



UNDER SECRETARY OF DEFENSE

4000 DEFENSE PENTAGON  
WASHINGTON, DC 20301-4000

PERSONNEL AND  
READINESS

The Honorable Carl Levin  
Chairman  
Committee on Armed Services  
United States Senate  
Washington, DC 20510

OCT 10 2012

Dear Mr. Chairman:

The enclosed report is submitted pursuant to section 711 of the National Defense Authorization Act for Fiscal Year 2010 (Public Law 111-84), which required the Department of Defense (DoD) to develop and implement a comprehensive policy on pain management by the Military Health System and to provide a report annually. Key elements of the report include a description of the policy and recent changes made, the adequacy and effectiveness of pain management services, ongoing research, provider training, and beneficiary education.

The Department implemented its current policy on pain management in March 2011. In addition to the new policy, DoD has developed Patient Centered Medical Homes in primary care clinics to provide comprehensive care by a primary care manager and team of health care professionals, especially important to patients with chronic pain. DoD has also been working to increase the number of pain management specialists in both military treatment and purchased care facilities. Results of patient surveys since implementing these changes indicate improved levels of patient satisfaction. I would be happy to provide a more detailed brief on our progress at your convenience.

Thank you for your interest in the health and well-being of our Service members, veterans, and their families.

Sincerely,

A handwritten signature in black ink, appearing to read "Erin C. Conaton".

Erin C. Conaton

Enclosure:  
As stated

cc:  
The Honorable John McCain  
Ranking Member



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The Honorable Howard P. "Buck" McKeon  
Chairman  
Committee on Armed Services  
U.S. House of Representatives  
Washington, DC 20515

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Ranking Member

**REPORT TO THE CONGRESS**

**THE IMPLEMENTATION OF A  
COMPREHENSIVE POLICY ON PAIN  
MANAGEMENT BY THE MILITARY HEALTH  
CARE SYSTEM**



**Office of the Secretary of Defense**

**September 2012**

Preparation of this report/study cost the  
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## EXECUTIVE SUMMARY

Approximately 100 million adults in this country are affected by chronic pain, at an annual cost of \$560-635 billion in direct medical treatment costs and lost productivity. There is great variation among individuals in pain occurrence, severity, duration, response to treatment, and degree of disability. Despite its high prevalence, chronic pain is often undertreated. There are multiple factors responsible for the variability observed in practice including the fact that not all physicians or healthcare providers possess the same knowledge base, skills or expertise in pain management. The Military Health System (MHS) faces the same challenges as the country as a whole with some additional unique issues because of its distinctive mission, structure and patient population with combat-related trauma.

- The Policy for Comprehensive Pain Management (Health Affairs Policy 11-003) was published on April 25, 2011 and encompasses key components of pain assessment, pain treatment and management and pain research.
- Deployment of the Patient Centered Medical Home (PCMH) model in primary care clinics incorporates a comprehensive, integrated approach to primary care and provides an effective means to educate beneficiaries on the management of acute and chronic pain.
- Adoption of Clinical Practice Guidelines for Low Back Pain and incorporation of electronic notification and tracking mechanisms in the Armed Forces Health Longitudinal Technology Application (AHLTA) enables providers to more easily follow evidence-based medicine providing the right care at the right time.
- The MHS has continued to work on increasing the number of pain management specialists in the MTFs and in the purchased care network for patients who require management beyond that available from Primary Care Managers.
- The MHS has noted improved patient satisfaction with inpatient pain management by comparing baseline data obtained in 2008-2009 to 2011 data.
- Research on pain management includes development and deployment of the Department of Defense (DoD) and Veterans Health Administration (VHA) Pain Rating Scale, a common DoD and VHA pain assessment tool. This common tool provides a tremendous advantage in evaluating outcomes and developing effective pain management strategies.
- Education of healthcare personnel has been initially addressed through the Uniformed Services University of Health Sciences with inclusion of core-curriculum for medical students and physicians in training as well as development of interactive, web-based materials on risk factors, stratification and mitigation strategies for medication misuse.

Numerous activities and efforts have occurred to ensure appropriate, timely management of pain in the MHS population. Additional efforts continue through research, provider and beneficiary education and exploration of new modalities, to ensure that every patient receives the most efficacious pain assessment and management available.

## Comprehensive Pain Management Policy

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Section 711 of the National Defense Authorization Act for Fiscal Year 2010 required the Department of Defense to develop and implement a comprehensive policy on pain management by the military health care system. Specifically, the policy was required to cover each of the following:

- The management of acute and chronic pain.
- The standard of care for pain management to be used throughout the Department of Defense.
- The consistent application of pain assessments throughout the Department of Defense.
- The assurance of prompt and appropriate pain care treatment and management by the Department when medically necessary.
- Programs of research related to acute and chronic pain, including pain attributable to central and peripheral nervous system damage characteristic of injuries incurred in modern warfare, brain injuries, and chronic migraine headache.
- Programs of pain care education and training for health care personnel of the Department.
- Programs of patient education for members suffering from acute or chronic pain and their families.

Section 711 further required the Secretary to revise the policy on a periodic basis in accordance with experience and evolving best practice guidelines. The Department was also required to submit a follow-up report to Congress not later than 180 days after the date of the commencement of the implementation of the policy and on October 1 each year thereafter through 2018. Each report shall include the following:

- A description of the policy implemented and any revisions made to the policy.

- A description of the performance measures used to determine the effectiveness of the policy in improving pain care for beneficiaries enrolled in the military health care system.
  - An assessment of the adequacy of Department pain management services based on a current survey of patients managed in Department clinics.
  - An assessment of the research projects of the Department relevant to the treatment of the types of acute and chronic pain suffered by members of the Armed Forces and their families.
  - An assessment of the training provided to Department health care personnel with respect to the diagnosis, treatment, and management of acute and chronic pain.
  - An assessment of the pain care education programs of the Department.
  - An assessment of the dissemination of information on pain management to beneficiaries enrolled in the military health care system.
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## INTRODUCTION

Chronic pain is both physically and emotionally debilitating, and patients with chronic pain are five times more likely to utilize health care services than those without chronic pain. These patients experience significant impairments in their quality of life, to include their physical, social, and psychological well-being. It's been estimated that over 50% of chronic pain patients also suffer from coexisting symptoms of depression or anxiety that also affect the utilization of healthcare services.

Chronic non-cancer pain is defined by the American Society of Interventional Pain Physicians as “pain that persists beyond the usual course of an acute disease or a reasonable time for any injury to heal that is associated with chronic pathologic processes that cause continuous pain or pain at intervals for months or years and that is not amenable to routine pain control methods”. In their 2011 report entitled “Relieving Pain in America: A Blueprint for Transforming Prevention, Care, Education, and Research”, the Institute of Medicine (IOM) identified several key barriers that impede the provision of effective pain management in the primary care setting. These include the high prevalence of chronic pain in the US population which adversely affects the ability to take effective actions on a national scale; provider attitudes and training, which can impede the delivery of high-quality care; patient attitudes which may interfere with their ability to recognize their need to address pain early on; and geographic barriers, which place residents of rural communities at a disadvantage. The IOM also identified a need to provide educational opportunities for primary care practitioners and other providers to improve their knowledge and skills in pain assessment and treatment, to include safe and effective opioid prescribing, as well as for better collaboration between pain specialists with primary care practitioners and teams when primary care providers have exhausted their expertise and the patient's pain persists.

