

DEVELOPMENT OF BATTLEFIELD ACUPUNCTURE IN THE US MILITARY - A PRE-WORK FOR META-ANALYSIS

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Abstract

Acupuncture has been used for thousands of years as a pain management method which is almost side effect free. We could be used instead of NSAID or as part of the general pain management protocol to lower pain. BFA is a unique form of ear acupuncture which is used widely in military medical facilities throughout the Department of Defense (DoD). It shows the biggest usefulness at areas (polytrauma, PTSD and TBI) where the western medicine methods don't bring the desired effects on long term. Encouraged by the results, acupuncture has been implemented since 2010 into the research and education system. The main reason of the spread of BFA is that it can be used for non-pharmacologic/opioid pain management in combat situations, during evacuation, and throughout recovery and rehabilitation.

Although the use of acupuncture is getting wide spread, they are still not accepted in the evidence based medicine as a functioning method. To determine how, when and which method should be used will be determined by use of meta-analysis

Keywords: *pain, acupuncture, battlefield, military*

Absztrakt

Az akupunktúrát már évezredek óta használják fájdalomcsillapító módszerként. Manapság a fájdalomcsillapításban a NSAID alternatívájaként, vagy az általános fájdalom menedzsment protokoll részeként használhatjuk. A BFA a fül akupunktúra egyedülálló formája, amelyet széles körben használnak a katonai egészségügyi intézményekben a Honvédelmi Minisztérium (DoD) területén. Hatását leginkább azokon a területeken lehet jól használni, ahol a nyugati gyógyászati módszerek hosszú távon nem hozzák a kívánt hatást (polytrauma, PTSD és TBI). Az eredményeken felbátorodva az akupunktúrát 2010 óta bevonták a kutatási és oktatási rendszerbe. A BFA elterjedésének fő oka az, hogy nem farmakológiai / opioid fájdalomkezelésre használható harci helyzetekben, evakuálás alatt és a rehabilitáció során. Annak ellenére, hogy az akupunktúra alkalmazása széles körben elterjedt, az "evidence based medicinába" még mindig nem bevont módszer. Annak eldöntésére, hogyan, mikor és melyik (gyógyszer, vagy akupunktúra) módszert érdemes használni, a meta-analízis módszere a legmegfelelőbb.

Kulcsszavak: *fájdalom, akupunktúra, harctéri, katonai*

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INTRODUCTION

Acute and chronic pain is a serious public health issue within military and civil populations. Unsatisfactory pain management can lead to lower quality of life and leads to increased medical cost. [1]. The most important job of the committed medical practitioners is to increase the effectiveness of pain management techniques and decrease the negative effects of pain on the patient. [2]

Pain management worldwide is solved by large amounts of over the counter (OTC) and prescription analgesic drugs. Most of the OTC medicines are non-steroidal anti-inflammatory drugs (NSAIDs) next to having analgesic effects.

The cognitive and physical side effects of these medicines hindered military personnel greatly. For military personnel, successful pain management results in an accelerated return to duty and increased mission readiness. The use of NSAIDs leads to the decrease of reaction speed [3], other common side effects of NSAIDs include cardiovascular events [4] and gastrointestinal bleeding [5].

For acute pain management in the Emergency Medicine opium is used. In right dosage it can relieve the patient from pain and help him get through the emotional and physical phase of the acute pain. It has been used on the battlefield for a long time as well. Because of continuous usage after the acute phase many side effects can appear which can weaken the progress of rehabilitation. Members of the military returning from combat operations have high rates of substance abuse. They also often exhibit a co-occurring triad of posttraumatic stress disorder (PTSD), traumatic brain injury (TBI), and pain, which complicates the problems with substance abuse. On many cases the patient becomes dependent on the drug. [6]

Clinical studies have demonstrated the effectiveness of acupuncture in the treatment of acute and chronic pain, nausea, headache, heart disease, and asthma. [7] [8] Clinical study report show fewer side effects with acupuncture when compared to analgesic medications. [9] [10] „The United States Armed Forces may benefit from utilizing acupuncture in the treatment of pain and thus, increase operational readiness. They began to conduct an observational study to assess the effectiveness of the acupuncture clinic at Malcolm Grow Medical Center, Andrews Air Force Base, Maryland in treating acute and chronic pain in active duty members and other healthcare beneficiaries. This was a pragmatic study, in which admission criteria broadly included both acute and chronic pain, and allowed the treating physician to use a combination of techniques.” [11]

Both methods (pharmacological and non-pharmacological pain management) has their advantages, disadvantages and limits.

