



SMALL WARS

JOURNAL

Pain Management: Maintaining the Force

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Journal Article | Mar 8 2016 - 3:20am

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Introduction

Combat injuries can result in severe acute pain, and options for pain control on the battlefield are currently limited. There is a need for improved pain control on the battlefield, as well as in higher echelons of casualty care. Initial pain control can increase patient comfort and aid in evacuation from the point of injury [1-3]. The development of novel analgesic agents may identify medications that produce decreased side effects as compared to morphine, which can result in respiratory depression, immunosuppression, hemodynamic effects, and cognitive deficits [4, 5]. The ultimate goal of Force Health Protection (FHP) is to preserve the fighting force [6-8], and pain is the ultimate performance degrader for Service Members. The implementation of more effective pain control on the battlefield will affect not only individual Service Members but also overall mission accomplishment. Additionally, effective initial pain control can decrease the incidence of chronic pain development, which could affect return to duty rates, and can also reduce patient care and rehabilitation expenses.

Current State of Pain Management from the Battlefield to the Hospital

The foremost barrier to effective pain management on the battlefield is the fact that pain management immediately following combat trauma is often deprioritized in favor of resuscitation and stabilization for rapid transport [9]. The situation can be further complicated by the potential detrimental effects of pain therapeutics on respiration and blood pressure. Logistic concerns and supply quantity requirements must also be considered when planning for medical care for both combatants and noncombatants, particularly in densely populated urban areas in asymmetrical warfare [8].

When a Service Member is injured on the battlefield, the first medical attention received, known as level I care, consists of self-aid, buddy-aid, or care administered by the combat medic. Once removed from the fight, the Service Member may be resuscitated and stabilized for transport to a level II care facility, which is staffed by a Forward Surgical Team, or a level III Combat Support Hospital [9]. If deemed unlikely to immediately return to duty, the injured service member is then air evacuated to a definitive care facility [3]. The care available at each of these levels is discussed below.

Level I-II: First-Responder Pain Management on the Battlefield

An individual Service Member may carry a combat pill pack, which includes NSAIDs, that are generally effective for mild pain and allow the Service Member to remain in the fight. A combat medic has access to additional analgesics, potentially including both opioid and non-opioid analgesics, to be given if the service member can no longer remain in combat. In the past, if intravenous (IV) or intraosseous (IO)

access is not obtainable or is not required, the medic could administer intramuscular (IM) morphine via an autoinjector mechanism. Other analgesic possibilities include fentanyl or ketamine [10].

However, opioid-induced respiratory depression and decreased cardiovascular function limit opioid usage in wounded Service Members who are bleeding. Due to the nature of combat injuries sustained in asymmetrical warfare, this includes a significant percentage of casualties, creating a major challenge for pain management on the battlefield. In addition, the analgesic efficacy of morphine and other drugs given IM is also significantly reduced during hypovolemic shock, as blood is shunted away from the limbs to maintain organ function, preventing IM administered drugs from entering circulation efficiently. The lack of pain relief may then lead the medic to administer additional doses of a medication, resulting in the simultaneous central nervous system availability of a large amount of analgesic following resuscitation. This may lead to additional side effects and requiring the use of additional medications to counteract these effects.

Finally, the nature of the battlefield poses unique concerns with the use of narcotics for pain management. Specifically, the cognitive and motor function effects, which are manageable in a traditional hospital setting, can be especially detrimental on the battlefield. If the injured Service Member experiences these effects, they may require assistance and monitoring from additional Service Members, thus further reducing combat numbers and further risking mission accomplishment. These effects can also make the evacuation of the casualty to a higher level of care more difficult because they are unable to participate actively in their own evacuation.