As a result of the August 2009 Army Pain Management Task Force, the DoD developed a comprehensive pain management policy to improve clinical, administrative and research processes involved with the provision of pain management care and services within the DoD. The DoD/VA Joint Executive Council (JEC) in turn chartered a work group to actively collaborate on a standardized DoD/VA approach to pain management that would improve the quality and effectiveness of care to beneficiaries of the Veterans Health Administration and the Military Health System. This DoD/VA Pain Management Work Group (PMWG) has built upon the work initiated by the Army Task Force and expressed in the DoD's comprehensive pain management policy. As requested in Section 711 of the 2010 National Defense Authorization Act, this report will address positive results from the ongoing deployment of DoD's

comprehensive pain management policy along with accomplishments from the efforts of the PMWG.

## COMPREHENSIVE PAIN MANAGEMENT POLICY

### *1. Policy Description*

The comprehensive pain management policy encompasses several key components, among which are pain assessment, pain treatment and management, and pain research. Each of these components in turn focuses on several key sub-components. The policy strives to reinforce that pain is not only a symptom of disease, but is often, in fact, a disease process in itself. As is the case for all disease processes, the approach taken towards treatment needs to be evidence-based and utilize best practices.

#### *Assessment of Pain:*

The assessment of pain is frequently referred to as “the fifth vital sign”. DoD Instruction (DoDI) 6025.13, which addresses MTF accreditation, clarifies the requirements for the assessment of pain management within Military Treatment Facilities (MTF). All fixed hospitals and free-standing ambulatory clinics are required to maintain accreditation; therefore, all are reviewed and accredited by either The Joint Commission or the Accreditation Association for Ambulatory Health Care. Both of these accrediting organizations include standards that focus on a patient’s right to pain management, patient education about pain and pain management, pain assessment in all patients, and a facility’s collection of data on the effectiveness of pain management.

The Code of Federal Regulations, Title 32, Section 199.6, requires all civilian hospitals (acute care, general and special) that provide inpatient and outpatient services (to include clinical and ambulatory surgical services) “to be accredited by The Joint Commission [TJC] or meet other such requirements as the Secretary of Health and Human Services, the Secretary of Transportation, or the Secretary of Defense finds necessary in the interest of the health and safety of patients who are admitted to and furnished services in the institution.” Therefore, all institutional providers that are contracted into the TRICARE network by one of the regional Managed Care Support Contractors (MCSC) must also be accredited. As with DoD’s MTFs, these facilities must also meet the rigorous pain management standards set forth by their accrediting organization.

The DoDI does not specify what tool should be used to assess pain within the DoD, only that an assessment is performed. It was recognized throughout DoD's pain care community that the most commonly used assessment tool, the 11 point, 0-10 Visual Analog Scale (VAS), was inadequate to meet patient and provider needs. Therefore, efforts were begun to develop a new tool that would be able to measure pain intensity, mood, stress, biopsychosocial impact and functional impact. This tool will be described more fully under the research section of this report.

In October, 2010, the Army Surgeon General published OPERATION ORDER (OPORD) 10-76 (USAMEDCOM COMPREHENSIVE PAIN MANAGEMENT CAMPAIGN PLAN) in an effort to implement standards for the treatment and management of pain in its facilities. This OPORD built upon the recommendations from the Army Task Force and sought to "establish an Army Medical Department (AMEDD) comprehensive pain management plan that is holistic, multidisciplinary and multimodal in its approach, utilizes state of the art science modalities and technologies, advances pain medicine through education and research programs, and provides optimal quality of life for Soldiers and all patients with acute and chronic pain throughout the continuum of care."

OPORD 10-76 mirrors the vision of the work being performed by the PMWG and the other Services. Central to the pain management strategies for the PMWG and the Services is the effective use of the Patient Centered Medical Home (PCMH) model; the use of evidence-based medicine to include Clinical Practice Guidelines (CPG); timely and appropriate referral for specialty care; and knowledge and training for providers commensurate with the level of care they provide.

*Patient Centered Medical Home:*

The Patient Centered Medical Home (PCMH) provides a comprehensive, integrated approach to primary care. It incorporates a number of principles that facilitate a holistic approach to patients with simple and complex medical needs and also facilitates partnerships among individual patients, their primary care physicians (PCP), and when appropriate, their families. In the PCMH model, the PCP leads a team of healthcare professionals who collectively take responsibility for the ongoing care of the patient. The PCP is responsible for either personally providing care for the patient, or for appropriately arranging treatment by other qualified healthcare professionals. This includes treatment for acute and chronic pain. The patient's care needs are coordinated and/or integrated across the entire health care system (acute and subspecialty care, inpatient care, home health care, skilled nursing care) and the patient's community (family, public and private community-based services). The PCMH facilitates education of both the patient

and his/her family on the etiology and management of acute and chronic pain, which may reduce the likelihood of disability, address the under-treatment of pain, and provide for individual tailoring of treatment plans.

In September 2009, the Assistant Secretary of Defense (Health Affairs) directed all MTFs to implement the PCMH model in their primary care clinics. In response to this directive, several MTFs instituted PCMH demonstrations within their facilities to determine the best approach to implementation of the concept. In addition, during the latter half of 2010 and early 2011, the TRICARE Management Activity (TMA), with concurrence from the three Services, contracted with the National Committee for Quality Assurance (NCQA) to survey all MTFs worldwide to determine their readiness to function as an NCQA-recognized medical home. There are approximately 470 current and projected PCMH practices in the MHS' Direct Care System, which include family medicine, primary care, pediatrics, internal medicine, flight medicine and undersea medicine clinics. These clinics have all completed NCQA's self-assessment tool to establish their baseline level of performance. This baseline assessment will allow for subsequent evaluation of value and return on investment; assessment of operational and IM/IT capabilities gaps; and identification of those top-performing practices that should be selected to undergo the formal recognition process by NCQA in the remainder of FY12 and beyond. To date, NCQA has surveyed and recognized 47 practices as part of its formal recognition process, of which 46 have achieved NCQA's highest level of recognition. By the end of calendar year 2012, an additional 130 practices will undergo the survey process.

#### *Clinical Practice Guidelines:*

In 1990, the Institute of Medicine defined CPGs as "systematically developed statements to assist practitioner and patient decisions about appropriate health care for specific clinical circumstances". CPGs provide guidance on the diagnosis, treatment and management of patients based upon clinical evidence obtained from an intensive, comprehensive review and analysis of the published medical literature. The recommendations within a CPG should not be viewed as sacrosanct, since a provider's clinical judgment regarding the appropriate management of each individual patient should remain paramount. Clinicians and patients must develop individual treatment plans that are customized to the specific needs and circumstances of each patient.

