

Management of chronic musculoskeletal pain in veterans: a systematic review

Alessandro Santini¹, Antonio Petruzzo¹, Noemi Giannetta,² Antonio Ruggiero¹, Marco Di Muzio³, Roberto Latina¹

¹School of Nursing Science & Midwifery, Sapienza University of Rome, A.O. S. Camillo-Forlanini Hospital, Rome, Italy

²Vita-Salute San Raffaele University, Tor Vergata, University of Rome, Italy

³Department of Molecular Medicine, Sapienza University of Rome, Italy

Abstract. *Background and aim of the work.* Veterans are military with health problems due to military conditions. The improved body armor and operational conditions has reduced the number of deaths, but increased the number of veterans with severe injuries, affected by musculoskeletal pain and associated syndromes, such as post-traumatic stress disorder. Multimodal approaches are considered in USA the gold standard for the treatment of these problems, while in Europe and Italy the data are unknown. The aim of this review was to describe and summarize multimodal therapeutic approaches that apply to the veteran population for chronic musculoskeletal pain and relate syndromes management. *Methods.* A comprehensive systematic review of the literature on Cochrane Library, PubMed, CINAHL e PsycINFO databases was conducted, from 2001 to 2020. *Results.* 228 papers have been found, 134 were selected after the first screening, 24 quantitative studies were included in the review, all from USA. Different multimodal interventions with different kind of treatment types emerged. The analyzed studies' sample size was 11 million (mean age = 57.67 years; SD=±11.94). The multimodal approaches showed a significant improvement in all outcomes (pain reduction and control, opioid therapy reduction, psychosocial outcomes) compared to traditional therapy. *Conclusions.* Multimodal therapeutic approaches seem to guarantee a good management chronic musculoskeletal pain and related mental disorders, and the reduction and control to opioid use. Military nurses emerged as professionals who have a central role in this approach. European and Italian authorities should consider veterans, in order to assess their expected increase in the future. (www.actabiomedica.it)

Keywords: veterans; military; nurses; pain; pain management; musculoskeletal pain; opioid therapy; post-traumatic stress disorder.

Background

The word *veteran* has different meanings in different countries (1, 2), but it generally means men and women in uniform who have reported disabilities and/or health problems, following accidents and or injuries in military operations and and/or due to extreme living and working conditions, specific services, and military operational contexts in crisis areas (3).

The exact number of veterans in the world is not clear, but in the USA, the country most involved in

international military operations, the United States Department of Veteran Affairs (VA – USA) estimated approximately 20 million US veterans in 2017 (4). The scientific world has a great interest in studying veterans (5, 6). In other countries, the veteran population is more contained but is likely to grow, given the increased commitments to international operations. In Italy, the Italian Ministry of Defense started an Italian veteran support program at the Defense Veterans Center in Rome and has improved civilian collaborations for post-traumatic rehabilitation (7, 8).

The issue regarding veterans has changed over the years, particularly after September 11, 2001. The number of veterans has grown since 2001, especially after Operation Enduring Freedom (OEF), the International Security Assistance Force (ISAF) in Afghanistan, and Operation Iraqi Freedom (OIF) in Iraq (9, 10). According to the Institute of Medicine (11), the improved body armor provided to service members and the improved emergency medical care in the war zone led to a favorable reduction in deaths, but also created an increase in veterans who return home with severe injuries. For these veterans, the most important health problems are a high level of disability due to chronic musculoskeletal pain (MSP), psychological or physical diseases and syndromes with social implications (12). The overall incidence of MSP was 40.5/1000 (veteran/year), with an incidence range in the general population between 24.2 and 44.7/1000 (person/year) in 2006. Furthermore, in 2018 in the US military cohort for the incidence increased to 54.2/1000 (veteran/year) for military vehicle drivers and 48.3/1000 (veteran/year) for soldiers employed in specific operations (13). MSP is a persistent or recurrent pain that continues for several months and directly affects bones, joints, muscles, and soft tissues (14), with dynamic interactions between the biological, psychological, and social factors unique to each individual with high comorbidity (15, 16) and a negative impact on quality of life (17). The psychological and physical wellbeing of these veterans is also compromised by the frequent coexistence of post-traumatic stress disorder (PTSD) in which traumatized people repeatedly experience the traumatizing event more than one month after the trauma. In many cases, people with PTSD become irritable or, often have chest pains, headaches, gastrointestinal problems, immune-depression, and they want to avoid remembering (18, 19). The MSP and PTSD correlation could be caused by the high intensity of the activities and by the high risks of attack in these operations (20) and by psychophysical stress, particularly musculoskeletal, due to the use of many hours in armored vehicles. Furthermore, comradeship and the concept of “brothers in arms” represent a special kind of friendship and an important and necessary bond in the military (21). So these veterans often have

also feelings of guilt because they survived and were not able to save their colleagues.

Lew et al. (22) described a high prevalence of MSP (81.5%) in veterans, followed by PTSD (68.2%) and persistent post-concussive symptoms (PPCS) (66.8%). Only 3.5% of veterans are free of these clinical conditions. In 42.0%, these conditions were combined, and in a few cases, they were isolated (10.3% *vs.* 2.9% *vs.* 5.3%). The presence of these three conditions is called the post-deployment triad (23). All of these conditions, which can also be associated with major depression and the abuse of drugs and alcohol, can negatively impact the pain management outcomes, such as pain interference, pain severity, pain acceptance, quality of life, and disability (24, 25, 26). Therefore, VA-USA considers chronic MSP in veterans as a national priority (27), investing in both research and the implementation of effective management approaches (28) also able to limit the abuse of opioid therapy (OT) (28), with interdisciplinary, multidisciplinary and trans-disciplinary problem solving approaches (29). These approaches are considered the gold standard because could guarantee greater efficacy, reduction of side effects, long-term satisfaction (30), limiting the illicit substances used to manage pain (31), and reestablishing the residual autonomy (32).