A recent study reported that only 39% of combat casualties in Afghanistan received analgesics at POI, whereas 92% received analgesics during tactical evacuation (TACEVAC) [10]. It is unclear why most casualties did not receive analgesia at POI; it could be due to lack of availability, prioritization of other life-saving interventions, or lack of self-reported pain. However, it is clear that better pain control is needed on the battlefield. In order to treat pain immediately on the battlefield, during evacuation, and in other austere environments, unique considerations must be taken into account. Pain therapeutics must be easy for a combat medic to carry among many other items, have minimal abuse potential to discourage illegal use, be easy to quickly administer in an austere and dangerous environment, and have limited effects on Service Member cognition and motor function to allow for evacuation. For severely injured trauma patients, pain therapeutics cannot interfere with life-saving measures and resuscitation; therefore, a pain therapeutic with limited side effects, including lack of respiratory depression and hypotension, should be selected. Current Tactical Combat Casualty (TCCC) guidelines recommend that, for severe pain when IV/IO access is not required for other purposes, OTFC or IM ketamine be administered. If IV/IO access is obtained, the recommendations are IV morphine or IV/IO ketamine. Opioids are not recommended if the casualty exhibits decreased consciousness, respiratory distress, or shock [11].

Level III-IV: Theater and Stateside Hospital Pain Management

Combat casualties evacuated from theater are treated and stabilized at tertiary hospitals associated with the US Department of Defense, with a full complement of medical and surgical services, comparable to any civilian tertiary hospital. Pain management at these facilities encompasses all varieties and etiologies of pain. Still, systemic opioids and NSAIDs are the most frequently administered drugs due to their ease of dosing and relative efficacy. In hospital patients at Landstuhl Regional Army Medical Center or the Walter Reed Army Medical Center, 56% of casualties injured in Operation Iraqi Freedom (OIF) received NSAIDs, 49% were prescribed opioids and 41% received an anticonvulsant or antidepressant [12]. While advanced pain management options, including interventions such as nerve blocks, are available at this level of care, the nature of injuries sustained in asymmetrical warfare are often severe and offer significant challenges to successful pain management. For example, a Soldier injured by an improvised explosive

device (IED) while on foot patrol would likely present with polytrauma, potentially including multiple amputations, fractures, shrapnel wounds, burns, and/or traumatic brain injury (TBI). The pain resulting from such widespread physical injuries may be exacerbated by psychological sequelae, such as post-traumatic stress disorder (PTSD), resulting from combat experiences. Taken together, such patients require the implementation of multimodal pain management strategies because their injuries and the resulting pain are too complex to effectively treat with a single medication or intervention.

Level V: Pain Management During Stateside Hospitalization and Rehabilitation

Pain management for these polytrauma patients during hospitalization and the transition to rehabilitative care remains complex. These patients have often developed opioid tolerance, and it is important to ensure that appropriate pain management is achieved using a combination of medications, interventions, and treatments. These combinations may include not only short and long-acting opioids, but also NSAIDs, anticonvulsants, antidepressants, or other medications. Additionally, interventions, including nerve blocks and surgeries, as well as device implants can be performed in a pain clinic as necessary. Finally, interdisciplinary care, including cognitive behavioral therapy (CBT), acupuncture, medical massage, movement therapy, physical therapy, and occupational therapy may also be employed in the pain management plan for patients during rehabilitation and return to duty/function.

Challenges Specific to Densely Populated Urban Operations Environments and Asymmetrical Warfare

Multiple unique considerations must be taken into account when planning for and implementing pain management strategies in densely populated urban operations environments [8]. For example, when conducting Intelligence Preparation for the Battlefield (IPB) in such environments, it is important to take into consideration the medical needs of both combatants and civilians. This concept becomes increasingly important when considering operations, whether war-related, humanitarian, or other, in densely populated urban areas or megacities. Pain itself will affect each civilian as well as each Service Member at some point; however, enough medications would likely not be available in the event of the use of a weapon of mass destruction, such as a thermonuclear device, in a megacity. Thus further research into novel, potent pain medications, as well as triage techniques and prioritization guidelines, is warranted. Additionally, because pain is a disease of perception that is mediated centrally, it is uniquely linked to psychosocial factors that can affect response to treatments as well as outcomes. Awareness of these issues is required for the preparation of an effective plan for pain management on a large scale during asymmetrical warfare.