The proofs for the effectiveness of the alternative modalities are not yet completed and many times contradict each other. Although the use of acupuncture is getting more common, in the functioning medical system it is still not accepted (it is not built-in the practice and the insurance does not cover it either).

META-ANALYSIS

Statistical methods

Presently it is impossible to publish a scientific article without providing data which doesn't confirm the statements of the article. Thus, these new, original articles are based on systematic and pre-planned researches, after which the data will be strictly with statistical methods evaluated. The statistical values lead to decisions based on probability. The decisions themselves always carry a chance for mistake (first kind or second kind mistake chance). Thus it is possible that an article shows a false result even if the outcome is statistically significant (can be viewed as proved).

The question is, how can we determine, that among the articles which contradict each other, which one is showing correct results?

Review

In the past when in a specific theme enough original article has been presented, the recognized researchers/practitioners would go over these articles and make a review in which they summaries the results. According their own expertise and perception, they would decide which articles are noteworthy and which don't contain valid results. The different researchers often have contradicting views regarding these summaries and strongly disapprove the others. Thus the credibility of these reviews vastly depends on the knowledge, experience and foresight of the one who created this review.

Systematic review and meta-analysis article

Because of this came up a new way to create the reviews which i will follow in my next work as well. One of its component is the meta-analysis:

- From the original articles we collect every relevant data regarding the researched subjects. These are results from similar examinations, although they can be acquired from different methods thus can contain different numerical data and scales.
- The data collected this way can't be compared using traditional statistic means because of the different methods used in acquiring them. The statistic method which is able to compare data which have resulted from different types of examinations and is informative regarding a specific question/research is called meta-analysis. Using this method, and following strict rules regarding it, we can re-evaluate the results from different articles making it easier to determine which ones are useful.
- As result of the evaluation we can come to a result which:
 - On one part takes into consideration all of the relevant data which has been published.
 - On the other part can stay objective and not be influenced by any partiality of defend „schools” and their weighting viewpoint. Thus the base of the result are the data of the articles.

Naturally the accidental or systematic mistakes in the original articles can influence the results of the meta-analysis. But the sheer number of the articles can enable us to detect and correct these mistakes, the meta-analysis has methods for this as well.

The first step of meta-analysis is analyzing the different articles. In this step we are only doing situation analysis, the processing of the data is another step.

DEVELOPMENT OF BATTLEFIELD MEDICS

Saving Life in Battlefield Medics

Combat has always produced gruesome wounds, and until recently many were fatal. During the Vietnam War, out of every 10 who died on the battlefield, nine would have died even if a trauma surgeon was standing next to them — there simply wasn't the medical technology or know-how to keep them alive. “We've changed that nine of 10 to five or six out of 10,” says Dale Smith, a medical historian at the Uniformed Services University of the Health Sciences in Bethesda, Md., a Defense Department medical school in 2010. “That's a huge difference. We've had 43,000 wounded in 10 years of war, and only 6,000 died. That's 13 percent, as low a number as we've ever had.” [12]

Since March 2005, every troop headed into combat is certified with advanced trauma care training as a Combat Life Saver and carries at least two tourniquets, an airway tube, a combat

life saver medical kit. Those devices have dramatically cut the primary causes of previous combat deaths. The idea of extending battlefield medical expertise beyond medics came from the Israeli army's experience during the Lebanon war in 1982. Trained non-medical soldiers were saving lives by providing immediate treatment, usually tourniquets to stop the bleeding, before medics could arrive.