In Europe and, in particular, in Italy, the issue of veterans is currently much more limited, even if Italy is among the main contributors to the military international operations (33). To our knowledge, data regarding MSP of Italian veterans is unknown. More, an increase in the number of missions is foreseeable in the future, so the Ministry of Defense has started a support program for Italian veterans, by establishing a special Defense Veterans Center in Rome (7), and by collaborating with civil health institutions in the post-traumatic rehabilitation sector (8). For these reasons, it would be desirable a better knowledge in order to plan correct management of chronic MSP of Italian veterans. Thus, it could be desirable acting in a preventive perspective rather than delaying interventions.

The literature describes the approaches used to treat chronic MSP in the general population (34, 35), but it is not clear which approaches are used in chronic MSP management in the veteran population.

Aims

The objective of this review was to describe and summarize multimodal therapeutic approaches that apply to the veteran population for chronic MSP management and related syndromes management.

Methods

Search strategy

A comprehensive systematic review was conducted from 2001 (OIF/ISAF/OEF start date) to 2020.

We excluded studies before 2001 because this year is considered the cornerstone in changed condition regarding veterans, as reported above.

This review used the following databases: Cochrane Library, PubMed, CINAHL, and PsycINFO. The keywords were “veterans,” “chronic musculoskeletal pain/MSP,” “post-traumatic stress disorder/PTSD,” “treatment,” “Afghanistan,” “Iraq/Irak,” “military operations,” and “noncancer.” Both thesaurus and free-text terms were used when relevant and combined with Boolean operators (AND, OR, NOT). The search strategies were adapted for each database, using Population, Intervention, Control, Outcome (PICO): P: Afghanistan and Iraq recent veterans; I: multimodal therapeutic approaches for chronic MSP and related mental disorders; C: compared to traditional pharmacological approaches; O: pain severity, improving quality of life, and cost reduction. The reference list of identified papers was also hand-searched for additional studies. This systematic review was conducted according to the PRISMA guidelines (36).

Inclusion and exclusion criteria

This review included all quantitative studies on: a) veterans of the recent crisis in Afghanistan (OEF/ISAF) and OIF in Iraq from 2001; b) inpatient and or/and outpatient veterans in treatment for chronic MPS; c) RCTs and observational studies; d) articles on different approaches to chronic MSP management with with/or mental disorders related, and e) papers

in English and Italian only. We have not included: a) case reports, editorial letters, consensus conference, doctoral thesis; b) studies on the general population; c) studies on veterans of operations before 2001; d) studies on the pediatric or geriatric population; e) studies on chronic cancer pain; qualitative studies.

Data extraction and synthesis of quantitative studies

The included studies were read to identify and understand the content and were selected by year, title, abstract, and duplicates. Subsequently, we obtained a sample of articles with full text. The data considered useful for the review have been extracted, analyzed and summarized according to the following items: authors, year, type of study, setting and characteristics of the population (sample, number, age, mean and standard deviation, sex, race, education), outcomes, outcomes instruments, aims, results, randomization, conclusions, nationality, and funding.

Quality appraisal

The quality of assessment of the study, for quantitative studies, was carried out through the Consolidated Standards of Reporting Trial (CONSORT) (37) method and its extension (38); for observational studies, we used the Reinforcement of the Reporting of Observational Studies in Epidemiology (STROBE) (39).

Results

Included articles, countries and funding

We found 228 papers in the selected databases. After the first screening of the title and abstract, and after removing duplicates, we identified 134 papers. After the screening of the full text, we included 24 articles, as shown in the flow chart diagram (Figure 1).

The selected articles are all on US veteran populations and none one on Italian veterans, all with public or academic funding and, in particular, by VA-USA. The first included study was published in 2009, eight years from the OEF/ISAF OIF operations start date.

The last studies were published in 2020 (Table 1).

