in mind, however, that depression is common in patients with chronic low back pain and should be assessed and treated appropriately (100).

Gabapentin is associated with small, short-term benefits in patients with radiculopathy (101, 102) and has not been directly compared with other medications or treatments. There is insufficient evidence to recommend for or against other antiepileptic drugs for back pain with or without radiculopathy. For acute or chronic low back pain, benzodiazepines seem similarly effective to skeletal muscle relaxants for short-term pain relief (96) but are also associated with risks for abuse, addiction, and tolerance. Neither benzodiazepines nor gabapentin are FDA-approved for treatment of low back pain (with or without radiculopathy). If a benzodiazepine is used, a time-limited course of therapy is recommended.

Herbal therapies, such as devil's claw, willow bark, and capsicum, seem to be safe options for acute exacerbations of chronic low back pain, but benefits range from small to moderate. In addition, many of the published trials were led by the same investigator, which could limit applicability of findings to other settings (103).

Systemic corticosteroids are not recommended for treatment of low back pain with or without sciatica, because they have not been shown to be more effective than placebo (104–107).

Most medication trials evaluated patients with nonspecific low back pain or mixed populations with and without sciatica. There is little evidence to guide specific recommendations for medications (other than gabapentin) for patients with sciatica or spinal stenosis. Evidence is also limited on the benefits and risks associated with long-term use of medications for low back pain. Therefore, extended courses of medications should generally be reserved for patients clearly showing continued benefits from therapy without major adverse events.

Recommendation 7: For patients who do not improve with self-care options, clinicians should consider the addition of nonpharmacologic therapy with proven benefits—for acute low back pain, spinal manipulation; for chronic or subacute low back pain, intensive interdisciplinary rehabilitation, exercise therapy, acupuncture, massage therapy, spinal manipulation, yoga, cognitive-behavioral therapy, or progressive relaxation (weak recommendation, moderate-quality evidence).

For acute low back pain (duration <4 weeks), spinal manipulation administered by providers with appropriate training is associated with small to moderate short-term benefits (108). Supervised exercise therapy and home exercise regimens are not effective for acute low back pain (109), and the optimal time to start exercise therapy after the onset of symptoms is unclear. Other guidelines suggest starting exercise after 2 to 6 weeks, but these recommendations seem to be based on poor-quality evidence (25, 110). Other nonpharmacologic treatments have not been proven to be effective for acute low back pain.

For subacute (duration >4 to 8 weeks) low back pain, intensive interdisciplinary rehabilitation (defined as an intervention that includes a physician consultation coordi-

nated with a psychological, physical therapy, social, or vocational intervention) (see Glossary) is moderately effective (111), and functional restoration (see Glossary) with a cognitive-behavioral component reduces work absenteeism due to low back pain in occupational settings (112). There is little evidence on effectiveness of other treatments specifically for subacute low back pain (113). However, many trials enrolled mixed populations of patients with chronic and subacute symptoms, suggesting that results may reasonably be applied to both situations.

For chronic low back pain, moderately effective nonpharmacologic therapies include acupuncture (114, 115), exercise therapy (109), massage therapy (116), Viniyoga-style yoga (see Glossary) (70), cognitive-behavioral therapy or progressive relaxation (see Glossary) (117, 118), spinal manipulation (108), and intensive interdisciplinary rehabilitation (119), although the level of supporting evidence for different therapies varies from fair to good (**Appendix Table 6**, available at www.annals.org). In meta-regression analyses, exercise programs that incorporate individual tailoring, supervision, stretching, and strengthening are associated with the best outcomes (109). The evidence is insufficient to conclude that benefits of manipulation vary according to the profession of the manipulator (chiropractor vs. other clinician trained in manipulation) or according to presence or absence of radiating pain (108). With the exception of continuous or intermittent traction (see Glossary), which has not been shown to be effective in patients with sciatica (120–122), few trials have evaluated the effectiveness of treatments specifically in patients with radicular pain (122) or symptoms of spinal stenosis. In addition, there is insufficient evidence to recommend any specific treatment as first-line therapy. Patient expectations of benefit from a treatment should be considered in choosing interventions because they seem to influence outcomes (123). Some interventions (such as intensive interdisciplinary rehabilitation) may not be available in all settings, and costs for similarly effective interventions can vary substantially. There is insufficient evidence to recommend the use of decision tools or other methods for tailoring therapy in primary care, although initial data are promising (124–126).

Transcutaneous electrical nerve stimulation (see Glossary) and intermittent or continuous traction (in patients with or without sciatica) have not been proven effective for chronic low back pain (**Appendix Table 6**, available at www.annals.org). Acupressure (see Glossary), neuroreflexotherapy (see Glossary), and spa therapy (see Glossary) have not been studied in the United States, and percutaneous electrical nerve stimulation (see Glossary) is not widely available. There is insufficient evidence to recommend interferential therapy (see Glossary), low-level laser therapy (see Glossary), shortwave diathermy (see Glossary), or ultrasonography. Evidence is inconsistent on back schools (see Glossary), which have primarily been evaluated in occupational settings, with some trials showing small, short-term benefits (127).

It may be appropriate to consider consultation with a back specialist when patients with nonspecific low back pain do not respond to standard noninvasive therapies. However, there is insufficient evidence to guide specific recommendations on the timing of or indications for referral, and expertise in management of low back pain varies substantially among clinicians from different disciplines (including primary care providers). In general, decisions about consultation should be individualized and based on assessments of patient symptoms and response to interventions, the experience and training of the primary care clinician, and the availability of specialists with relevant expertise. In considering referral for possible surgery or other invasive interventions, other published guidelines suggest referring patients with nonspecific low back pain after a minimum of 3 months (25) to 2 years (128) of failed nonsurgical interventions. Although specific suggestions about timing of referral are somewhat arbitrary, one factor to consider is that trials of surgery for nonspecific low back pain included only patients with at least 1 year of symptoms (129–131). Other recommendations for invasive interventions are addressed in a separate guideline from the APS (17).

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Note: Clinical practice guidelines are "guides" only and may not apply to all patients and all clinical situations. Thus, they are not intended to

override clinicians' judgment. All ACP clinical practice guidelines are considered automatically withdrawn or invalid 5 years after publication or once an update has been issued.

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Appendix Table 1. **The American College of Physicians Clinical Practice Guidelines Grading System***

Quality of Evidence	Strength of Recommendation	
	Benefits Do or Do Not Clearly Outweigh Risks	Benefits and Risks and Burdens are Finely Balanced
High	Strong	Weak
Moderate	Strong	Weak
Low	Strong	Weak
Insufficient evidence to determine net benefits or harms		I

* Adapted from the classification developed by the Grading of Recommendations, Assessment, Development, and Evaluation (GRADE) work group.