Other innovations include rapidly infusing patients in the operating room with a combination of whole blood, plasma and platelets to stem bleeding, rapid medical evacuation from the war zone aboard aircraft, a flying intensive care units; and "smart" powered artificial limbs and experimental use of regenerated bone and spray-on skin. [12]

To control pain — a major contributor to the later development of post-traumatic stress disorder — combat medics found that fentanyl, a powerful pain reliever, was faster and more effective than morphine, especially when administered through the mouth. Some battlefield medics tape a fentanyl lozenge to the fingertip of the patient and stick it in his or her mouth; when the drug takes effect and the patient falls asleep, his or her finger drops out. [12]

The Army is adding critical care flight paramedics aboard the helicopters that transport the wounded from battlefield to hospital to provide in-flight CPR and other life-saving interventions. The field hospitals, manned by Forward Surgical Teams, or FSTs, are typically housed in large, air-conditioned and sterile tents close to combat action. Medevac helicopters bring the most seriously injured patients there for immediate resuscitation. FSTs are meant to stabilize critically wounded patients — providing blood transfusions and tying off blood vessels and intestines — before they are flown to a major hospital and on to the United States. [12]

Frustrated by delays in treating severely wounded Marines, they invented a combat "doc-in-a-box" by mounting a small medical facility on the back of a stoutly armored box and riding into battle, it can drive into firefights too intense for a medevac helicopter to land. "The idea was to get trauma care to Marines closest to the point of injury," says Navy Cmdr. Sean Barbabella, the 2nd Marine Division (Forward) surgeon, in a phone interview from Camp Leatherneck in southern Afghanistan. "We can go in there and begin pretty sophisticated treatment, and keep it going while we're driving [back] out to a field hospital." All of this, of course, rides on the back of basic research and the willingness of taxpayers to have their funds used this way. [12]

As we can see the supply of the soldiers before deployment and their thorough preparation on how to use them, the fast development of medical equipment, the developing surgery methods and the pharmacological treatments together managed to decrease the mortality on the battlefield significantly. In 2014 it was determined, that although the injuries on the battlefield are getting more and more severe, „the United States has achieved unprecedented survival rates, as high as 98%, for casualties arriving alive at the combat hospital.” „With up to 25% of deaths on the battlefield being potentially preventable, the prehospital environment is the next frontier for making significant further improvements in battlefield trauma care. Strict adherence to the evidence-based Tactical Combat Casualty Care (TCCC) Guidelines has been proven to reduce morbidity and mortality on the battlefield.” [13]

However the success what they gained in the acute treatment put even more weight on the rehabilitation programs (politrauma trias: PTSD (Post-traumatic Stress Disease), chronic pain, TBI (Traumatic Brain Injury)),. Thus they had to make further improvements in this field as well. Presently it became clear that the analgesic used in combat zone in itself is incapable of effectively reduce the pain. The problems originating from pharmacological treatment, or the lack of it and the number of dependent patients is going to increase in the future. The overuse of narcotics in the military and civil life is both a huge problem.

Since 1999, such prescriptions and sales have quadrupled in the United States. In 2012 alone, doctors handed out 259 million opioid prescriptions — one bottle for every adult in the United States. "More than 40 Americans die each day from prescription opioid overdoses. We must

act now,” CDC Director Tom Frieden said in a statement on Tuesday. “Overprescribing opioids — largely for chronic pain — is a key driver of America’s drug-overdose epidemic. The guideline will give physicians and patients the information they need to make more informed decisions about treatment.” [14]

Chronic pain itself is a particular problem, as conventional treatment relies on opioids which impair functionality, have potential for abuse, and often fail to relieve symptoms fully. [15] This leads to an overall decrease in readiness, a significant concern for a military population. [16] [17] [18]

Battlefield Acupuncture

As we mentioned before the use of prescription opioids for chronic pain has increased markedly within the past few decades; thus, death rates associated with opioid overdoses have increased dramatically. [19] Non-opioid pharmacologic therapies also are associated with adverse effects. Consequently a full implementation across the entire force and commitment from both line (pharmacologic and non-pharmacologic) and medical leadership continue to face ongoing challenges.