Future Directions for Pain Management on the Battlefield

Current research efforts are geared towards developing fast acting, novel analgesics with limited side effects for use in forward operating environments. The ideal drugs will have decreased side effects, particularly in regard to hemodynamic, respiratory, and cognitive effects. These drugs will need to be easy to administer and exhibit limited monitoring requirements. Additionally, they should lack addictive or diversion potential. The candidate analgesics should also have a quick onset of action as well as a lengthy duration of action, to limit redosing requirements. A pharmacological solution for pain management fitting this profile will allow for the effective management of pain in densely populated urban areas and megacities during operations, as well as improve pain management strategies and patient outcomes in all environments.

Acknowledgements

This work was supported by the United States Army Medical Research and Materiel Command Combat Casualty Care Research and the Clinical and Rehabilitative Medicine Research programs.

The authors report no conflicts of interest. The opinions or assertions contained herein are the private views of the author and are not to be construed as official or as reflecting the views of the Department of the Army or the Department of Defense.

End Notes

1. Buckenmaier, C.C., et al., *Pain following battlefield injury and evacuation: A survey of 110 casualties from the wars in Iraq and Afghanistan*. Pain Medicine, 2009. **10**(8): p. 1487-1496.
2. Clark, M.E., et al., *Assessment and treatment of pain associated with combat-related polytrauma*. Pain Med, 2009. **10**(3): p. 456-69.
3. Clifford, J.L., et al., *State of the science review: Advances in pain management in wounded service members over a decade at war*. J Trauma Acute Care Surg, 2014. **77**(3 Suppl 2): p. S228-36.
4. Passik, S. and K. Kirsh, *The need to identify predictors of aberrant drug-related behavior and addiction in patients being treated with opioids for pain*. Pain Medicine, 2003: p. 186-189.
5. Pergolizzi, J., et al., *Opioids and the management of chronic severe pain in the elderly: consensus statement of an International Expert Panel with focus on the six clinically most often used World Health Organization Step III opioids (buprenorphine, fentanyl, hydromorphone, methadone, morphine, oxycodone)*. Pain Pract, 2008. **8**(4): p. 287-313.
6. Chapman, P.L., et al., *Training, deployment preparation, and combat experiences of deployed health care personnel: key findings from deployed U.S. Army combat medics assigned to line units*. Military Medicine, 2012. **177**(3): p. 270-277.
7. Patel, T.H., et al., *A U.S. Army Forward Surgical Team's experience in Operation Iraqi Freedom*. J Trauma, 2004. **57**(2): p. 201-7.
8. Command, A.T.a.D., *Urban Operations*, in FM 3-06, D.o. Army, Editor. 2006: <https://rdl.train.marmy.mil/catalog>.
9. Lenhart, M.K., Savitsky, E. and Eastridge, B. Eds., *Combat Casualty Care: Lessons Learned from OEF and OIF*. 2012, Fort Detrick, MD: Office of the Surgeon General. 719.
10. Shackelford, S.A., et al., *Prehospital pain medication use by U.S. Forces in Afghanistan*. Mil Med, 2015. **180**(3): p. 304-9.
11. Butler, F.K., Jr., et al., *A triple-option analgesia plan for tactical combat casualty care: tccc guidelines change 13-04*. Journal of Special Operations Medicine, 2014. **14**(1): p. 13-25.
12. Cohen, S.P., et al., *Presentation, diagnoses, mechanisms of injury, and treatment of soldiers injured in Operation Iraqi Freedom: an epidemiological study conducted at two military pain management centers*. Anesth Analg, 2005. **101**(4): p. 1098-103, table of contents.

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