In 2004, the DoD/VA Health Executive Council (HEC) chartered the DoD/VA Evidence-Based Practice Work Group (EBPWG) to advise providers on the use of clinical and epidemiological evidence to improve the health of the population across the MHS and VHA. The EBPWG selects topics for the

development of CPGs based on high cost, high volume, high risk, and problem prone conditions. To date, three CPGs have been developed related to the treatment of acute and chronic pain. These are: Opioid Therapy (OT) for Chronic Pain, Lower Back Pain (LBP), and Post-Operative Pain (POP). There are currently two additional CPGs under development related to pain management; these are: Perioperative Pain Control and Degenerative Joint Disease (DJD). It is anticipated that the perioperative pain guideline, which is under development in collaboration with the American Pain Society, should be available for distribution sometime in the next 1-2 years; work on the DJD guideline is expected to begin within the next year.

While it is important to develop and implement CPGs as educational tools to align medical practice patterns with the most currently available clinical evidence, it is also important to make them easy to use and integrate into routine provider practice. The report of the Army Task Force revealed that many DoD providers were unaware of the CPGs for pain management, and of those who were, many found them difficult to use or integrate into their practices. To address this problem, the PMWG began developing electronic solutions to embed in the Military's computerized patient medical record, the Armed Forces Health Longitudinal Technology Application (AHLTA), that would simplify the use of these CPGs by military providers. To date, Alternate Input Method (AIM) forms have been developed within AHLTA that detail an evidence –based approach to the treatment of Low Back Pain for providers to follow. Additional AIM forms are under development for the remaining pain-related CPGs. In addition, the PMWG is working to ensure that any future electronic medical record system is designed with the CPG algorithms embedded within them, enabling providers to more easily follow these evidenced based practices and to deviate from them if clinically appropriate.

#### *Specialty Care Referral:*

In October 2009, the VHA established an integrated, biopsychosocial Stepped Care Model of Pain Management in which care for most pain conditions is delivered in the primary care setting. This Biopsychosocial Model posits that the causes and outcomes of many illnesses, including pain, often involve the interaction of physical and pathophysiologic factors, psychological traits and states, and social-environmental factors. The model incorporates, and is supported by, timely access to secondary consultation and collaborative care from multiple specialties to include pain management, behavioral health, physical and rehabilitative medicine, and other specialties. It is an effective approach to providing a continuum of care to a population of patients with a spectrum ranging from acute pain caused by injuries or diseases to chronic pain diseases and disorders that may be expected to persist for more than 90 days, and in some

instances, for the patient's lifetime. While the goal is for the primary care provider to render as much of the care as possible, consultation with pain medicine, as well as other specialists, in managing complex, severe and high risk patients may be needed. The Army Pain Task Force strongly recommended adaptation of the Stepped Care Model by the DoD. The PMWG is collaborating with the Services in their efforts to deploy this model within MTFs.

In an effort to successfully implement the Stepped Care Model, the MHS has increased the number of pain management specialists in its MTFs and in its purchased care networks to provide specialized treatment for patients who require treatment beyond that available from the primary care manager. The Army has begun deploying pain management providers to regional interdisciplinary pain management centers located at their larger facilities. Patients are either referred to a regional center, receive care at their parent facility via telemedicine, or are seen by a traveling specialist. The Navy has developed a comprehensive program comprised of locally embedded pain teams in primary care facilities supported by regional subspecialty care pain teams and telemedicine services. This soon to be implemented program will provide improved access to pain care services for beneficiaries regardless of whether they are located near a major Military Treatment Facility or in a more remote location world-wide.

DoD is currently exploring new technologies to address the problem of providing access to specialty care for patients with complex chronic diseases such as chronic pain, who reside in areas that are relatively inaccessible to or remote from these specialized services. The Extension for Community Healthcare Outcomes (ECHO™) program which was pioneered at the University of New Mexico employs an 'academic detailing' intervention using video technology. The program offers local providers the opportunity to co-manage difficult and complex patients, while simultaneously affording them with the training and technical skills that over time allows them to become highly skilled in the treatment of these chronic and complex diseases. Ultimately, this creates a center of excellence in their own community, and diminishes the need to obtain specialty evaluations in these remote areas. ECHO™ has demonstrated lower costs and improved outcomes in the treatment of chronic diseases such as Hepatitis C. The VHA has adopted the ECHO™ model, and has begun transforming their Specialty Care Services program by developing Specialty Care Access Networks (SCAN), so that all veterans, even those distant from medical centers, will have access to specialty level care for chronic disease management when needed. DoD is currently adapting the ECHO™ program to provide pain management services in remote sites and smaller MTFs. A pilot project is currently under development at the Walter Reed National Military Medical Center.

### *Education and Training:*

Many health care professionals have little or no training in pain management and are unable to effectively respond to the pain care needs of their patients. Pain management receives very little attention in the curricula of many U.S. medical and allied health professions schools, and in fact, health care professional programs at most major medical educational and training sites do not include a dedicated pain management curriculum. The military medical training programs are no exception, and consistently mirror these deficiencies. The typical medical school may provide only four hours of instruction on the topics of basic pain physiology, opioid and non-opioid therapies, and back pain. Even when the curriculum includes some baseline information on pain management, it is seldom organized in such a way to enable students to successfully apply this knowledge to clinical practice. The lack of a consistent approach to pain management education results in considerable variation in pain management understanding and practice within all medical professions.

In an effort to improve pain management education provided to clinicians in training, the National Institutes of Health (NIH) in June, 2012 designated eleven professional schools as Centers of Excellence in Pain Education (CoEPE). The institutions selected were: University of Washington, Seattle; the University of Pennsylvania Perelman School of Medicine, Philadelphia; Southern Illinois University, Edwardsville; the University of Rochester, N.Y.; the University of New Mexico, Albuquerque; the Harvard School of Dental Medicine, Boston; the University of Alabama at Birmingham; the Thomas Jefferson University School of Medicine, Philadelphia; the University of California, San Francisco; the University of Maryland, Baltimore; and the University of Pittsburgh. In addition, many of the new CoEPEs will build curricula across several of their health professional schools. These new centers will enhance provider training by utilizing findings from the most current pain management research to enable clinicians across multiple specialties to partner with their patients in making better and safer choices about pain treatment. A key goal of these new CoEPEs will be to help prevent adverse outcomes by designing curricula that promote appropriate screening and management of chronic pain patients, to include education about the risks of opioid and other prescription drug abuse. The PMWG intends to collaborate closely with the NIH to incorporate relevant components of this educational initiative at the Uniformed Services University of the Health Sciences (USUHS) and within DoD training initiatives.