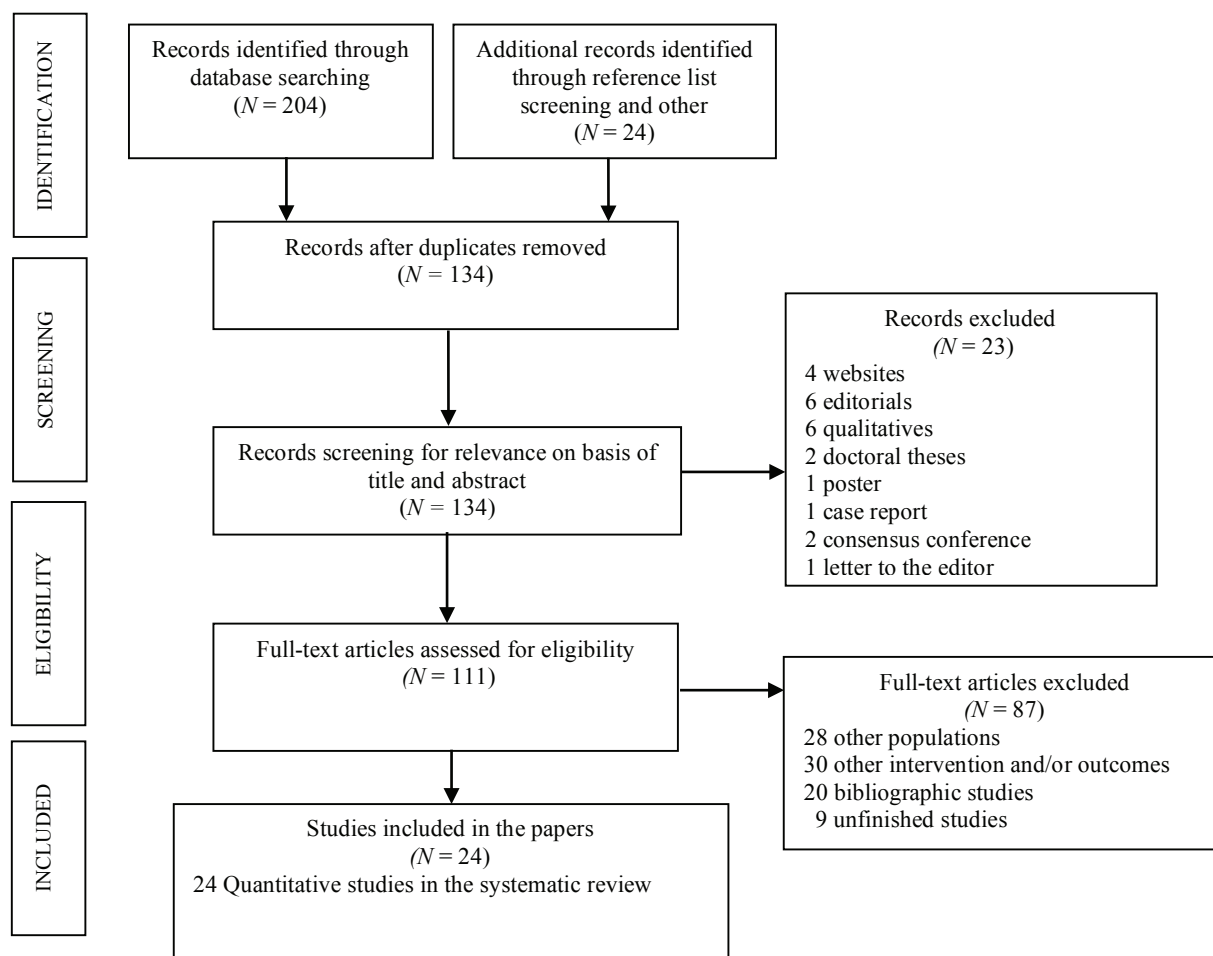


Figure 1. Flow chart diagram

Table 1. Studies

Articles	Study	Country	Funding
Dobscha et al., 2009	Cluster RCT	USA	VA- USA
Murphy et al., 2013	Observational study	USA	VA-USA
Kroenke et al., 2014	RCT	USA	VA-USA
King et al., 2015	Pilot study	USA	VA-USA
Bair et al., 2015	RCT	USA	VA-USA
Stratton et al., 2015	CT non randomized	USA	VA-USA
Thielke et al., 2015	RCT - secondary analysis	USA	VA-USA
Frank et al., 2015	Observational study	USA	VA-USA
Herbert et al., 2016	Observational study	USA	VA-USA
Koffel et al., 2016	RCT - secondary analysis	USA	VA-USA
Groessler et al., 2017	RCT	USA	VA-USA

Articles	Study	Country	Funding
Highland et al., 2017	RCT pilot	USA	USA, Department of the Army
Burgess et al., 2018	RCT pilot	USA	USA, National Center for CIH
Cosio et Lin, 2018	Quasi-experimental study	USA	Non funding
Goode et al., 2018	RCT pilot	USA	VA-USA / National Center for CIH
Martinson et al., 2018	Quasi-experimental study	USA	VA-USA
Cummins & Tobian, 2018	CT non-randomized	USA	VA- USA
Anamkath et al., 2018	Observational study	USA	VA-USA / University of California
Carey et al., 2018	Observational study	USA	VA-USA
Edmond et al., 2018	Observational study	USA	Weldon Donaghue Medical Research Foundation and VA-USA
Kay et al., 2018	Observational study	USA	USA, Advancing a Healthier Wisconsin
Rosen et al., 2019	RCT	USA	USA, National Institutes of Health
Han et al., 2019	Observational study	USA	VA-USA / National Center for CIH
Herbert et al., 2019	Observational study	USA	VA-USA

RCT = Randomized Controlled trial; CT = Controlled Trial; VA-USA = Veterans Affairs department – United States of America; CIH = Complementary and Integrative Health.

Intervention types

From our analysis, different interventions with different kind of treatment types emerged: 9 were considered interdisciplinary, 1 transdisciplinary, 4 multidisciplinary, 1 not clear (Table 2).

Interdisciplinary studies considered a combination of different treatments (i.e., yoga, acupuncture, psychoeducational interventions, muscular stretching exercises etc.). In the transdisciplinary studies a two steps algorithm was applicated (12 weeks of analgesic treatment coupled with pain self-management strategies, and in the step 2, 12 weeks of cognitive behavioral therapy). In the multidisciplinary studies were used 4 different interventions: a home-based bright light treatment, a health technology intervention to help primary-care providers, a motivational intervention and a yoga-classes program. The

last intervention used a comprehensive approach in order to predict and manage OT and alternative therapies.

Quantitative studies quality appraisal

The included quantitative studies have many of the quality appraisal checklists (CONSORT and STROBE). The only limits were: a) single center and b) blinding for 4 randomized controlled trials (41, 42, 43, 44); b) single center for Cluster RCT (30); c) do not defined the non-inferiority limits, population age media and ethnic percentage for noninferiority's RCT (45); d) single center and small sample for the pilot RCTs (46, 47, 48, 49); e) poor control bias in some observational studies (34, 50, 51, 52, 53, 54, 55). We did not analyze quasi-experimental studies, non-randomized trials, or RC secondary analyses.