Appendix Table 2. **Methods for Grading the Strength of the Overall Evidence for an Intervention***

Grade	Definition
Good	Evidence includes consistent results from well-designed, well-conducted studies in representative populations that directly assess effects on health outcomes (at least 2 consistent, higher-quality trials).
Fair	Evidence is sufficient to determine effects on health outcomes, but the strength of the evidence is limited by the number, quality, size, or consistency of included studies; generalizability to routine practice; or indirect nature of the evidence on health outcomes (at least 1 higher-quality trial of sufficient sample size; 2 or more higher-quality trials with some inconsistency; at least 2 consistent, lower-quality trials, or multiple consistent observational studies with no significant methodologic flaws).
Poor	Evidence is insufficient to assess effects on health outcomes because of limited number or power of studies, large and unexplained inconsistency between higher-quality trials, important flaws in trial design or conduct, gaps in the chain of evidence, or lack of information on important health outcomes.

* Adapted from methods developed by the U.S. Preventive Services Task Force (19).

Appendix Table 3. Definitions for Estimating Magnitude of Effects*

Size of Effect	Definition
Small/slight	Pain scales: Mean 5- to 10-point improvement on a 100-point VAS or equivalent Back-specific functional status: Mean 5- to 10-point improvement on the ODI, 1–2 points on the RDQ, or equivalent All outcomes: SMD, 0.2–0.5
Moderate	Pain scales: Mean 10- to 20-point improvement on a 100-point VAS or equivalent Back-specific functional status: Mean 10- to 20-point improvement on the ODI, 2–5 points on the RDQ, or equivalent All outcomes: SMD, 0.5–0.8
Large/substantial	Pain scales: Mean >20-point improvement on a 100-point VAS or equivalent Back-specific functional status: Mean >20-point improvement on the ODI, >5 points on the RDQ, or equivalent All outcomes: SMD >0.8

* ODI = Oswestry Disability Index; RDQ = Roland–Morris Disability Questionnaire; SMD = standardized mean difference; VAS = visual analogue scale.

Appendix Table 4. Recommendations and Summary Ratings*

Grade	Recommendation
A	The panel strongly recommends that clinicians consider offering the intervention to eligible patients. *The panel found good evidence that the intervention improves health outcomes and concludes that benefits substantially outweigh harms.*
B	The panel recommends that clinicians consider offering the intervention to eligible patients. *The panel found at least fair evidence that the intervention improves health outcomes and concludes that benefits moderately outweigh harms, or that benefits are small but there are no significant harms, costs, or burdens associated with the intervention.*
C	The panel makes no recommendation for or against the intervention. *The panel found at least fair evidence that the intervention can improve health outcomes, but concludes that benefits only slightly outweigh harms, or the balance of benefits and harms is too close to justify a general recommendation.*
D	The panel recommends against offering the intervention. *The panel found at least fair evidence that the intervention is ineffective or that harms outweigh benefits.*
I	The panel found insufficient evidence to recommend for or against the intervention. *Evidence that the intervention is effective is lacking, of poor quality, or conflicting, and the balance of benefits and harms cannot be determined.*

* Adapted from methods developed by the U.S. Preventive Services Task Force (19).

Appendix Table 5. Level of Evidence and Summary Grades for Noninvasive Interventions in Patients with Acute Low Back Pain*

Intervention	Level of Evidence	Net Benefit	Grade
Acetaminophen	Fair	Moderate	B
Nonsteroidal anti-inflammatory drugs	Good	Moderate	B
Skeletal muscle relaxants	Good	Moderate	B
Superficial heat	Good	Moderate	B
Advice to remain active	Good	Small (no significant harms)	B
Benzodiazepines	Fair	Moderate	B
Opioids and tramadol	Fair	Moderate	B
Self-care education books	Fair	Small (no significant harms)	B
Herbal therapies	Fair (devil's claw and white willow bark) to poor (cayenne)	Moderate (devil's claw and white willow bark), unable to estimate (cayenne)	B (devil's claw and white willow bark)
Spinal manipulation	Fair	Small to moderate	B/C
Advice to rest in bed	Good	No benefit	D
Exercise therapy	Good	No benefit	D
Systemic corticosteroids	Fair	No benefit	D
Aspirin	Poor	Unable to estimate	I
Acupuncture	Poor	Unable to estimate	I
Back schools	Poor	Unable to estimate	I
Interferential therapy	Poor	Unable to estimate	I
Low-level laser	Poor	Unable to estimate	I
Lumbar supports	Poor	Unable to estimate	I
Massage	Poor	Unable to estimate	I
Modified work	Poor	Unable to estimate	I
Shortwave diathermy	Poor	Unable to estimate	I
Transcutaneous electrical nerve stimulation	Poor	Unable to estimate	I
Superficial cold	Poor	Unable to estimate	I

* See **Appendix Tables 1**, **2**, and **3** for explanation of grades. Low back pain is considered acute if its duration is <4 weeks.

Appendix Table 6. **Level of Evidence and Summary Grades for Noninvasive Interventions in Patients with Chronic or Subacute Low Back Pain***

Intervention	Level of Evidence	Net Benefit	Grade
Acetaminophen	Fair	Small (no significant harms)	B
Acupuncture	Fair (some inconsistency vs. sham acupuncture)	Moderate	B
Psychological therapy (cognitive-behavioral therapy or progressive relaxation)	Good for cognitive-behavioral, fair for progressive relaxation	Moderate (cognitive-behavioral) to substantial (progressive relaxation)	B
Exercise therapy	Good	Moderate	B
Interdisciplinary rehabilitation	Good	Moderate	B
Nonsteroidal anti-inflammatory drugs	Good	Moderate	B
Spinal manipulation	Good	Moderate	B
Opioids and tramadol	Fair (primarily indirect evidence from trials of patients with other pain conditions)	Moderate	B
Brief individualized educational interventions	Fair	Moderate	B
Benzodiazepines	Fair	Moderate	B
Massage	Fair	Moderate	B
Yoga	Fair (for Viniyoga) to poor (for Hatha yoga)	Moderate (Viniyoga), unable to estimate (Hatha yoga)	B (Viniyoga)
Tricyclic antidepressants	Good	Small to moderate	B/C
Antiepileptic drugs	Fair (for gabapentin) to poor (for topiramate)	Small (gabapentin in patients with radiculopathy), unable to estimate (topiramate)	C (gabapentin), I (topiramate)
Back schools	Fair (some inconsistency)	Small	C
Firm mattresses	Fair	No benefit or harm	D
Traction	Fair	No benefit (continuous or intermittent traction), small to moderate (autotraction for sciatica)	D (continuous or intermittent traction), C (autotraction for sciatica)
Aspirin	Poor	Unable to estimate	I
Biofeedback†	Poor	Unable to estimate	I
Interferential therapy	Poor	Unable to estimate	I
Low-level laser	Poor	Unable to estimate	I
Lumbar supports	Poor	Unable to estimate	I
Shortwave diathermy	Poor	Unable to estimate	I
Skeletal muscle relaxants	Poor	Unable to estimate	I
Transcutaneous electrical nerve stimulation	Poor	Unable to estimate	I
Ultrasonography	Poor	Unable to estimate	I

* See **Appendix Tables 1, 2,** and **3** for explanation of grades. Low back pain is considered subacute at 1–3 months' duration and chronic at >3 months' duration.
† The use of auditory or visual signals reflecting muscle tension or activity to learn how to inhibit or reduce the muscle activity.