In their 2011 report “Relieving Pain in America: A Blueprint for Transforming Prevention, Care, Education, and Research”, IOM recommended “health professions education and training programs, professional associations, and other groups that sponsor continuing education for health professionals should

develop and provide educational opportunities for primary care practitioners and other providers to improve their knowledge and skills in pain assessment and treatment, including safe and effective opioid prescribing”. DoD concurs with the IOM’s recommendations that providers need additional training in the areas of pain management and medication misuse. A description of DoD’s efforts can be found below in the ‘Training and Healthcare Education’ section.

#### *Pain Management and Treatment:*

As noted previously, opioid therapy is commonly utilized for the treatment of chronic pain. As patients become more and more opioid tolerant, they require stronger opioid medications and/or higher doses to achieve the necessary level of pain relief. However, prescribing high doses of potent opioids to patients who are opioid-naïve can lead to serious and potentially lethal complications. It is therefore important to ensure that patients are prescribed the proper dose of opioids, and are not given potent doses if they have not established opioid tolerance.

In an effort to reduce the risk to DoD beneficiaries who were not opioid tolerant from receiving high doses of potent opioids such as Fentanyl, a review process was established in both direct care and civilian network pharmacies. An edit was placed in the Pharmacy Data Transaction Service (PDTS), used in filling prescriptions at all military and civilian network pharmacies, to screen patients presenting with prescriptions for high-potency opioids prior to dispensing. A warning message is sent by PDTS to the dispensing pharmacy if the patient has not received treatment with a high-potency opioid in the past 60 days, thereby signaling the pharmacist they may be opioid-naïve. This warning allows the dispensing pharmacist to determine whether or not the patient is opioid-tolerant before dispensing the drug to reduce the risk of medication related adverse events. The pharmacist can either question the patient directly, or contact the patient’s physician to verify the patient’s medication history before filling the prescription. This patient safety program, which was first implemented in August, 2007 with transdermal Fentanyl, has recently been expanded to include other formulations of Fentanyl as well as other strong opioids with labeling that recommends use in opioid-tolerant patients only.

## *2. Performance Measures*

Like most organizations, DoD strives to continuously improve its performance and the quality of care provided to its beneficiaries. Performance measures are tools that provide senior leaders and other stakeholders with data that enables them to evaluate their health plan’s overall performance across key



dimensions of quality and value, and also drive strategic quality improvement initiatives.

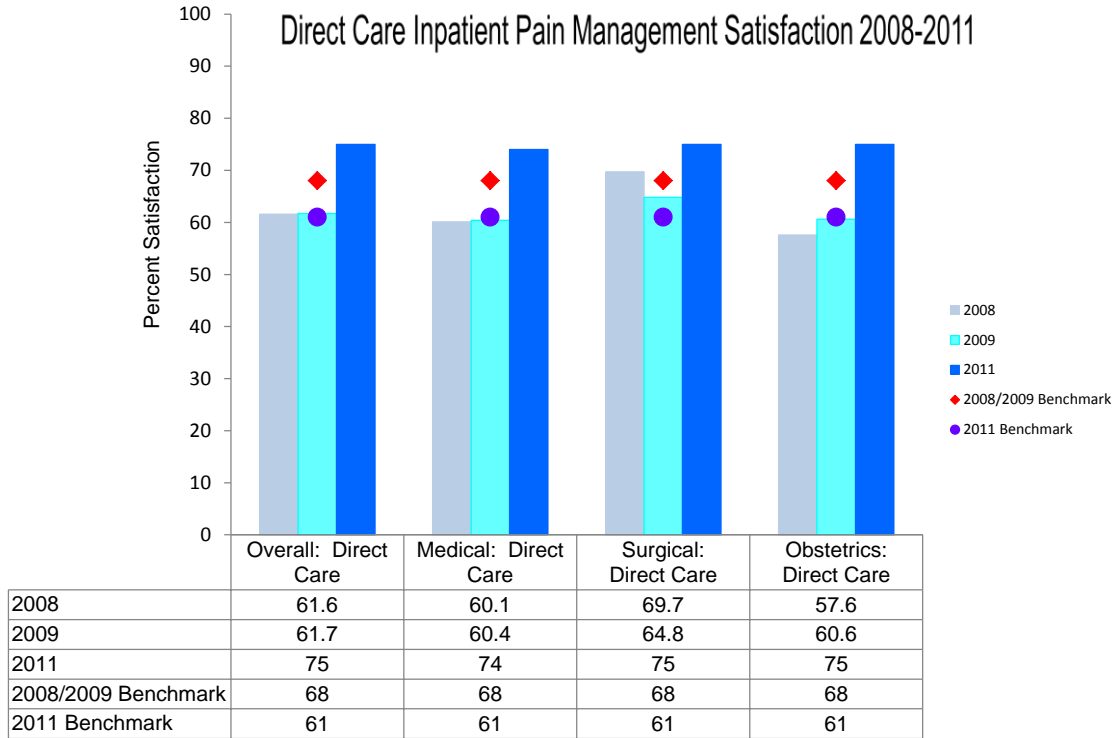
Congress has requested a description of the performance measures used to determine the effectiveness of DoD's pain management policy in improving pain care for beneficiaries enrolled in the military health care system. DoD tracks numerous performance measures, yet in the area of pain management, the number and breadth of measures is still quite limited. DoD, working in conjunction with the PMWG is in the process of identifying and developing relevant measures that will enable an appropriate assessment of the effectiveness of its pain management policy in improving pain care for beneficiaries enrolled in the military health care system. This entails the development of measures that assess care in both the inpatient and outpatient settings.

### *3. Adequacy of Pain Management Services*

Congress has requested an assessment of the adequacy of DoD's pain management services be included in this annual report based on a current survey of patients managed in Department clinics. Currently there is no standardized survey across the DoD for patient satisfaction in the outpatient setting. The PMWG is working on developing a standardized survey instrument for beneficiaries to provide this feedback in the future. DoD has been assessing beneficiary satisfaction with inpatient pain management, however, as part of its annual Hospital Consumer Assessment of Healthcare Provider and Systems (HCAHPS) survey. This survey was developed in partnership between the Centers for Medicare and Medicaid Services (CMS) and the Agency for Healthcare Research and Quality (AHRQ). Data are collected on a sample of inpatients treated for medical, surgical, or obstetrical diagnoses during each fiscal year (prior to 2010, samples were obtained on a calendar year basis). Overall patient satisfaction with pain management is based upon responses to two pain related questions: "During this hospital stay, how often was your pain well controlled?", and "During this hospital stay, how often did the hospital staff do everything they could to help you with your pain?" The survey question responses are grouped into four broad categories: Medical, Surgical, Obstetrical, and Overall. Results in each category form an aggregate score which can be compared to the national benchmark in each category for all hospitals reporting results from this survey.

The below chart depicts DoD's performance on inpatient satisfaction from 2008 through 2011. Performance overall has improved from 61.6% satisfaction in 2008 (national benchmark 69%) to 75% satisfaction in 2011 (national benchmark

61%), with DoD satisfaction now exceeding the national benchmark in all four categories.