Evidence for non-pharmacologic treatments, such as acupuncture, are needed. The research is wide-ranging; they are researching a variety of aspects of pain. Subjective pain scales are used to test the effects caused on the central and autonomy nervous system.

Women in labor have many choices for analgesia including pharmacologic and non-pharmacologic interventions. Pharmacologic methods, such as epidurals and combined spinal epidurals, are most effective; however these methods are associated with potential negative outcomes. However non-pharmacologic methods of labor pain relief have been inconsistent results regarding traditional acupuncture’s efficacy to relieve labor pain, specifically. [20]. [21] Non-opioid treatment options for moderate to severe acute pain in the emergency department (ED) are limited. [22] Additional strategies for managing acute pain in the ED are needed.

Although acupuncture continues to gain popularity in civilian sectors across the globe, use of acupuncture techniques by U.S. military medical personnel is still a relatively nascent process. Other pain decreasing modalities such as acupuncture may be useful in the treatment of several painful conditions. Battlefield acupuncture is being promulgated as a potential low-risk, non-pharmacological therapy for pain. The National Institutes of Health [23] and the World Health Organization [24] note that acupuncture is a safe and effective treatment for pain. Auricular acupuncture, one of it’ modality is also a safe, rapid, and effective analgesic modality in managing acute pain. [25] [11] [26] [27]

Battlefield Acupuncture (BFA) was developed by Col. Dr. Richard C. Niemtow, (MD, PhD, MPH) of Andrews Air Force Base, as a standardized protocol to provide a simple, easy to apply, non-pharmaceutical solution for the Military’s pain-management needs in the clinical and battlefield settings.[28] [29] [25] It can be performed by non-acupuncturist health care providers, [25] including medical students, [27] after short training.

Since 2001, Battlefield Acupuncture (BFA) has been used to treat members of the U.S. Military who have acute and chronic pain conditions. One of the many pain issues treated is the pain associated with traumatic brain injury (TBI), which may manifest anywhere in the body. BFA appeared to be a successful treatment of the chronic sequelae of mild and severe TBI and was a possible alternative to using multiple medications to treat this condition. [30] Headaches are prevalent among Service members with traumatic brain injury (TBI); 80% report chronic or recurrent headache. In a study was investigated if two types of acupuncture (auricular acupuncture [AA] and traditional Chinese acupuncture [TCA]) were feasible and more effective than usual care (UC) alone for TBI-related headache. The results showed, that both acupuncture groups had sizable decreases in NRS (Pain Best), compared to UC. No statistically significant results were found for any other secondary outcome measures. [31]

PTSD can be crippling for patients who are affected. It constitutes a growing burden to already overstrained public agencies and medical facilities and exerts an increasing toll on society and economic costs. Therapeutic interventions that are more effective than conventional PTSD treatments are needed urgently. The manual stimulation of acupuncture points has been combined with components of cognitive and exposure therapies into a clinical and self-help approach known as Emotional Freedom Techniques (EFT). More than 40 clinical trials and four meta-analytic reviews of EFT treatments have demonstrated large effect sizes with a range of conditions, including pain, PTSD (in both civilian and military veteran populations), phobias, anxiety, and depression. Seven empirically approach were identified that make it especially suitable for use with veterans and active military: (1) the depth and breadth of treatment effects; (2) the relatively brief time frames required for successful treatment; (3) the low risk of adverse events; (4) the minimal training time required for the approach to be applied effectively; (5) the simultaneous reduction of physical and psychologic symptoms; (6) the utility and cost-effectiveness of clinical EFT in a large group format; and (7) the method's adaptability to online and telemedicine applications. [32]

Micro current therapies involve applying weak direct currents (80 μ A–1mA), and are now being recognized increasingly as adjuncts for pain relief and ANS regulation. [33] [34] [35] [36] One of the BFA protocol involves the applications of a stimulus to five key acupuncture ear (auricular) points. That isolate the autonomic nervous system (ANS) and central nervous system's (CNS) role in the chronic/acute pain cycle. When these points are treated collectively, it has been reported that a wide variety of neuromyofascial pain syndromes can be relieved effectively on a timely basis. [37] Although sufficient evidence supports the application of acupuncture needles for autonomic regulation, there is limited evidence in literature to support the use of electrotherapies for the same purpose. [37]