Table 2. Interventions

Intervention	Type of approach	Description
Complementary and Integrative Health therapies (CIH)	Interdisciplinary	Additional treatment by chiropractic, acupuncture, yoga, and psycho-educational therapy
Acceptance and Commitment Therapy (ACT)	Interdisciplinary	Cognitive behavioral therapy comprises three components: 1) awareness and nonjudgmental acceptance of all experiences (negative as well as positive), 2) identification of valued life directions, and 3) committed action toward goals that support values.
Interdisciplinary Pain Rehabilitation Program (IPRP)	Interdisciplinary	Several treatment components, including the following: Acceptance and Commitment therapy, cognitive behavioral therapy, physical therapy, pain education, and pharmacy counseling.
Home-based morning bright light treatment	Multidisciplinary	13 days of a one-hour morning bright light treatment self-administered at home. Consist of having participants receive high-intensity ultraviolet free light, most typically from a light box during morning hours
Restorative Exercise and Strength Training for Operational Resilience and Excellence (RESTORE)	Interdisciplinary	8-week based on therapeutic yoga, targeting major muscles affected by chronic lower back pain, including back and core strengthening / stretching for postural alignment.
Screening Brief Intervention and Referral to Treatment-Pain Module (SBIRT-PM)	Interdisciplinary	Brief phone counseling about the veteran's pain and an explanation of multimodal pain treatment, to explain on substance use, to inform them of available services at the VA Healthcare
Stepped Care to Optimize Pain care Effectiveness (SCOPE)	Transdisciplinary	Two steps; Step 1 included 12 weeks of analgesic treatment and optimization according to an algorithm coupled with pain self-management strategies; Step 2, 12 weeks of cognitive behavioral therapy. Nurse care managers delivered all intervention aspects
Effectiveness of a Collaborative Approach to Pain (SEACAP)	Interdisciplinary	Included a 2-session clinician education program, patient assessment, education and activation, symptom monitoring, feedback and recommendations to clinicians, and facilitation of specialty care
Cognitive Behavioral Therapy (CBT)	Interdisciplinary	Intervention included stretching, strengthening, and aerobic activities; CBT-P covered activity pacing, relaxation techniques, and cognitive restructuring
Comprehensive TBI Evaluation (CTBIE)	Not clear	Patients are evaluated by CTBIE (Emotional, Vestibular, Cognitive and Somatic/Sensory symptoms) to predict the start of drug therapies in order to manage the short term and long-term OT and alternative non-pharmacological therapy
Education, Exercise and Chiropractic treatment (EEC)	Interdisciplinary	Integrated conventional and complementary alternative medicine with educational programs, exercise training, and chiropractic therapy
Specialty Care Access Network-ECHO (SCAN-ECHO)	Multidisciplinary	Uses tele-health technology to provide primary care providers with case-based specialist consultation and pain management education. To assess the association between provider SCAN-ECHO-PM consultation and 1) delivery of outpatient care (physical medicine, mental health, substance use disorder, and pain medicine) and 2) medication initiation (antidepressants, anticonvulsants, and opioid analgesics)
Chronic Opioid Therapy (COT) + ambulatory resources	Interdisciplinary	Uses telephone calls, secure messages, nurse visits, and telephone triage to the management of patients on chronic opioid therapy

Intervention	Type of approach	Description
Motivational Enhancement Therapy (MET)	Multidisciplinary	MET is a brief, targeted, structured version of motivational interviewing; It is an evidence-based form of treatment that is used to elicit and strengthen motivation for change. Patients are helped to process their own change talk, therefore helping them to build on their motivations as well as helping them understand their own sustaining narratives that may be holding them back from change. The process is respectful, nondirective, and emphasizes participants' personal choice and control
Yoga	Multidisciplinary	Yoga classes (with home practice) were led by a certified instructor twice weekly for 12 weeks and consisted primarily of physical postures, movement, and breathing techniques

Population characteristics

The included studies' settings were mainly from the OEF/ISAF and OIF veterans. The analyzed studies' sample size is 11 million; the mean age was 57.67 years (SD=±11.94), with a range from 36 to 70 years. 85.26% were male, 70% were White/Caucasian, 22.88% were African-American/Black, and 7.12% were Other. The 11.98% of population included attended high school while the 88.02% upper educational level. Educational level results in 11.98% high school and in 88.02% upper.

The mental disorders related (PTSD, PPCS, depression) were analyzed in all studies, except for three (42, 44, 56).

Quantitative studies included

In the 24 quantitative studies included, we found different outcomes and instruments used. However, all included studies were analyzed to measure outcomes relative to pain severity, pain-related disability, pain interference, quality of life, quality of sleep, depression, and anxiety. Another important outcome is OT reduction. All multimodal approaches (using two or more different methods or medications to manage pain) that were described and analyzed (Table 2) show a significant improvement in all outcomes compared to traditional therapy or non-inferiority, but with fewer side effects (data not shown). In particular, using the Stepped Care model as a transdisciplinary approach, we found the following: a) 2 point decrease in the Roland-Morris disability questionnaire (95% CI, -3.2

to -0.7, $p=0.002$); b) 0.8 point decrease in the Pain Interference subscale score of the Brief Pain Inventory (95% CI, -1.3 to -0.3, $p=0.003$); c) a 6.6 point decrease in the Graded Chronic Pain scale (95% CI, -10.5 – 2.7; $p=0.001$); d) an 0.9 point decrease in OT (4.2% to 3.3%) and a 3.1% increase in non-OT at 5 years (36.7% to 39.8%) (41, 52, 57).