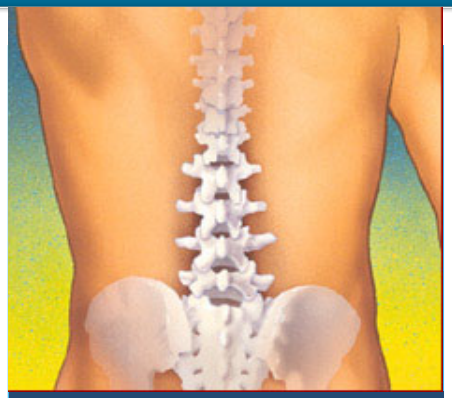
Patient Education Handout: Spinal Manipulation For Low Back Pain

Print double sided

Low Back Pain

Low back pain is very common, it is estimated that 8 out of 10 people will seek care for their low back pain during their lifetime. This is especially true for military members, whose unique training, careers, and deployments place significant stress on the lower back.

Most episodes of low back pain will resolve on it's own after a few days or weeks. For others, the pain may become chronic and debilitating. Common treatments options include hot or cold packs, exercise, stretches medications, minimal rest, and complementary treatments like spinal manipulation.



Chiropractic Services Off Post

Tricare does not currently cover chiropractic care received in the local community.

How to find a licensed chiropractor in the local community

American Association of Chiropractors

www.acatoday.org

The Patriot Project

A grass roots movement to provide chiropractic care to all active duty military.

Contact participating chiropractors to verify participation and learn about discounts or free service eligibility.

www.patriot-project.org

Spinal Manipulation

For Low Back Pain

What You Should Know

Local Resources

Below is a list of professionals that are trained to perform Spinal Manipulation at Clark Health Clinic, Fort Bragg, and off post. Talk with your PCM about options that are best for you.

1. Clark Health Clinic

- Acute Care Physical Therapist
- Chiropractor
- Osteopathic Physician

2. Fort Bragg

- Physical Therapy
- Pain Clinic

3. Off Post

- Physical Therapy
- Chiropractor (not covered by Tricare)

Questions and Answers

What is Spinal Manipulation?

Spinal Manipulation, or Spinal Manipulation Therapy, usually includes manipulation and mobilization techniques on the spine. The practitioner performs the manipulation by using their hands or a device to apply a controlled force to a joint of the spine. The force applied varies depending on the form of manipulation used. Health care professionals that usually practice spinal manipulation include osteopathic physicians, chiropractors, physical therapists, and naturopathic physicians.

What are the benefits and risks?

Spinal manipulation is one of several options, including exercise, massage, and physical therapy, used to treat low back pain. Spinal manipulation has been shown to provide mild-to-moderate relief in pain and works as well as conventional treatments like applying heat, using a firm mattress, and taking pain-relieving medications. Extensive reviews have deemed spinal manipulation relatively safe when performed by a licensed practitioner. Common side effects are usually minor and include temporary soreness and feeling tired. There is a very low chance that spinal manipulation will worsen a herniated disc. A rare complication of spinal manipulation for low back pain is cauda equina syndrome, a significant narrowing of the lower part of the spinal canal that may cause pain, weakness, loss of sensation in one or both legs, and bowel or bladder problems. However, the connection between spinal manipulation and cauda equina syndrome is unclear.

Spinal manipulation is currently one of the supported treatment options for the treatment of acute (less than 4 weeks), subacute (4-12 weeks), and chronic (greater than 12 weeks) low back pain. Discuss with your PCM if spinal manipulation therapy is an appropriate option for you.

Who can perform Spinal Manipulation?

Licensed and trained practitioners that perform spinal manipulation include osteopathic physicians, physical therapists, chiropractors, some medical doctors, and naturopathic physicians.

Reference: National Center for Complementary and Integrative Health. (2016). Spinal Manipulation for Low Back Pain. https://nccih.nih.gov/health/pain/spinemanipulation.htm

Summary

Like the civilian population, there is a high prevalence of Nonspecific Low Back Pain (NLBP) within the military population, which negatively impacts the patient's quality of life and the healthcare system. Military members are a unique patient population that is at an increased risk for experiencing nonspecific low back pain related to their endeavors and exposures both on and off the battlefield. Evidence exists that spinal manipulation therapy (SMT) is beneficial for the treatment of nonspecific low back pain and the current clinical practice guideline recommends spinal manipulation therapy as a treatment option for nonspecific low back pain. Decreased pain and improvement of disability in service members is essential in maintaining a mentally and physically fit and wartime ready military workforce. However, no review of the literature has been done to determine the impact of spinal manipulation therapy on pain and disability in the military population with nonspecific low back pain. This SMT Toolkit provides current, evidenced based recommendations regarding the use of SMT for nonspecific low back pain in the military population and guidance on local treatment options.

Additional Resources

- VA/DoD Low Back Pain Clinical Practice Guideline website
  - https://www.qmo.amedd.army.mil/lbp/lbpfr.htm
- Back On Track- CEMM Virtual Library
  - https://www.lowbackpainatoz.org/Your-Back/Introduction
- Low Back Pain examination videos
  - https://www.qmo.amedd.army.mil/lbp/video/LBP.html

Managing Low Back Pain

VA/DoD Clinical Practice Guidelines
Low Back Pain

Published November 2009

Managing Low Back Pain

If you have low back pain, you are not alone. Nearly everyone at some point has back pain that interferes with work, routine daily activities, or fun. Back pain is one of the most common physical complaints. It is the fifth most common reason for health care provider visits. Fortunately, most low back pain goes away within a few days. Most of the time, low back pain can be managed with self-care. For those who have pain that takes longer to resolve or have chronic pain, your healthcare team has a variety of treatments and referrals. The good news is most people with chronic low back pain will not need surgery.

Your Back at a Glance

Your back is an amazing part of your body made up of bones, muscles, nerves, ligaments and tendons. Your spine begins at your neck and runs down to your tailbone. Blocks of bone, called vertebrae, are stacked together to support your weight and protect your spinal cord. Between the vertebrae are the intervertebral discs. The discs are tough, flexible shock absorbers that cushion the vertebrae. Strong bands of tissue known as ligaments and tendons help to hold the bones of your spine in place and attach the large muscles of your back to the bones. All together, when these parts work in harmony, they make your back strong and you are able to move and bend without difficulty.