#### 4. Pain Research

DoD performs numerous research projects which are relevant to treating the types of acute and chronic pain suffered by members of the Armed Forces and their families. Acute and chronic pain is ubiquitous in trauma patients, and there is a high cost for pain management in Wounded Warriors. Prior to 2010, pain management was seriously underrepresented in DoD’s research investment strategy, and the widespread patient dissatisfaction with pain control and other outcomes measures suggested an urgent need for a change in this strategy. In Fiscal Year 2010, funding was allocated to create the Defense and Veterans Pain Management Institute (DVPMI) which allowed DoD to perform Research, Development, Test & Evaluation (RDTE) specifically for pain management. On May 13, 2011, the Assistant Secretary of Defense (Health Affairs) designated the DVPMI as a Center of Excellence, and the organization was renamed as the Defense and Veterans Center for Integrative Pain Management.

Since 2003 DoD personnel have written and published multiple articles in world-renowned peer reviewed journals regarding the management of both acute and chronic pain; several articles are also currently pending publication (see Appendix for details on interval research and publications since submission of the 2011 Report to Congress). In addition, several clinical protocols have been developed and are currently undergoing clinical trials in both battlefield and non-battlefield pain management. These protocols will greatly enhance the knowledge and management of acute and chronic pain, particularly for soldiers wounded on the battlefield where early intervention may prevent long term chronic pain and narcotic dependence.

Work continues on the VA/DoD Regional Anesthesia Military Battlefield Pain Outcomes Study (RAMBPOS) collaborative research project. This is currently the only long term outcomes study looking at both the physical and biopsychosocial aspects of pain in wounded warriors. This study is providing valuable information on the pain experience of wounded warriors and insight into the effectiveness of traditional and novel pain management techniques. This project also represents a template for additional research collaboration between the DoD and VHA that will enhance wounded warrior care throughout the federal healthcare system.

As noted above, DoD has launched the Defense and Veterans Pain Rating Scale (DVPRS) validation study, which will be the first attempt by a major medical system to develop a new pain scale and to standardize the way we measure pain throughout the military care continuum. The Pain Management Task Force (PMTF) report (May 2010) called for a standardized pain assessment tool to provide a common set of pain measurement questions and visual cues (PMTF – 4.1.2). Once the validation study is completed (anticipated for Fall 2012) and if the results support the course of action, the DVPRS will be recommended as the common DoD and VHA pain assessment tool. Pain management has been identified as a key marker of quality healthcare. Standardization of how patients are queried about their pain will provide the DoD and VHA a tremendous advantage in evaluating treatment outcomes and developing effective pain treatment strategies.

##### *5. Training, Education and Healthcare Personnel*

Integral to achieving and maintaining a successful pain management program within the DoD is the provision of appropriate training to health care personnel with respect to the diagnosis, treatment, and management of acute and chronic pain. The Uniformed Services University of the Health Sciences (USUHS) has developed interactive, web-based videos to educate providers about

risk factors, risk stratification and mitigation strategies for medication misuse. In addition, they have developed a core-curriculum for medical students and physicians in training on pain management and medication misuse. These educational programs were initially utilized only at USUHS, but they are now available via the Internet, providing valuable training as well as continuing education credits, for all military and VHA providers. The VHA is in the final stages of developing an educational curriculum which will be made available for its providers through their SCAN-ECHO program. This curriculum, which includes instructional videos on how to perform physical examinations to assess various types of pain, along with PowerPoint presentations discussing a variety of pain topics to include medication management, will be accessible to DoD providers as well. The presentations are based upon the most current medical evidence and have been peer reviewed by experts in the field of pain management.

Complementary and Alternative Medicine (CAM) includes such modalities as acupuncture, aroma therapy, yoga, biofeedback, and therapeutic massage. While scientific evidence exists regarding some CAM therapies, for most, there are key questions that have yet to be answered through well-designed scientific studies – questions, such as whether these therapies are safe and effective for the purposes for which they are used. It is well known that there are medically acceptable practices in both complementary and traditional western medicine that are utilized which lack adequate evidence of both safety and effectiveness from well-designed research and data. Among these, CAM practices in particular are often debunked as being ineffective or as effective merely due to their placebo effect. Given this as background, DoD has been working with the VA through an educational subgroup of the PMWG to develop a tiered, standardized training and certification curriculum for acupuncture that will be tailored to the education level of the provider. Training will range from simple acupuncture such as auricular stimulation for use by technicians in the battlefield to advanced training for anesthesiologists and pain management specialists. As part of this effort, data will be collected regarding the safety and efficacy of these procedures to determine the true utility of this pain management modality. Though acupuncture is currently not a TRICARE benefit since it has not been proven to be both safe and effective, the Services are moving forward with implementing this treatment option within MTFs. It is their belief that despite the lack of conclusive peer-reviewed scientific literature, acupuncture, as well as other forms of CAM, has clinical utility as an alternative to such potentially harmful treatments as chronic opioid therapy.

## *6. Pain Care Education*

In response to the PMTF report (May 2010 – 4.1.9) recommendation for a Pain Assessment and Outcome Registry (PASTOR), DVCIPM launched the

Chronic Pain Impact Network (CPAIN) PASTOR demonstration project between Walter Reed National Military Medical Center, Madigan Army Medical Center, and the University of Washington. PASTOR is a patient self-reported, Internet based information system designed to support primary care physicians and pain specialists. Efficient for both patient and provider, the system generates information that can assist the provider in enhancing care by increasing awareness of real or potential pain-related health problems. Questions within the system explore substance abuse issues, behavioral health, and pain therapy effectiveness to name just a few of the topics that are addressed. The system will also aid providers in delivering effective patient-centric pain management education. PASTOR's development, which is supported by all three Services, will be the key resource for pain management outcomes data for both the DoD and VHA. PASTOR is also being designed to work with and complement the Patient Centered Medical Home.

## APPENDIX

### **Current Research Protocols**

1. Regional Anesthesia Military Battlefield Pain Outcomes Study. 2008-Present
2. Study Measuring Total Plasma Ropivacaine Levels during Continuous Peripheral Nerve Catheter Infusion. 2010-Present
3. Defense and Veterans Pain Rating Scale Validation Study. 2011-Present
4. Impact of Regional Anesthesia versus General Anesthesia on Immune Modulation and Clearance of Circulating Tumor Cells in Subjects Undergoing Surgery for Primary Nonmetastatic Breast Cancer. 2011-Present
5. Sciatic Expression and Identification of differential proteins in traumatized versus non-traumatized nerves. 2011-Present
6. VIPER: Veteran Integrated Pain Evaluation Research. 2011-present
7. Ambulatory Continuous Peripheral Nerve Blocks for Treatment of Post-Amputation Phantom Limb and Stump Pain. 2011-present
8. CPAIN-(Chronic Pain Impact Network). 2011-Present