Discussion

The objective of this review was to describe and summarize the multimodal therapeutic approaches applicable to the veterans' population, which is necessary for chronic MSP management and related syndromes management. All papers we found were created in the USA, with VA-USA or clinic (VA Center) funding. According to us, the reasons for this are attributable to many factors: a) US is the country most involved in international military operations with 20 million total veterans estimated in 2017 and an excellent form of veterans specific welfare, the United States Department of Veterans Affairs (4, 10); b) the numerical contribution of other nations to international operations is certainly lower than in the US (9, 10); d) these are confidential military data and are not published in scientific papers; e) other countries, for example, the UK has a different military health organization that is fully integrated with civil health (58). In Italy, the number of veterans is lower than in the US, but the Italian Ministry of Defense guarantees health care for veterans support by using the military and civil national health system, which comprises both civil and

military care (7, 8). All studies reported the management of the major issue of veterans: the chronic pain, with implications for the physical, psychological, and spiritual conditions of people, necessitating an holistic approach (35). In the included studies, different intervention types emerged as an alternative and and/or complement to traditional OT and, in particular, multidisciplinary, interdisciplinary, and transdisciplinary approaches based. In interdisciplinary and, even more, transdisciplinary, the team shares not only the same goal but also the same treatment plan, thus representing itself as the gold standard of multimodal approaches (32). Among the emerging emerged interventions, the transdisciplinary approach was employed in veterans' populations in the stepped care model. In fact, in the multidisciplinary approach, a problem is viewed from different disciplinary perspectives; interdisciplinary approaches refers to cooperation between academic disciplines which could appear in contrast; last, transdisciplinary methods could led to a new discipline which transcend the limits of a disciplinary (59) perspective .

This model was used in two RCT studies (41, 57), and in one observational retrospective study (52). The Stepped Care model includes two steps: Step 1, which uses analgesic therapy optimization for 12 weeks with a specific algorithm, and a self-management program to reduce the mobility deficit and increase participation through the largest possible number of daily activities that include physical activity and stretching; after 12 weeks, Step 1 continues and Step 2 begins with six individual sessions two times a week (45 minutes each time) week, with 45 minutes each of Cognitive Behavioral Therapy to reshape the patient's perception and feelings about pain, past treatments, and to identify barriers that hinder the return to normal life. In this model, the nurse care manager is central in all phases of treatment, from analgesic optimization to self-management and in coordinating the Cognitive Behavioral Therapy, with excellent results. This approach provides: a) the concept of gradualness between Step 1 and Step 2; b) the follow-up monitoring; c) the OT optimization with a precise algorithm; d) overcoming barriers to services access and the healthcare professionals' role as pain managers. However, the two RCT studies where Stepped Care Model was conducted presented

some limitations, such as conduction in single center and blinding method not used.

In the present review, only four RCTs were found which is probably due to the following issues: a) resource poorness in this research sector; b) difficulties investigating methods that compare multidisciplinary/interdisciplinary/transdisciplinary treatments to OT treatments and that, with all the risks already highlighted, are effective and rapid. For this reason, patients are reluctant to abandon OT treatments because the patients often depend on these treatments. However, the alternative and and/or complementary treatments we analyzed usually require longer times to prove their effectiveness. This leads to recruitment difficulties and high dispersion in the RCTs (41).

The results showed different outcomes and tools that did not let us proceed with the meta-analysis. In particular, one of the most important outcomes of our review is OT reduction, which results in efficacious therapy for MSP symptoms. However, OT alternatives and/or complementary practices are equally effective and could reduce opioid drug use (34, 50, 56, 60). These multimodal treatments (Table 2) would allow a reduction of the OT's collateral negative effects, such as drug abuse and the use of illicit substances (31), a very important problem in the US (61, 62). This last issue should be carefully assessed in other populations of veterans.

The correlation between MSP and mental disorders has been analyzed for specific outcomes, such as depression, quality of sleep, and anxiety; in some articles, a positive correlation was highlighted in the improvements obtained in the management of mental disorders and MSP, and vice versa (57, 63, 64). Another important element is a follow-up analysis that resulted in only a few papers for a maximum of 12 months (42, 49, 53, 54). These analyses showed more long-term improvements than short-term outcomes because, in our opinion, multimodal approaches need more time to be effective than OT, which is immediate (30).

In our analysis, the population included about 1.1 million people compared to the total population of OIF and OEF/ISAF veterans (1.9 million in 2010) (18) and that the population could reach about 7.2 million (VA-USA) since these operations are still ongoing. However, although with different modes and

characteristics (9, 10), the population characteristics are comparable to the active American military service population (65, 66). The analysis of population characteristics correlates MSP with some mental disorders (PTSD, PPCS, depression). These correlations were considered in the eligibility criteria and and/or in outcomes of all studies, except for 3 papers (42, 44, 56) and it seems that OEF - OIF/ISAF veterans' phsico-physical wellbeing is compromised by the frequent coexistence of mental disorders (18).

Limitations

Only English and Italian studies have been sought, since only US studies were used, and this could represent a generalizability limit for results of other nations' veterans.

Implications for Nursing Education, Practice and Research

Pain is a multidimensional and subjective experience that affects all human components: biological, physical, psychic, spiritual, and social. Kress et al. (69) analyzed the stakeholder's role in chronic MSP management and, in particular, the nurses' role. Nurses are being oriented to global care and are the closest to patients (70); for these characteristics, they could have a central role in pain management, but these potentials are not adequately exploited in pain management in Europe yet. In our review, instead, it emerges that in the multimodal approaches analyzed, the nurse's role is clear, central and well defined in the chronic pain management and, in particular, in the Stepped Care model (Table 2). It is essential to emphasize the importance of military nurses, in particular, for veterans. The military nurses are "brothers in arms", because they have similar experiences and know the military organizations (71). They, therefore, occupy a privileged position in the multimodal treatment of their colleagues' chronic MPS, which must be implemented, also in Europe, developing specific training paths and professional roles.

European countries should deal with this issue, given the future increasing in military missions abroad. Our result should push European and, particularly, Italian ministries and institutions to cooperate in order to improve interventions such as those reported in this study. Even though there are some different cultural issues, to our opinion the methods used for American veterans could be as much effective for Italian veterans. For this reason, research should be increased in order to address this issue. Future studied should evaluate if the reported methods could operate in a specific social and cultural environment, and if they should be adapted or modified.