Most of the motion in your back happens in your lower back. This part of your back, where you tend to feel most back pain, supports the weight of your body and allows you to move.

What Causes Low Back Pain ?

The exact cause of low back pain can be hard to pinpoint at times. Maybe you helped your neighbor move and used your back more than you are used to or possibly you lifted something the wrong way. You may have stood or sat too long in one position so now the muscles are stiff and sore. If you work out for the first time in a while and do a lot of push-ups, you expect your upper arm muscles to be sore the next day. The same goes for your back muscles.

Your back pain may have come on gradually during the day or you may have noticed it during the night or when you woke up. Your back may feel stiff and sore or you may have sharp or burning pain. Sometimes people have tingling, or a 'pins-and-needles' feeling. Up to 85% of people will experience back pain at some time in their lives – it is that common! The good news is it usually only lasts for a few days or weeks. Every now and then, it lasts a bit longer, up to 4 or 6 weeks, but that's less common. Back pain that lasts 12 weeks or less is considered "acute" pain. When it lasts longer than 12 weeks, back pain is considered "chronic".

Is Back Pain Serious?

Most of the time, low back pain is not serious and is not the result of a back/spine injury. Back pain is a symptom, not a disease. Very serious low back problems are rare. Although on occasion someone will be able to pinpoint when their back started to hurt or ache, most people don't actually remember hurting their back. Your spine and the body parts that work with it are very strong, so it's difficult to have a serious back injury.

When should you see your health care provider?

See your health care provider if any of the following problems occur within a few days of your back injury or the onset of your back pain:

- Pain that keeps you from moving.
- Pain that runs down a leg.
- Night pain that keeps you from sleeping.
- Pain that increases after a few days rest.
- Pain that does not lessen after rest and self treatment.

Seek immediate attention from your health care provider if you have any of the following with back pain:

- Difficulty controlling your bladder or bowels.
- Loss of sensation in the groin area or between your legs.
- Pain following a fall or impact to the back.
- Severe leg pain down both legs, weakness, tingling, numbness, or inability to move.
- Pain that is steadily increasing over several hours.
- Chills, fever, or night sweats.
- Difficulty with balance or coordination.

What Can You Do If You Have Back Pain?

Remaining active is an important key in managing low back pain. Although this may be hard to do when you are having pain, research shows us that being inactive can actually make your back pain worse.

Despite having pain, there is good news. Most who experience low back pain will have rapid improvement in the first month.

The best thing to do is to remain active and be conservative with X-rays and MRI testing. Even if the x-ray shows a little arthritis, this can be normal and is no reason to be concerned. The latest research also shows that as long as there is no injury, specific disease or spinal abnormality, serious or permanent damage is rare. Additionally, the rare conditions that are serious or can cause permanent damage can be initially identified by your healthcare provider by a focused history and physical exam.

One of the worst things you can do is stay in bed. You can actually weaken your bones and muscles which may make the pain worse.

What Are My Options?

Actions you can take:

- Most back pain resulting from minor strains can be resolved with over-the-counter medicines and simple self-treatment.
- If the pain gets better as time passes, or the pain is not the result of a serious injury, then successful low back treatment by yourself is possible.
- Avoid the use of bed rest and prolonged inactivity.
- Use the exercises in this booklet to help your back and abdomen.
- Stay active, keep moving.

Self-Care Guidelines

Over-the-Counter Medicines*

- Over-the-counter (OTC) medicines are available without a prescription. They are very effective for reducing inflammation, swelling, and pain. OTC pain relievers include acetaminophen (e.g. Tylenol®) and non-steroidal anti-inflammatory (NSAID) drugs such as aspirin, ibuprofen (e.g. Advil® or Motrin® IB), and naproxen sodium (e.g. Aleve®). Caution: You should not take two similar drugs such as aspirin, ibuprofen, (Advil, Motrin),or naproxen sodium together. It is safe to combine acetaminophen (Tylenol) with a NSAID.

- OTCs are medicines and you should take them with caution. Do not exceed the recommended dosage of a medication without consulting with your healthcare provider. If you are taking other medicines, nutritional supplements or herbal remedies, talk with your health care provider or pharmacist to be sure an OTC medicine will not negatively interact with any of the prescription drugs you are taking.

Treatment Without Medication

There are many safe and effective ways to relieve your low back pain without using medication. Sometimes these techniques are used in combination with drug treatments. Many of these pain relief methods can be used at home; others require the help of a health care provider. Remember to talk with your health care provider about any pain relief techniques you are planning to use.

Ice

- For a day or two, apply ice or a cold pack for about 20 minutes at a time, three or four times a day.

- Always wrap ice or cold packs in a thin protective layer - such as a towel or face cloth. This will protect your skin. A bag of frozen peas makes a great ice pack.

Heat

- If ice has not relieved the pain after 2 or 3 days, apply moist heat.
  - Wrap a hot water bottle in a towel or take a warm shower.
  - Apply moist heat about 15 to 20 minutes, two or three times a day.

- Do not use heat if you injured your back in a fall, or if the heat increases your symptoms.

Bed Rest

Staying in bed more than a few days can make you stiff and cause supporting back muscles to become weaker; some movement is necessary to heal properly. Bed rest is a consequence of having pain, not a form of treatment for low back pain. Get active as soon as you can.

Treating Your Own Back

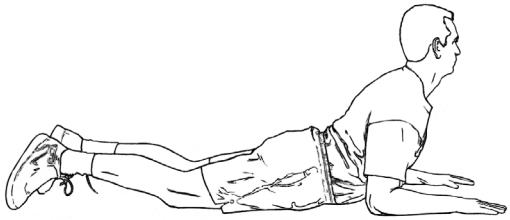
- Recovery from an acute injury takes some time. It is important to increase your activity gradually so you do not increase your discomfort. If you suffer from an acute back injury:
- Perform stretches in a smooth motion and hold the position for a few seconds; do not bounce or jerk while stretching.
- Do these stretches and exercises after a day or two of rest, if rest is necessary.
- You may experience some discomfort when doing these exercises. If the discomfort increases and remains the following day, consult your health care provider. Keep moving.
- Begin aerobic exercise as soon as you can. Aerobic exercise will promote blood flow and healing. Examples of aerobic exercise are walking, swimming, stationary bike and the elliptical machine.
- Begin by performing your aerobic program continuously for 10-20 minutes every other day. If you do not have increased pain after 1 week, increase this activity by 5 minutes every other day. Your goal should be at least 30 minutes of continuous aerobic exercise at least 3 times per week.

Press-Ups

Lie on your stomach with your legs straight and feet together.

Prop up your upper body with your forearms.

Push upward while keeping your pelvis on the floor.



Hold for five seconds.

Gently lower yourself to the floor.

Repeat five times.