### **Publications**

1. Kent M, Upp J, Spevak C, Shannon C, & Buckenmaier III C. Ultrasound Guided Peripheral Nerve Stimulator Placement in Two Soldiers with Acute Battlefield Neuropathic Pain. *Anesthesia and Analgesia* 2012, April; 114(4): 875-8.
2. Huang J, Galvagno S, Hameed M, Wilkinson I, Erdek M, Patel A, Buckenmaier C, Rosenberg J, & Cohen S. Occipital Nerve Pulsed Radiofrequency Treatment: A Multi-Center Study Evaluating Predictors of Outcome. *Pain Medicine* 2012, April; 13(4): 489-497.
3. Turabi A, Plunkett A. The Application of Genomic and Molecular Data in the Treatment of Chronic Cancer Pain. *Journal of Surgical Oncology* 2012, April; 105(5): 494-501
4. Buckenmaier C, Capacchione J, Mielke A, Bina S, Shields C, Kwon K, McKnight G, Fish D, Bedocs P. The Effect of Lipid Emulsion Infusion on Postmortem Ropivacaine Concentrations in Swine: Endeavoring to Comprehend a Soldier's Death. *Anesthesia & Analgesia* 2011, Aug; 113(3) published on line

5. Buckenmaier III CC, Gallagher RM, Rupprecht C, Spevak C, Mackey S, Edwards H, Houston J, Griffith S, Clark M, Kurihara C, Jankovich E, Cahana A, Davis S. Waging War on Pain: New Strategies to Improve Pain Care for Military and VA Personnel. *The Federal Practitioner* 2011, June; 28(Suppl 2): 1-16
6. Kent M, Upp J, Buckenmaier III CC. Acute Pain on and off the Battlefield: What We Do, What We Know, and Future Directions. *International Anesthesiology Clinics* 2011, Summer; 49(3): 10-32
7. Allcock E, Spencer E, Frazer R, Applegate G, Buckenmaier C. Continuous Transversus Abdominis Plane (TAP) Block Catheters in a Combat Surgical Environment. *Pain Medicine* 2010 Sep; 11(9): 1426-1429
8. Buckenmaier, Chester C, Griffith, Scott. Military Pain Management in 21st Century War. *Military Medicine* 2010, July; 175(1): 7-12
9. Buckenmaier C, Brandon-Edwards H, Borden D, Wright J. Treating Pain on the Battlefield: A Warrior's Perspective. *Current Pain and Headache Reports* 2010, Feb; 14(1):1-7.
10. Cohen S, Strassels A, Kurihara C, Forsythe A, Buckenmaier C, McLean B, Riedy G, Seltzer A. Randomized Study Assessing the Accuracy of Cervical Facet Joint Nerve (Medial Branch) Blocks Using Different Injectate Volumes. *Anesthesiology* 2010 Jan; 112(1): 144-152
11. Cohen S, Brown C, Kurihara, Plunkett A, Nguye C, Strassels S. Diagnoses and Factors Associated with Medical Evacuation and Return to Duty in Non-Military Personnel Participating in Operations Iraqi and Enduring Freedom. *Lancet* 2010 Jan; 375(9711): 301-309

### **Accepted for Publication**

1. Polomano R, Buckenmaier CC III, Kwon K, Goldberg C, Hanlon H, Gallagher RM. Effects of IV Ketamine on Peripheral and Central Pain from Major Limb Injuries Sustained in Combat. *Pain Medicine*
2. Buckenmaier III C. The Role of Pain Management in Recovery after Orthopedic Surgery and Trauma. *Journal of the American Academy of Orthopedic Surgeons* 2012 Summer.
3. Buckenmaier III C, Mahoney P, Anton T, Kwon N, Polomano R. Impact of an Acute Service on Pain Outcomes with Combat Injured Soldiers at Camp Bastion, Afghanistan. *Pain Medicine* 2012 Summer

4. Polomano R, Chisolm E, Anton T, Kwon N, Mahoney P, Buckenmaier III C. A survey of Military Health Professionals' Perceptions of an Acute Pain Service at Camp Bastion, Afghanistan. *Pain Medicine* 2012 Summer
5. Buckenmaier III C, Polomano R. Galloway K, McDuffie M, Kwon K, Gallagher R, & Kerns R. Defense and Veterans Pain Rating Scale (DVPRS) Validation Study. *Pain Medicine* 2012 Summer

### **Books**

Military Advanced Regional Anesthesia & Analgesia Handbook, developed as a supplement to the "Emergency War Surgery-The Third United States Revision", Jan 2009, Chester Buckenmaier III, MD; Lisa Bleckner, MD; With original illustrations by Lieutenant Michael K. Sracic, MD; and the Borden Institute.

### **Book Chapters**

1. Baechler M, Tintle, S, Buckenmaier III CC, Drake M. Combat Orthopedic Surgery: Lessons Learned in Iraq and Afghanistan. Complex Reconstructive Challenges in Hand and Forearm Wounds. SLACK incorporated 2011; 16: 169-80.
2. Plunkett A, Mclean B. "Anesthetic Techniques: Regional (Chapter 13)" *Anesthesia Student Survival Guide: A Case-Based Approach*. New York: Springer Science + Business Media, LLC. 2010; 1: 173-98.
3. Published in *The New York School of Regional Anesthesia, Textbook of Regional Anesthesia and Acute Pain Management*, Admir Hadzic, 2006; "Regional Anesthesia in Austere Environments," Chapter 66, Chester C. Buckenmaier III.
4. *Anesthesia and Orthopaedic Surgery*, Andre P. Boezaart, Fall 2006; "Battlefield Orthopaedic Anesthesia," Chapter 34, Chester C. Buckenmaier III.
5. *Regional Anesthesia and Acute Pain Management*, Fall 2006; "Regional Anesthesia in Austere Environment Medicine," Chapter 66, Chester C. Buckenmaier, III, MD
6. Buckenmaier III CC. Austere environment anesthesia. In: Steele SM, Nielsen KC, Klein SM, editors. *Ambulatory Anesthesia Perioperative Analgesia*. New York: McGraw-Hill, 2005: 357-370.
7. Buckenmaier III CC, Croll SM, Rubin Y. In: Steele SM, Nielsen KC, Klein SM, editors. *Ambulatory Anesthesia Perioperative Analgesia*. New York: McGraw-Hill, 2005: 371-394