Conclusions

Chronic MSP and its related mental disorders are significant problems for veterans, and their countries have a moral and political obligation to care for veterans and improve their quality of life. This improvement is possible through transdisciplinary approaches to chronic MSP management, where the nurses play a central role. We do not mean that OT is to be abandoned; indeed, its effectiveness, despite the side effects discussed, remains significant, but we do mean that it is important the right management of this therapy, considering all the possibility of its control and reduction in order to manage negative effects such as opioid abuse and the use of illicit substances.

However, it is necessary to conduct more trials, involving more countries, and analyzing the follow-up outcomes to confirm this results.

Conflicts of interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article.

References

1. Cornell Law School Legal Information Institute - Electronic code of federal regulations; 2019. Available at: <https://www.law.cornell.edu/cfr/text/38/3.1>. Accessed on July 4, 2019).

2. Ministero della Difesa: Esercito. Centro Veterani della Difesa [Ministry of Defense: Army, Defense Veterans Center]; 2018. Available at: <http://www.esercito.difesa.it/Veterani%20della%20Difesa>. Accessed on April 19, 2019.
3. Pardew J, Bennett C. North Atlantic Treaty Organization (NATO): Rivista della NATO. Operazioni: vecchie e nuove [NATO Magazine: Operations: old and new]; 2006. Available at: <https://www.nato.int/docu/review/2006/issue1/italian/art1.html>. Accessed on November 27, 2019.
4. VA USA. Veteran Population Projections 2017-2037; 2019. Available at: https://www.va.gov/vetdata/docs/Demographics/New_Vetpop_Model/Vetpop_Infographic_Final31.pdf. Accessed on September 02, 2019.
5. Naliboff BD, Wu SM, Schieffer B, et al. A randomized trial of 2 prescription strategies for opioid. Treatment of chronic nonmalignant pain. *J. Pain* 2011; 12: 288-296.
6. Matthias MS, Miech JE, Myers LJ, Sargent C, Bair MJ. An expanded view of self-management: patients' perceptions of education and support in an intervention for chronic musculoskeletal pain. *Pain Med.* 2012; 13: 1018-1028.
7. Ministero della Difesa. Eventi del Ministro [Italian Ministry of Defense. Events of the Minister]; 2018. Available at: http://www.difesa.it/Il_Ministro/Eventi/Pagine/ministero-difesa-nasce-a-roma-il-centro-veterani.aspx. Accessed April 14, 2019.
8. Ministero della Difesa. Primo Piano [Italian Ministry of Defense. Focus]; 2019. Available at: http://www.difesa.it/Primo_Piano/Pagine/Difesa-e-Sanita-accordo-tra-Celioe-Fondazione-Santa-Lucia.aspx. Accessed on September 18, 2019.
9. North Atlantic Treaty Organization (NATO). Relations with Iraq; 2018. Available at: https://www.nato.int/cps/en/natohq/topics_88247.htm?selectedLocale=en. Accessed on April 24, 2019.
10. North Atlantic Treaty Organization (NATO). NATO and Afghanistan; 2019. Available at: https://www.nato.int/cps/en/natohq/topics_8189.htm?selectedLocale=en. Accessed on April 24, 2019.
11. Institute of Medicine. Returning Home from Iraq and Afghanistan: preliminary assessment of readjustment needs of veterans, service. U.S.: The National Academies, 2010
12. Gironda RJ, Clark ME, Massengale JP, Walker RL. Pain among veterans of Operations Enduring Freedom and Iraqi Freedom. *Pain Med* 2006; 7: 339-343.
13. Bader CE, Giordano NA, McDonald C, Meghani SH, Polomano RS. Musculoskeletal pain and headache in the active duty military population: An integrative review. *Worldviews Evid Based Nurs* 2018; 15: 264-271.
14. Treede R, Rief W, Barke A, Aziz Q, Bennett M, Benoliel R, et al. Chronic pain as a symptom or a disease: the IASP Classification of Chronic Pain for the International Classification of Diseases (ICD-11). *IASP* 2019; 160: 19-27.
15. Kaiser U, Arnold B, Pflingsten M, Johannes BN, Sabatowski R. Multidisciplinary pain management programs. *J. Pain Res* 2013; 6: 355-358.
16. Peterson K, Anderson J, Bourne D, Mackey K, Helfand M. Effectiveness of models used to deliver multimodal care for chronic musculoskeletal pain: a rapid evidence review. *J. Gen. Intern. Med.* 2018; 33: 71-81.
17. Centro for Effective Practice - Management of chronic non-cancer pain; 2018. Available at: <https://cep.health/clinical-products/chronic-non-cancer-pain/>. Accessed on April 23, 2019.
18. Institute of Medicine. Treatment for posttraumatic stress disorder in Military and Veteran populations: Final Assessment. U.S: The National Academies, 2014.
19. National Institute of Mental Health. Mental Health Information- Post-Traumatic Stress Disorder; 2019. Available at: <https://www.nimh.nih.gov/health/topics/post-traumatic-stress-disorder-ptsd/index.shtml>. Accessed on August 05, 2019.
20. Outcalt S. Pain experience of Iraq and Afghanistan veterans with comorbid chronic pain and posttraumatic stress. *J. Rehabil. Res. Dev.* 2015; 51: 559-570.
21. Verweij D. Comrades or Friends? On Friendship in the Armed Forces. *J. Mil Ethics* 2007; 6: 280-291.
22. Lew HL, Otis JD, Tun C, Kerns R, Clark ME, Cif DX. Prevalence of chronic pain, posttraumatic stress disorder, and persistent postconcussive symptoms in OIF/OEF veterans: Polytrauma clinical triad. *J. Rehabil. Res. Dev.* 2009; 46: 697-702.
23. Merrit BP, Kretzmer T, McKenzie-Hartman T, Gootam P. Neurobehavioral management of the polytrauma veteran. *Phys Med Rehabil Clin N Am* 2019; 30: 133-154.
24. Randleman ML, Douglas ME, DeLane AM, Palmer AG. Measuring chronic pain intensity among veterans in a residential rehabilitation treatment program. *J. Addict. Nurs.* 2014; 2: 74- 80.
25. Outcalt S, Kroenke K; Krebs EE, et al. Chronic pain and comorbid mental health conditions: independent associations of posttraumatic stress disorder and depression with pain, disability, and quality of life. *J. Behav. Med.* 2015; 38: 535-543.
26. Seal KH, Bertenthal D, Barnes DE, et al. Traumatic brain injury and receipt of prescription opioid therapy for chronic pain in Iraq and Afghanistan veterans: do clinical practice guidelines matter? *J. Pain* 2018; 19: 931-941.
27. Kerns R, Philip E, Lee A, Rosemberger P. Implementation of the veterans health administration national pain management strategy. *Transl. Behav. Med* 2011; 1: 635-643
28. Toblin RL, Quartana PJ, Riviere LA, Walper KC, Hoge, CW. Chronic pain and opioid use in U.S. soldiers after combat deployment. *JAMA Intern. Med.* 2014; 174: 1400-1401.
29. Butt L, Caplan T. The rehabilitation team. *Handbook of Rehabilitation Psychology* (2nd ed.: pp. 451-457) New York, NY American Psychological Association, 2010.
30. Dobscha S, Corson K, Perrin N, Hanson G, Leibowitz R, Gerrity M. Collaborative care for chronic pain in primary care: a cluster randomized Trial. *JAMA* 2009; 301: 1242-1252.