(Remember to keep your forearms in contact with the floor at all times.)

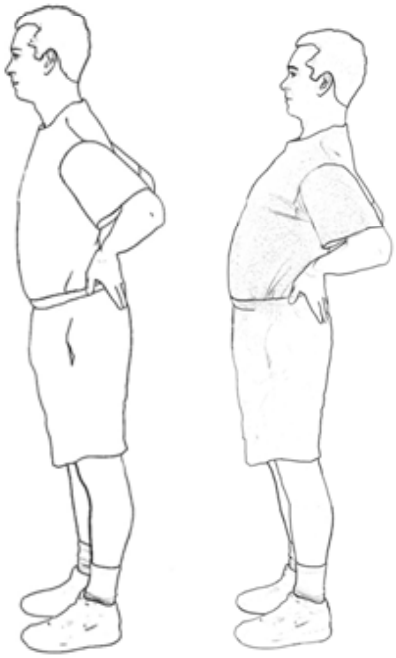
Backward Stretch

Stand upright.

Place your feet a shoulder width apart.

Place your hands on your lower back.

Lean backward while keeping your neck straight.



Lean further back until you feel a slight stretch in your back.

Hold for a count of five.

Return to the upright position.

Repeat three or four times.

Lower Back and Hip Stretch

Lie on your back with knees bent and feet flat on the floor.

Press your lower back onto the floor.

Grasp one knee with both hands and pull toward your chest keeping your head on the floor.

Keep the other knee bent with your foot on the floor.

Hold for a count of ten.

Return to starting position.

Repeat with the other leg.

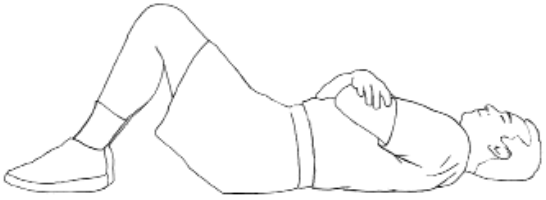
Repeat ten times on each leg for three sets.

Pelvic Tilt

Lie on your back.

Bend your knees at a 90-degree angle.

Tighten stomach muscles and buttocks.



Slowly push your lower back downward.

Hold your back in this position for five seconds.

Slowly return to normal and relax.

Repeat five times.

Good Body Mechanics Can Protect Your Back

Getting Out of Bed

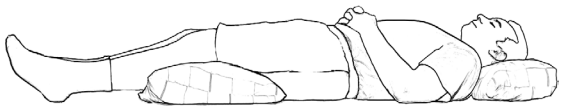
Roll on your side and push your body up with your arms.

Bend your knees and lower your feet to the floor. Use your legs to lift your entire body.

Sleeping

Sleep on a firm, comfortable mattress.
If the mattress is too soft, insert a board under the mattress for firmness.

Sleep on your back with a pillow under your knees or on your side with a pillow between your bent knees.



Sleep on a contoured pillow (with a shallow curve for the head) to help keep your neck and spine aligned during sleep.

Getting into a vehicle

Use the door to help you sit.

Grasp the steering wheel for support when seated, and slowly swing both legs into the car.

If you use a seat pad or back support, secure it to the seat to prevent slippage.

Getting out of a vehicle

Use the steering wheel as leverage to help pivot your lower body out of the car.

If possible, slowly swing legs out of the car at the same time to prevent twisting your back.

Use the door for support as you raise your body with your legs.

Sitting

While sitting at work or at home, try to maintain good posture.

Keep your knees at a 90-degree angle.

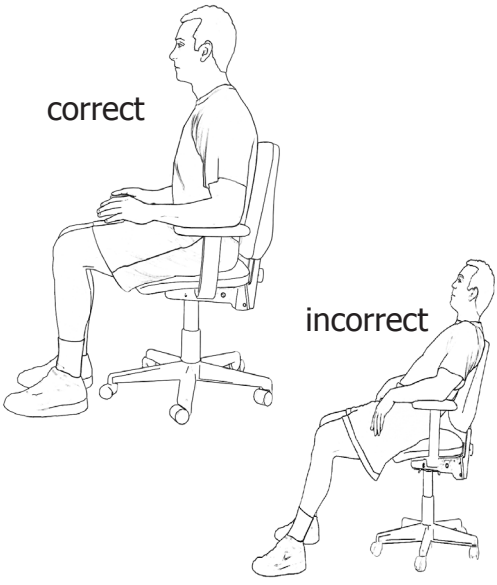
Keep your feet flat on the floor or on a footrest.

Use a back support or a rolled up towel to support the normal curvature of your lower back.

Keep your ears, shoulders, and hips in a straight line perpendicular to the floor.

Bend your elbows at about 90 degrees, with your wrists parallel to the floor.

Allow your arms to rest on the soft armrests of a chair. This will also relieve some compression on your lower back.



Lifting

When lifting, keep the object close to your body.

If the object is on the floor, widen your stance (slightly outside of shoulder width) and bend only at the hips and the knees.

Keep your back in its normal arched position while lifting.

correct

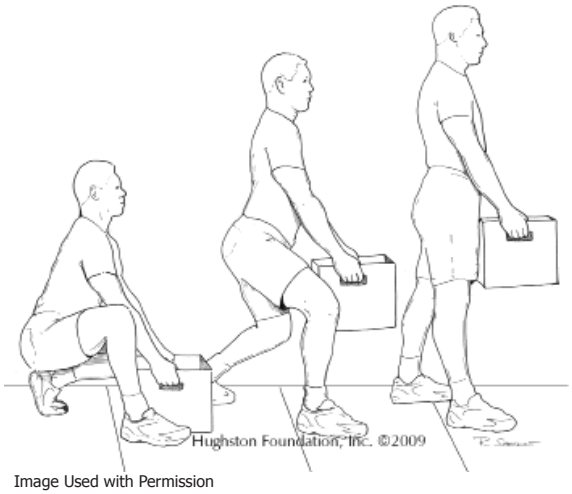
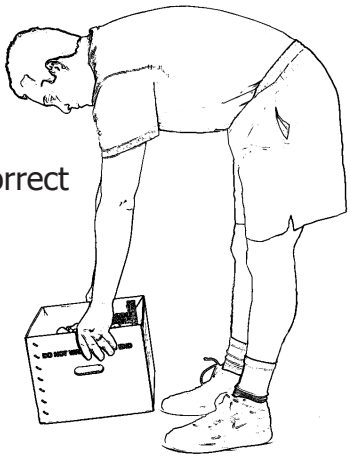


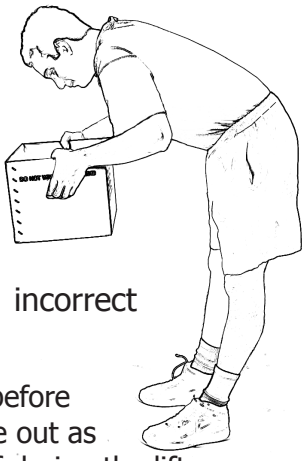
Image Used with Permission

Lifting (cont)

Do not lift by bending forward and using your lower back.