## Posters

1. Serum Free Ropivacaine Concentrations in Trauma Patients Receiving Long-Term Continuous Peripheral Nerve Catheters.  
Blecker L, Solla C, Edwards H, Fileta B, Howard R, Morales C, & Buckenmaier III C.. American Society of Anesthesiology, October 2012. Poster Presentation
2. Blecker L, Solla C, Edwards H, Fileta B, Howard R, Morales C, & Buckenmaier III C. Serum Free Ropivacaine Concentrations in Trauma Patients Receiving Long-Term Continuous Peripheral Nerve Catheters. Uniformed Services University, May 2012. Poster Presentation
3. Bedocs P, Capacchione J, Sanders C, & Buckenmaier III C. Hemodynamic changes following administration of intravenous lipid emulsion in swine. Uniformed Services University, May 2012. Poster Presentation
4. Buckenmaier III C, McDuffie M, Chiang A, Morales C, & Polomano R. Defense and Veterans Pain Rating Scale (DVPRS). American Association of Pain Medicine, Feb 2012. Poster presentation.
5. The Regional Anesthesia Military Battlefield Pain Outcomes Study (RAMBPOS): A Preliminary Report.  
Buckenmaier III C, Gallager R, Farrar J, Oslin D, McGhee L, Kwon K, Williams Y, Luu H, Vaughan M, Spevak C, Fernandes S, Polomano R, American Academy of Pain Medicine, March 2011. Honored as Poster Winner.
6. Quality Improvement Project to Determine the Noted Variables which affect Nursing Compliance to Pain Assessments.  
Hisani E, Kwon K, Chiang A, Morales C; 3<sup>rd</sup> Annual National Capital Region Case Report and Quality Improvement/Quality Assessment Poster Competition, March 2011.
7. A Survey of Military Health Professionals' Perceptions of an Acute Pain Service at Camp Bastion, Afghanistan.  
CPT Todd Anton, MDKyung H. Kwon, CRNP, MSN, Col Peter F. Mahoney OBE TD MSc FRCA L/RAMC, COL Chester 'Trip' Buckenmaier III, MD, Rosemary C. Polomano, PhD, RN  
Presented at American Society of Anesthesia, October 2010
8. Impact of an Acute Pain Service on Pain Outcomes with Combat Injured Soldiers at Camp Bastion, Afghanistan.  
CPT Todd Anton, MDKyung H. Kwon, CRNP, MSN, Col Peter F. Mahoney OBE TD MSc FRCA L/RAMC, COL Chester 'Trip' Buckenmaier III, MD, Rosemary C. Polomano, PhD, RN  
Presented at American Society of Anesthesia, October 2010

9. A Unique Presentation of non-sympathetically medicated complex regional pain syndrome type I treated with a Continuous sciatic nerve block and Parenteral Ketamine Infusion: A Case Report  
A.R. Plunkett, B.C. McLean, A.W. Everett, C.C. Beahen; 1st National Capital Region Military Research Poster Competition, March 2009. First Place for Case Report.
10. Loss of Resistance Technique for Paravertebral Nerve Blockade Using the Episure™ Autodetect™ Syringe, Anthony Plunkett, Derick Munday, Chester Buckenmaier: 1st National Capital Region Military Research Poster Competition, March 2009. Third place for Case Report.
11. A Qualitative Analysis of Perceptions and Experiences Following Battlefield Injury and Evacuation: A Survey of Casualties from the Iraq and Afghanistan Wars  
Christine Rupprecht, MSN, RN, Chester 'Trip' Buckenmaier III, MD, Desiree Fleck, MSN, RN, Geselle McKnight, CRNA, MSN, Brian McMillan, DO, Ron White, MD, Janet Deatruck, PhD, RN and Rosemary Polomano, PhD, RN: 1st National Capital Region Military Research Poster Competition, March 2009.
12. Pain Following Battlefield Injury and Evacuation: A Survey of 110 Casualties from the Wars in Iraq and Afghanistan  
Chester C. Buckenmaier III, MD, Christine Rupprecht, RN, MSN, Geselle McKnight, CRNA, MSN, Brian McMillan, DO, Ron White, MD, Rollin M. Gallagher, MD, MPH, Rosemary Polomano, PhD, RN: Presented at 1st National Capital Region Military Research Poster Competition, March 2009
13. Neck Pain During Combat and Operations; Analysis of Clinical and Prognostic Factors. Anthony Plunkett, Shruti Kapoor, Charlie Brown, Brian McLean, Cuong Nguyen, Dominique Schiffer, Ali Turabi, Steven Cohen. ASRA 2008.
14. Teaching Advanced Regional Anesthesia in Ho Chi Min City. Anthony R. Plunkett, Brian McMillan, Geselle McKnight, Chester C. Buckenmaier III. PGA 2007.
15. It Happens, Wrong Side Blocks Despite Patient and Multiple Staff Member Involvement- Our New Prevention Mechanism. Fritz W, Joltes K, Meenan D, Wasko K.  
American Society of Regional Anesthesia & Pain Medicine, 2007

## News

1. Featured in Montreal Gazette, April 2012, entitled “Better armour, treatment saves more wounded soldiers, but many left in chronic pain” by Sharon Kirkley  
<http://www.montrealgazette.com/news/Better+armour+treatment+saves+more+wounded+soldiers+many+left+chronic/6479598/story.html>

2. HJF Creates First eBook For Client. The Military Advanced Regional Anesthesia and Analgesia (MARAA) is available via phone or tablet in a number of forms. HJF “The Scoop” Summer 2011, p.3
3. Featured in News Front Page: [www.army.mil](http://www.army.mil) “Warrior Clinic Reduces Pain Medication Use” by Joshua Wick  
<http://www.army.mil/-news/2011/04/29/55754-warrior-clinic-reduces-pain-medication-use/index.html?ref=home-headline-title3>
4. Video on Pentagon TV, Pentagon Channel Report, March 2009 “Walter Reed Helps Manage Pain”  
[http://pentagontv.feedroom.com/?fr\\_story=f208a3f930f43c131e42755c711ecb4b64e](http://pentagontv.feedroom.com/?fr_story=f208a3f930f43c131e42755c711ecb4b64e)
5. Featured in US Medicine, August 2008, entitled “DoD Trauma Care Improvements Discussed” by Sandra Basu.  
<http://www.usmedicine.com/article.cfm?articleID=1780&issueID=114>
6. Article in Army Times, July 16, 2008, entitled “Doctors Explore Early Treatment to Help Prevent Chronic Pain” by Gina Cavallaro.
7. Highlighted in Stripe and US Army.mil, April 2008, “New Pain Management Clinic to Open” by Kristin Ellis, Walter Reed Strategic Communications.  
<http://www.army.mil/-news/2008/04/14/8470-new-pain-management-clinic-to-open>
8. American Society of Anesthesiologists Newsletter, December 2007, entitled “Military Pain Medicine: State of the Art” by Michael Verdolin, MD.
9. First recipient of Across the Services Award, October 2007, presented by Headquarters Staff HAF / IMM C. J. Hilsinger.
10. Featured in US Medicine, August 2007, entitled “Transforming Pain Management in the Military”.
11. Featured in JAMA, June 13, 2007, entitled “Researchers Probe Nerve-Blocking Pain Treatment for Wounded Soldiers” by Terry Hampton, PhD.
12. Featured in Newsweek, June 4, 2007, entitled “New Research Into Pain Treatment” by Mary Carmichael.  
<http://www.msnbc.msn.com/id/18881802/site/newsweek/page/0/>
13. APNews, May 7, 2007, entitled “Doctors Urge Better Pain Care for Troops” by Lauran Neergaard. <http://apnews.excite.com/article/20070507/D8OVQ2L80.html>