31. Manchikanti L, Cash KA, Damron KS, Manchukonda R, Pampati V, McManus CD. Controlled substance abuse and illicit drug use in chronic pain patients: An evaluation of multiple variables. *Pain Physician* 2006; 9: 215-225.
32. Gordon RM, Corcoran GR, Bartley-Daniele P. A Transdisciplinary team approach to pain management in inpatient health care settings. *Pain Manag Nurs* 2014; 5: 426-435.
33. Ministero della Difesa – Operazioni Internazionali [Italian Ministry of Defense. International Operations]; 2019. Available at: <http://www.difesa.it/OperazioniMilitari/Pagine/OperazioniMilitari.aspx>. Accessed April 2, 2019.
34. Frank JW, Lovejoy TI, Becker WC, Morasco BJ, Krebs E. Patient outcomes in dose reduction or discontinuation of long-term opioid therapy. A systematic review. *Ann. Intern. Med.* 2017; 167: 181-191.
35. Latina R, De Marinis MG, Giordano F, et al. Epidemiology of chronic pain in the Latium Region, Italy: a cross-sectional study on the clinical characteristics of patients attending pain clinics. *Pain Manag Nurs* 2019; 20: 373-381.
36. Liberati A, Altman DG, Tetzlaff J, et al. PRISMA Statement per il reporting di revisioni sistematiche e meta-analisi degli studi che valutano gli interventi sanitari: spiegazione e elaborazione [Statement for reporting systematic reviews and meta-analyses of studies evaluating health interventions: explanation and elaboration]. *Gimbe* 2015; 7: 1-36.
37. Schulz KF, Altman DG, Moher D. Improving the reporting of randomized trials: the CONSORT Statement and beyond. *Stat Med* 2012; 31: 2985-2997.
38. CONSORT. Statement; 2019. Available at: <http://www.consort-statement.org>. Accessed on August 2019.
39. Von Elm E, Altman DG, Egger M, Pocock SJ, Gotsche PC, Vandenbroucke JP. The Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) statement: guidelines for reporting observational studies. *Gac Sanit* 2008; 22: 144-150.
40. O'Brien BC, Harris IB, Beckman TJ, Reed DA, Cook DA. Standards for reporting qualitative research: a synthesis of recommendations. *Acad Med* 2014; 9: 1245-1251.
41. Bair MJ, Ang D, Wu J, et al. Evaluation of stepped care for chronic pain (ESCAPE) in veterans of the Iraq and Afghanistan conflicts. A randomized clinical trial. *JAMA* 2015; 175: 682-689.
42. Groessl EJ, Liu L, Chang DG. Yoga for Military Veterans with Chronic Low Back Pain: A Randomized Clinical Trial. *Am J Prev Med* 2017; 53 (5): 599-608
43. Kroenke K, Krebs EE, Wu J, Yu Z, Chumbler NR, Bair MJ. Telecare Collaborative Management of Chronic Pain in Primary Care: A Randomized Clinical Trial. *JAMA* 2014; 312 (3): 240-248.
44. Rosen MI, Becker WC, Black AC, et al. Brief Counseling for Veterans with Musculoskeletal Disorder, Risky Substance Use, and Service Connection Claims. *Pain Med.* 2019; 20: 528-542.
45. Herbert MS, Malaktaris AL, Dochat C, Thomas ML, Wetherell L, Afari N. Acceptance and Commitment Therapy for Chronic Pain: Does Posttraumatic Stress Disorder Influence Treatment Outcomes? *Pain Med.* 2019; 0(0): 1-9.
46. Burgess HJ, Rizvydeen M, Kimura M et al. An Open Trial of Morning Bright Light Treatment Among US Military Veterans with Chronic Low Back Pain: A Pilot Study. *Pain Med.* 2018; 0(0): 1-9.
47. King PR, Beehler GP, Wade MJ. Self-Reported Pain and Pain Management Strategies Among Veterans With Traumatic Brain Injury: A Pilot Study. *Mil. Med.* 2015; 180 (8): 863-868.
48. Goode AP, Taylor SS, Hastings SN, Stanwyck C, Coffman CJ, Allen KD. Effects of a Home-Based Telephone-Supported Physical Activity Program for Older Adult Veterans With Chronic Low Back Pain. *Phys Ther* 2018; 98 (5): 369-380.
49. Highland KB, Schoemaker A, Rojas W, et al. Benefits of the Restorative Exercise and Strength Training for Operational Resilience and Excellence Yoga Program for Chronic Lower Back Pain in Service Members: A Pilot Randomized Control Trial. *Arch Phys* 2017; 1-22.
50. Anamkath NS, Palyo S, Jacobs SC, Lartigue A, Schopmeyer K, Stigo IA. An Interdisciplinary Pain Rehabilitation Program for Veterans with Chronic Pain: Description and Initial Evaluation of Outcomes. *Pain Res Manag* 2018; 1-9.
51. Carey EP, Nolan C, Kerns RD, Ho PM, Frank JW. Association Between Facility-Level Utilization of Non-pharmacologic Chronic Pain Treatment and Subsequent Initiation of Long-Term Opioid Therapy. *J. Gen. Int. Med.* 2018; 33(1): 38-45.
52. Edmond S, Moore BA, Dorflinger LM, et al. Project STEP: Implementing the veterans health administration stepped care model of pain management. *Pain Med.* 2018; 19: 30-37.
53. Han L, Goulet JL, Skanderson M, et al. Evaluation of Complementary and Integrative Health Approaches Among US Veterans with Musculoskeletal Pain Using Propensity Score Methods. *Pain Med.* 2019; 20, 90-102.
54. Herbert MS, Afari N, Liu L, et al. Telehealth versus In-Person Acceptance and Commitment Therapy for Chronic Pain: A Randomized Non-Inferiority Trial. *J. Pain* 2016; 2-29.
55. Kay C, Wozniak E, Ching A, Bernstein J. Health care utilization by veterans prescribed chronic opioids. *J. Pain Res.* 2018; 11: 1779-1787.
56. Cummins DM, Tobian R. Motivational Enhancement Therapy for Veterans with Chronic Pain and Substance Use. *Health Soc Work* 2018; 43(4): 269-273.
57. Koffel E, Kroenke K, Bair MJ, Laverty D, Polusny MA, Krebs EE. The bidirectional relationship between sleep complaints and pain: analysis of data from a randomized trial. *Health Psychol* 2016; 35: 41-49.
58. The British Army. Army the Best. Army Medical Service; 2019. Available at: <https://www.army.mod.uk/who-we-are/corps-regiments-and-units/army-medical-services/>. Accessed on September 11, 2019.
59. Nicolescu B. Manifesto of transdisciplinarity. N.Y: State Univ of New York, 2002.