Do not twist while you are lifting.

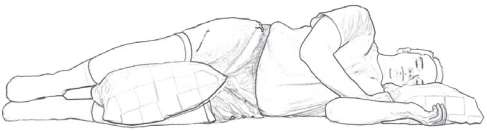


Take a breath in before lifting and breathe out as you exert yourself during the lift.

Tighten your stomach muscles and begin the upward lift by using your legs.

If you are carrying the object, be sure to keep it close to your body and maintain a straight spine.

How You Do Things Matters!



Additional Treatment Info.

X-RAYS

Your health care provider may order x-rays if you have persistent or recurrent low back pain. X-rays are usually not necessary in the beginning of low back pain treatment. This is because back muscles, ligaments, and discs do not show up on x-rays. X-rays are necessary for significant trauma (a fall or blow to the back), or for older patients with severe degenerative conditions (brittle bones).

Surgery

Surgery is most often not needed for low back pain. Nonsurgical treatments, exercise, and good body mechanics are usually effective at relieving low back pain. For complicated disc injury, surgical treatment may be necessary depending on the type of back injury. Consult your health care provider about surgical options.

Specialist Referral

Your primary care manager will only refer you to a specialist if you have specific symptoms, test results or findings on physical exam. Most back pain will resolve if you follow a well researched treatment plan from your primary care provider.

Rules To Live By

- Keep moving, stay active.
- Learn to lift things the right way.
- Lose weight. Extra pounds, especially around the middle, increase stress on the lower back.
- Don't smoke. Smoking can interfere with blood circulation to the lower back, while a constant cough can bring on a back spasm.
- Reduce stress. Economic worries, family pressures, and fatigue can cause back spasms or tense muscles.
- Daily exercise is an excellent way to relieve stress.
- Walk short distances instead of driving.
- Climb a few flights of stairs instead of taking the elevator.
- Choose a sport that is easy on your back such as walking, swimming, or bicycling in an upright position.
- Be aware there are times when immediate medical attention is required.
- Remember, most back pain from minor strains can be resolved with over-the-counter medicines and simple home treatment.

Chronic Low Back Pain

Chronic back pain does not mean there is damage. The back is designed for a lot of movement so the sooner you are active, the better. If possible, stay at work and make simple changes in how you do your job. It's common for people with low back pain to also have stress, anxiety or depression and it's important to get treatment for these symptoms as well. If your pain does not go away, your health care provider can check for more serious problems and suggest other treatments that may help.

This patient education booklet was prepared by the U.S. Army Medical Command Office of Evidence-Based Practice in support of the VA/DoD Low Back Pain Clinical Practice Guideline. The guideline recommendations were developed from an in-depth review and analysis of the literature by experts from the American College of Physicians, the American Pain Society and Working Group members from VA and the Departments of Army, Navy and Air Force.

Fear-Avoidance Beliefs Questionnaire (FABQ)
Waddell et al (1993) Pain , 52 (1993) 157 - 168

Here are some of the things which other patients have told us about their pain. For each statement please circle any number from 0 to 6 to say how much physical activities such as bending, lifting, walking or driving affect or would affect *your* back pain.

	Completely disagree			Unsure			Completely agree
1. My pain was caused by physical activity……..	0	1	2	3	4	5	6
2. Physical activity makes my pain worse…….	0	1	2	3	4	5	6
3. Physical activity might harm my back……..	0	1	2	3	4	5	6
4. I should not do physical activities which (might) make my pain worse	0	1	2	3	4	5	6
5. I cannot do physical activities which (might) make my pain worse…...	0	1	2	3	4	5	6

The following statements are about how your normal work affects or would affect your back pain

	Completely disagree			Unsure			Completely agree
6. My pain was caused by my work or by an accident at work……	0	1	2	3	4	5	6
7. My work aggravated my pain……	0	1	2	3	4	5	6
8. I have a claim for compensation for my pain……	0	1	2	3	4	5	6
9. My work is too heavy for me……..	0	1	2	3	4	5	6
10. My work makes or would make my pain worse……..	0	1	2	3	4	5	6
11. My work might harm my back……..	0	1	2	3	4	5	6
12. I should not do my normal work with my present pain…….	0	1	2	3	4	5	6
13. I cannot do my normal work with my present pain……...	0	1	2	3	4	5	6
14. I cannot do my normal work till my pain is treated……..	0	1	2	3	4	5	6
15. I do not think that I will be back to my normal work within 3 months.	0	1	2	3	4	5	6
16. I do not think that I will ever be able to go back to that work……...	0	1	2	3	4	5	6

Scoring
Scale 1: fear-avoidance beliefs about work – items 6, 7, 9, 10, 11, 12, 15.
Scale 2: fear-avoidance beliefs about physical activity – items 2, 3, 4, 5.

Source: Gordon Waddell, Mary Newton, Iain Henderson, Douglas Somerville and Chris J. Main, A Fear-Avoidance Beliefs Questionnaire (FABQ) and the role of fear-avoidance beliefs in chronic low back pain and disability, *Pain*, 52 (1993) 157 – 168, 166.

SMT Toolkit Power Point Presentation

The Impact of Spinal Manipulation Therapy (SMT) for Nonspecific Low Back Pain in the Military Population:

An SMT Toolkit for Primary Care Providers

Kelsey Ress, DNP- FNP Student
University of Massachusetts Amherst
College of Nursing

Overview

- DNP Project
- Objectives
- Nonspecific Low Back Pain
- Spinal Manipulation Therapy (SMT)
- Current Evidence
- Why Is This Topic Important?
- Clinical Practice Guideline
- SMT Toolkit
- Conclusion and Post Presentation Questionnaire

DNP Project

- Integrative Review
  - Objective
- Pre-Presentation
  - Focus Group Meetings
  - SMT Toolkit
- Presentation
- Debrief/Evaluation

Presentation Objectives

- Increase knowledge and awareness of the current evidence and recommendations of SMT for nonspecific low back pain
- Explore significance of SMT as treatment option for active duty patients
- Gain insight into local SMT options for active duty patients and understand how to effectively and efficiently refer patients for treatment

Nonspecific Low Back Pain (LBP)

- Estimated that 80% of adults seek care for low back pain during their lifetime
- One of the top ten reasons for seeking medical attention in the U.S.
  - Medical costs reaching $34 billion annually
  - Leading cause of disability and work absence
- 85-90% of all LBP presentations is nonspecific low back pain
  - Pain in the lower back without an underlying medical cause
    - Infection, cancer, osteoporosis, fracture, inflammatory process, or herniated disc

Bureau of Labor Statistics, 2014; Gaskin & Richard, 2011; Guerra et al., 2012; National Institute of Health, 2014; Yu et al., 2012 ; Wilkie, Parsell, Grant, & Green, 2010

Nonspecific Low Back Pain

Three categories

- Acute: 4-6 weeks
- Subacute: 7-12 weeks
- Chronic: > 12 weeks

Guerra et al., 2012

Nonspecific Low Back Pain

Active Duty Military

- One of most common causes for medical visits and lost duty days
- Lowest return-to-unit among deployed service members in 2011
- Third highest service-connected disability in 2015
- Fourth highest service-connected disability of all veterans in 2015

Armed Forces Health Surveillance Center, 2015; Cohen et al., 2011; Department of Veterans Affairs, 2015.