The NCCIH estimates that 30% of adults and 12% of children in the United States use nonconventional therapies [38]. Accordingly, the Department of Defense (DoD) has shown increasing interest in and usage of IM for managing chronic conditions within the Military Health System (MHS), particularly the signature “polytrauma triad” [39] of chronic pain, traumatic brain injury (TBI), and posttraumatic stress disorder (PTSD) among wounded warriors [40]A nationwide study of veterans ($n = 613,391$) found a three-year prevalence of 9.6% for TBI, 29.3% for PTSD, and 40.2% for pain, with 6.0% exhibiting the full polytrauma triad [39].

In 2015, the Acus Foundation was invited to train the family practice residents at Nellis Air Force Base in Nevada in the HMI/Acus military medical acupuncture approach, and to follow the effect of these treatments on patients' symptoms and quality of life. One year after starting this cycle of training, surveys of the residents revealed two very positive trends in their clinical caseloads: (1) a 75% reduction in symptoms from one or a series of acupuncture treatments; and (2) a 50% reduction in prescriptions for medications to treat symptoms. In 2016, the clinic achieved \$250,000 savings on off-base referrals for pain-management treatments, compared to 2015 expenses. These surveys reported only trends and were not randomized controlled trials. At Nellis, we are following through with a series of trials to track acupuncture's effect on the clinical problems for which acupuncture is most commonly provided.

Training is necessary and partially funded through DoD and Veteran's Administration (VA) internal Joint Incentive Funds grants between the DoD and the VA for multidisciplinary teams as part of a larger initiative related to the recommendations from the DoD Army Surgeon General's Pain Management Task Force. This interdisciplinary training is currently being integrated into both schools for physicians and advanced practice nurses at the Uniformed Services University of the Health Sciences. In addition, according to Buckenmaier [41], with the national challenges in the military of opioid overuse and dependence, a cultural change is needed with a more holistic, interdisciplinary, and multimodal approach to pain and addressing

these other war related issues. The situation in the military is consistent with challenges in the civilian sector with a reported significant increase to 16,651 opioid-related deaths in 2010 [42]. The result of this crisis has caused changes in policy at the federal state and local levels and integrative medicine approaches to be explored. [43]

CONCLUSION

Given the patient-driven demand for the modalities of acupuncture, their potential for addressing chronic disease in an effective and coordinated way, and a new focus on promoting access to these therapies, it is likely that the scope of Integrative Medicine (IM) in the MHS will continue expanding. Further research, such as secondary analysis of healthcare claims, will help to inform sound medical, psychological, and financial decision-making to provide the best and most cost effective care to military members and their families.

In the published literature we can find support for battlefield acupuncture. Battlefield acupuncture is a unique auricular acupuncture procedure which is being used in a number of military medical facilities throughout the Department of Defense (DoD). They use the acupuncture mainly in the area of pain management related to polytrauma, posttraumatic stress disorder (PTSD), traumatic brain injury (TBI), and even the joint and muscle pain from carrying heavy equipment in austere environments. Despite the fact that there is bulk amount and quality of published research presently do not justify wide adoption of this practice by those strictly adherent to evidence-based medicine.

The need for effective and secure pain management in combat zone is great. In scientific literature one can find proof about the effectiveness and limits of pharmacological and non-pharmacological interventions. The results of the alternative modalities are still controversial. Most of the uncertainties are caused by non-standardized research processes, most of the times they are missing valuable data, are not focused uniformly on one area and the final results are contradictory. The world of science is starting to split in two camps, one side is clearly in favor of alternative medicine methods, the other side thinks of it as something unacceptable. To determine if acupuncture and its modalities are effective treatment methods has to be determined by the right scientific method, the meta-analysis.

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