14. Featured in Military Times, November 30, 2006, entitled “Troops survive but suffer chronic pain, survey finds” by Gayle Putrich.  
<http://www.armytimes.com/story.php?f=1-292925-2390501.php>
15. Featured in Anesthesiology News (Clinical Anesthesiology), November 2006, (Issue 11, Vol 32:11); entitled “Battle Wounds Spur Advances in Regional Anesthesia, Pioneering Techniques Easing Pain in Combat Vets” by Karen Blum.  
<http://www.anesthesiologynews.com/index.asp?show=searchresult>
16. Featured in the Wall Street Journal, June 13, 2006, in an article entitled “Pain Pump Tested in Battle”. Highlighted the use of the ambIT portable infusion pump by Sorenson Medical Inc., by the US Military.  
[http://online.wsj.com/wsjgate?subURI=%2Farticle%2FSB115015718613178395-email.html&nonsubURI=%2Farticle\\_email%2FSB115015718613178395-IMyQjAxMDE2NTEwMzExNTM3Wj.html](http://online.wsj.com/wsjgate?subURI=%2Farticle%2FSB115015718613178395-email.html&nonsubURI=%2Farticle_email%2FSB115015718613178395-IMyQjAxMDE2NTEwMzExNTM3Wj.html)
17. Featured in Military Medical Technology, Online Publication, February 2006. Highlighted patient and health care provider options for treating pain.  
<http://www.military-medical-technology.com/article.cfm?DocID=1292>
18. American Pain Foundation, Special Online Chats with Chester “Trip” Buckenmaier III, MD, LTC, MC, Chief, Army Regional Anesthesia & Pain Management Initiative (ARAPMI) at Walter Reed Army Medical Center. “Battlefield Medicine and Combat Trauma: New Approaches to Pain Relief” September 9, 2005; “Pain as a Disease Process” October 18, 2005; “The History of Pain Treatment in War Times: Progress and Pitfalls” November 28, 2005; “Talking With Your Doctor About Pain” February 21, 2006.  
<http://www.painfoundation.org/page.asp?file=Veterans/ChatTranscripts.htm>
19. Featured in a televised Special Report by ABC News, May 2005, in a series entitled “New Approaches to Treating Battlefield Injuries.” Highlighted are the pioneering techniques used by LTC Buckenmaier and the Regional Anesthesia Team to aid wounded soldiers in the management of pain resulting from battlefield injuries.  
<http://abcnews.go.com/Health/PainManagement/story?id=748359&page=1>
20. Featured on NPR, April 2005, in an interview with Terry Gross entitled “Army Doctor Pioneers Pain-Relief Work.” Highlighted were the developing regional anesthesia procedures used to manage severe pain in wounded soldiers.  
<http://www.npr.org/templates/story/story.php?storyId=4621493>
21. Featured in WIRED magazine, February 2005, in an article entitled “The Painful Truth.” Highlighted Brian Wilhelm, the first US soldier treated in Iraq, by LTC Buckenmaier utilizing continuous peripheral nerve block techniques.  
<http://www.wired.com/wired/archive/13.02/pain.html>

## **Talk Invitations**

1. COL Buckenmaier spoke at American Academy of Pain Medicine, National Harbor, MD March 25, 2011 for Army Pain Management: From Injury to Home.
2. COL Buckenmaier, MAJ Applegate, CPT Anton and Ms. McKnight completed medical training/education mission to Ho Chi Minh City, Vietnam, March 2010.
3. COL Buckenmaier spoke at Greater Philadelphia Pain Society, Philadelphia, PA, March 2010.
4. COL Buckenmaier spoke at the American Academy of Pain Medicine, San Antonio, TX, February 2010.
5. COL Buckenmaier and MAJ Applegate completed cadaver training workshop at the New York Post Graduate Assembly in Anesthesiology, December 2009.
6. COL Buckenmaier spoke at the Special Operation Medical Association, December 2009.
7. COL Buckenmaier spoke at the American Society of Regional Anesthesia & Pain Medicine, November 2009.
8. Hosted the DVPMI Board meeting in conjunction with ASA, October 2009. Discussed Pain Medications for Evacuation Flights. Air Force Pain Scale, JRAATs, Future DVPMI structure in light of the Pain Task Force. Next meeting summer 2010, Washington, DC.
9. COL Buckenmaier and Geselle McKnight attended the EJTCG meeting in McLean, Va in September 2009.
10. COL Buckenmaier attended the VA Symposium as speaker in September 2009.
11. COL Buckenmaier deployed Camp Bastion, Afghanistan, Summer 2009.

## **Oral Presentations**

1. Acute Pain Management Following Trauma: Ultra Long Term Nerve Infusions. Buckenmaier III C. Australian Symposium on Ultrasound and Regional Anesthesia (ASURA), March 2012.
2. The Regional Anesthesia Military Battlefield Pain Outcomes Study (RAMBPOS): A Preliminary Report.

- Buckenmaier III C, Gallagher R, Farrar J, Oslin D, McGhee L, Kwon K, Williams Y, Luu H, Vaughan M, Spevak C, Fernandes S, Polomano R. American Academy of Pain Medicine (AAPM), March 2011. 1 of 6 selected for oral presentation.
3. Effects of IV Ketamine on Peripheral and Central Pain from Major Limb Injuries Sustained in Combat.  
Polomano R, Buckenmaier III C, Kwon K, Goldberg C, Hanlon H, Gallagher RM. American Society of Anesthesiologists (ASA), October 2009.
  4. Transitioning to Outpatient Bilateral Reduction Mammoplasties: The Memorial Medical Center Experience.  
Fritz WT, Ashurst J, Garguilo JM. 53rd American Osteopathic Association Research Conference, 2009.
  5. Complications of Regional Anesthetic Procedures at a Rural Level One Trauma Center – Our Acute Pain Service’s First 5000 Blocks.  
Fritz WT, Meenan DR, Garguilo JM. International Anesthesia Research Society, 2008.
  6. Bilateral Sciatic Continuous Peripheral Nerve Blocks in Anticoagulated Combat Casualties where Neuraxial Blockade is Contraindicated.  
Rogers JM, Brown DS, Buckenmaier III CC. American Society of Regional Anesthesia and Pain Medicine, 2006.
  7. Continuous Peripheral Block Catheter Tip Adhesion in a Rat Model.  
Auton AA, Flournoy WS, Buckenmaier III CC. American Society of Regional Anesthesia and Pain Medicine, 2006.

**Waiting for Publication Clearance from the Dept of Research Programs at WRNMMC**

1. Cohen S, Gupta A, Strassels S, Christo P, Erdek M, Griffith S, Kurihara C, Buchenmaier III C, Cornblath D, Vu T. Does MRI Affect Treatment Results or Decision Making in Patients with Lumbosacral Radiculopathy Referred for Epidural Steroid Injections? A Multi-Center, Randomized Controlled Trial.
2. Bedocs P, Capacchione J, Sanders C, & Buckenmaier III C. Hemodynamic changes following administration of intravenous lipid emulsion in swine. American Society of Anesthesiologists, October 2012. Poster Presentation