Nonspecific Low Back Pain

Active duty patients with primary diagnosis low back pain from October 2015-May 2016

- Fort Bragg
  - 3,968
- Clark Health Clinic
  - 1,090
  - Third highest clinic

FY 2016- Fourth highest diagnosis for AD

WAMC IMD/Clinical Data Services, 2016

Spinal Manipulation Therapy

- Mobilization, manipulation, or both
  - Mobilization: low-grade velocity and small or large amplitude passive movement techniques to spinal joint's range of motion
  - Manipulation: high velocity thrusts at short amplitude during range of motion, often accompanied by audible crack
- Commonly performed by chiropractor, physical therapist, and osteopathic physicians
  - Philosophies and treatment objectives differ

Rubinstein et al., 2012 ; Sandoz, 1969 ; van de Veen et al., 2005 .

Click **HERE** to return to TOC | Click **HERE** to return to SMT Algorithm

Current Evidence

Acute

- Quality of evidence was too low and with a high risk of bias to make specific conclusions or recommendations for the use of SMT
  - Rubstein et al., 2012
- Noted improvements in pain, function when added to another intervention, and recovery
  - Cherkin, Deyo, Battié, Street & Barlow, 1998; Childs, Flynn & Fritz, 2004; MacDonald & Bell, 1990.

Chronic

- Equally effective as other treatment modalities
  - Rubstein et al., 2013

Current Evidence

- Recommended in other Clinical Practice Guidelines
  - Osteopathic Manipulation
    - Seffinger et al., 2010
  - Physical Therapy
    - Delitto et al., 2012
- No serious complications related to SMT were noted
  - Rubstein et al., 2012; Rubstein et al., 2013
- Recommended in CPGs internationally
  - U.S., Austria, Italy, Netherlands, Canada, Finland, Norway, Germany, and New Zealand
    - Koes et al., 2010

Why Is This Topic Important?

- High prevalence
- High performance careers, training, combat
- High incidence of mental health disorders
- Distinct benefits for the military patient population
  - Practical and conservative treatment option
  - Available in austere, combat environments
  - Alternative for patient who do not have access or cannot take therapeutic medications
- Recommended for all presentations of nonspecific low back pain

Blakley & Jansen, 2013; Chou et al., 2007; Cohen et al., 2012, Roy, Lopez, & Pva, 2013; Shaw et al., 2010.

Clinical Practice Guideline

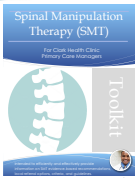
Chou et al., 2007

Clinical Practice Guideline

Clinical Practice Guideline

SMT Toolkit

- Introduction
- Low Back Pain Algorithm
- SMT Algorithm
- Contraindications to SMT
- Local Guidelines
  - Acute Care Physical Therapy, Physical Therapy, Chiropractor
- SMT Clinical Predictor Tool
- Pain Management Referral Guideline
- LBP Clinical Practice Guide
- SMT Patient Education Handout
- Additional Resources



Conclusion

- DNP Project
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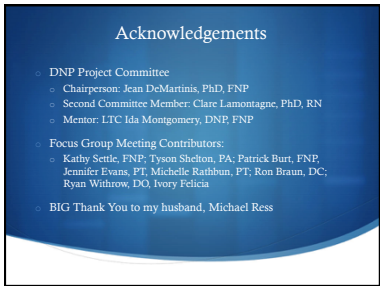
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DNP Project Committee
Chairperson: Jean DeMartinis, PhD, FNP
Second Committee Member: Clare Lamontagne, PhD, RN
Mentor: LTC Ida Montgomery, DNP, FNP
Focus Group Meeting Contributors:
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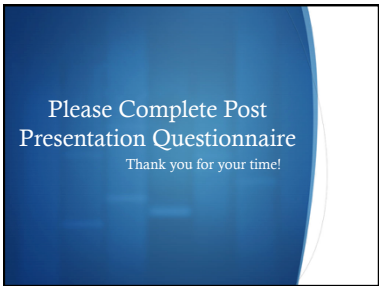
BIG Thank You to my husband, Michael Ress


Please Complete Post Presentation Questionnaire
Thank you for your time!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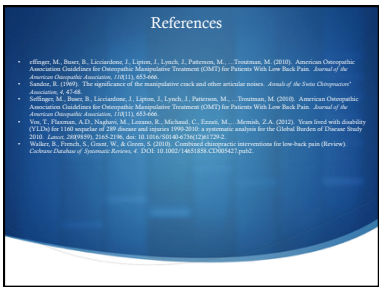
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Appendix F
Educational Presentation

The Impact of Spinal Manipulation Therapy (SMT) for Nonspecific Low Back Pain in the Military Population:

An SMT Toolkit for Primary Care Providers

Kelsey Ress, DNP- FNP Student
University of Massachusetts Amherst
College of Nursing

Overview

- DNP Project
- Objectives
- Nonspecific Low Back Pain
- Spinal Manipulation Therapy (SMT)
- Current Evidence
- Why Is This Topic Important?
- Clinical Practice Guideline
- SMT Toolkit
- Conclusion and Post Presentation Questionnaire

DNP Project

- Integrative Review
  - Objective
- Pre-Presentation
  - Focus Group Meetings
  - SMT Toolkit
- Presentation
- Debrief/Evaluation

Presentation Objectives

- Increase knowledge and awareness of the current evidence and recommendations of SMT for nonspecific low back pain
- Explore significance of SMT as treatment option for active duty patients
- Gain insight into local SMT options for active duty patients and understand how to effectively and efficiently refer patients for treatment

Nonspecific Low Back Pain (LBP)

- Estimated that 80% of adults seek care for low back pain during their lifetime
- One of the top ten reasons for seeking medical attention in the U.S.
  - Medical costs reaching $34 billion annually
  - Leading cause of disability and work absence
- 85-90% of all LBP presentations is nonspecific low back pain
  - Pain in the lower back without an underlying medical cause
    - Infection, cancer, osteoporosis, fracture, inflammatory process, or herniated disc

Bureau of Labor Statistics, 2014; Gaskin & Richard, 2011; Guerra et al., 2012; National Institute of Health, 2014; Yoo et al., 2012 ; Wilkie, Parsell, Grant, & Green, 2010.