60. Carey EP, Nolan C, Kerns RD, Ho PM, Frank JW. Association Between Facility-Level Utilization of Non-pharmacologic Chronic Pain Treatment and Subsequent Initiation of Long-Term Opioid Therapy. *J. Gen. Intern. Med.* 2018; 33(1): 38-45.
61. National Safety Council. Safety Topics Opioids; 2018. Available at: <https://www.nsc.org/home-safety/safety-topics/opioids/timeline>. Accessed on July 25, 2019.
62. National Institute of Health. National Institute on Drug Abuse. Opioid Overdose Crisis; 2019. Available at: <https://www.drugabuse.gov/drugs-abuse/opioids/opioid-overdose-crisis>. Accessed on November 27, 2019.
63. King PR, Beehler GP, Wade MJ. Self-Reported Pain and Pain Management Strategies Among Veterans With Traumatic Brain Injury: A Pilot Study. *Mil. Med.* 2015; 180(8): 863-868.
64. Herbert MS, Malaktaris AL, Dochat C, Thomas ML, Wetherell L, Afari N. Acceptance and Commitment Therapy for Chronic Pain: Does Posttraumatic Stress Disorder Influence Treatment Outcomes? *Pain Medicine* 2019; 0(0): 1-9.
65. The Balance Careers. U.S. Military Careers. Age Limits Within Military Service Branches; 2019. Available at: <https://www.thebalancecareers.com/us-military-enlistment-standards-3354001>. Accessed on September 13, 2019.
66. Council Foreign Relations. Demographics of the U.S. Military; 2019. Available at: <https://www.cfr.org/article/demographics-us-military>. Accessed on September 13, 2019.
67. Hoffman JM, Ehde DM, Dikmen S, et al. Telephone-delivered cognitive behavioral therapy for veterans with chronic pain following traumatic brain injury: Rationale and study protocol for a randomized controlled trial study. *Contemp. Clin. Trials* 2019; 76: 112-119.
68. Denke L, Barnes D. An Ethnography of Chronic Pain in Veteran Enlisted Women. *Pain Manag Nurs* 2013; 95 (14).
69. Kress HG, Aldington D, Alon E, Coaccioli S, SichPre P. A holistic approach to chronic pain management that involves all stakeholders: change is needed. *CURR MED RES OPIN* 2015; 31: 1743-1754.
70. Latina R, Mastroianni C, Sansoni J, et al. The use of complementary therapies for chronic pain in Italian hospices. *Prof Inferm* 2012; 65: 244-50.
71. Matthias MS, Miech EJ, Myers LJ, Sargent C, Bair MJ. A qualitative study of chronic pain in Operation Enduring Freedom/Operation Iraqi Freedom Veterans: "a burden on my soul". *Mil. Med.* 2014; 179: 26-30.

Correspondence:

Received: 4 August 2020

Accepted: 5 January 2021

Alessandro Santini

School of Nursing Science & Midwifery, Sapienza University of Rome, AO S. Camillo-Forlanini Hospital, Rome, Italy,

Email: alessandro.santini1980@gmail.com