Nonspecific Low Back Pain

Three categories

- Acute: 4 weeks
- Subacute: 7-12 weeks
- Chronic: > 12 weeks

Chou et al., 2007; Guerra et al., 2012

Nonspecific Low Back Pain

Active Duty Military

- One of most common causes for medical visits and lost duty days
- Lowest return-to-unit among deployed service members in 2011
- Third highest service-connected disability of new compensation recipients in 2015
- Fourth highest service-connected disability of all compensation recipients

Armed Forces Health Surveillance Center, 2015; Cohen et al., 2011; Department of Veterans Affairs, 2015.

Nonspecific Low Back Pain

Active duty patients with primary diagnosis low back pain from October 2015-May 2016

- Fort Bragg
  - 3,968
- Clark Health Clinic
  - 1,090
  - Third highest clinic

FY 2016- Fourth highest diagnosis for all active duty

WAMC IMD/Clinical Data Services, 2016

Spinal Manipulation Therapy

- Mobilization, manipulation, or both
  - Mobilization: low-grade velocity and small or large amplitude passive movement techniques to spinal joint's range of motion
  - Manipulation: high velocity thrusts at short amplitude during range of motion, often accompanied by audible crack
- Commonly performed by chiropractor, physical therapist, and osteopathic physicians
  - Philosophies and treatment objectives differ

Rubinstein et al., 2012 ; Sandoz, 1969 ; van de Veen et al., 2005 .

Current Evidence

Acute

- Quality of evidence was too low and with a high risk of bias to make specific conclusions or recommendations for the use of SMT
  - Rubstein et al., 2012
- Noted improvements in pain, function when added to another intervention, and recovery
  - Cherkin, Deyo, Battié, Street & Barlow, 1998; Childs, Flynn & Fritz, 2004; MacDonald & Bell, 1990.

Chronic

- Equally effective as other treatment modalities
  - Rubstein et al., 2013

Current Evidence

- Recommended in Clinical Practice Guidelines
  - Osteopathic Manipulation
    - Seffinger et al., 2010
  - Physical Therapy
    - Delitto et al., 2012
- No serious complications related to SMT were noted
  - Rubstein et al., 2012; Rubstein et al., 2013
- Recommended in CPGs internationally
  - U.S., Austria, Italy, Netherlands, Canada, Finland, Norway, Germany, and New Zealand
    - Koes et al., 2010

Why Is This Topic Important?

- High prevalence
- High performance careers, training, combat
- High incidence of mental health disorders
- Distinct benefits for the military patient population
  - Practical and conservative treatment option
  - Available in austere, combat environments
  - Alternative for patient who do not have access or cannot take therapeutic medications
- Recommended for all presentations of nonspecific low back pain

Blakley & Jansen, 2013; Chou et al., 2007; Cohen et al., 2012, Roy, Lopez, & Pva, 2013; Shaw et al., 2010.

Clinical Practice Guideline

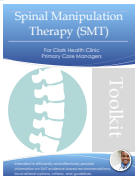
Chou et al., 2007

Clinical Practice Guideline

Clinical Practice Guideline

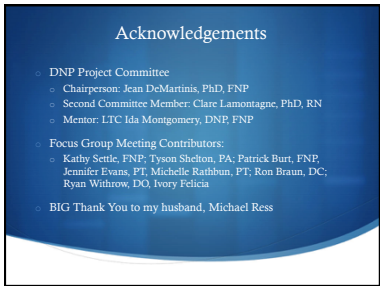
SMT Toolkit

- Introduction
- Low Back Pain Algorithm
- SMT Algorithm
- Contraindications to SMT
- Local Guidelines
  - Acute Care Physical Therapy, Physical Therapy, Chiropractor
- SMT Clinical Predictor Rules
- Pain Management Referral Guideline
- LBP Clinical Practice Guide
- SMT Patient Education Handout
- Additional Resources



Conclusion

- DNP Project
- Objectives
- Nonspecific Low Back Pain
- Spinal Manipulation Therapy (SMT)
- Current Evidence
- Why Is This Topic Important?
- Clinical Practice Guideline
- SMT Toolkit
- Conclusion and Post Presentation Questionnaire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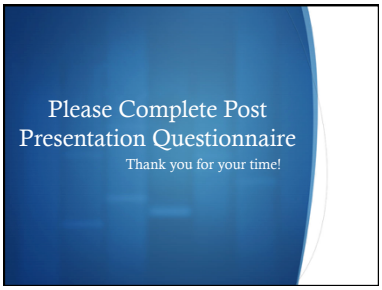
DNP Project Committee
Chairperson: Jean DeMartinis, PhD, FNP
Second Committee Member: Clare Lamontagne, PhD, RN
Mentor: LTC Ida Montgomery, DNP, FNP
Focus Group Meeting Contributors:
Kathy Settle, FNP; Tyson Shelton, PA; Patrick Burt, FNP, Jennifer Evans, PT, Michelle Rathbun, PT; Ron Braun, DC; Ryan Withrow, DO, Ivory Felicia
BIG Thank You to my husband, Michael Ress


Please Complete Post Presentation Questionnaire
Thank you for your time!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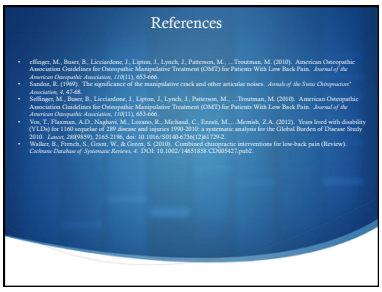
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Appendix G

Internal Review Board Approval

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Human Research Protection Office
Research Affairs

MEMORANDUM

To: Kelsey Ress, Nursing
From: Human Research Protection Office
Date: November 21, 2016

Project Title: **The Impact of Spinal Manipulation Therapy (SMT) for Nonspecific Low Back Pains in the Military Population: An Integrative Review with Presentation of the SMT Toolkit to Primary Care Providers**

IRB Number: 16-140

The Human Research Protection Office (HRPO) has evaluated the above named project and has made the following determination:

☐ The activity does not involve research that obtains information about living individuals and therefore does NOT require IRB review and approval.

☐ The activity does not involve intervention or interaction with individuals OR does not use identifiable private information and therefore does NOT require IRB review and approval.

☒ The activity is not considered research under the human subject regulations (Research is defined as "a systematic investigation designed to develop or contribute to generalizable knowledge.) and therefore does NOT require IRB review and approval.

☐ The activity is determined to meet the definition of human subject research under federal regulations and therefore DOES require submission of applicable materials for IRB review.

For activities requiring review, please see our web pages for more on types of review or submitting a new protocol. For assistance do not hesitate to contact the Human Research Protection Office at 545-3428 for assistance.