Technical Inquiry
Military Medicine and Behavioral Health

Developed by:

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Technical Inquiry Summary. HDIAC received a technical inquiry regarding an analysis concerning the Army’s current electronic medical record system, in addition to the behavioral health issues that currently impact the Army’s service members, particularly Post Traumatic Stress Disorder (PTSD), Traumatic Brain Inquiry (TBI), and other psychological disorders that can lead to increased suicide rates. The customer also requested a summary of FY2015 budget dollars specifically targeting behavioral health interventions and suicide prevention.

The HDIAC processed and analyzed scientific and technical information in internal databases as well as pertinent outside sources to prepare the following response to the inquiry.

1. Introduction
The military is excellent at treating visible wounds, but falls short when providing treatment for mental injuries. Since 2009, mental health disorders have been responsible for more hospitalizations than any other injury, including visible damages from battle. In that same year, 1,224 soldiers had a mental illness, such as post-traumatic stress disorder, and received a medical discharge. This number was a seven percent increase from 745 soldiers in 2005, bringing the statistic for the number of soldiers forced to leave the Army solely because of a mental disorder up to 64 percent.\(^1\) The number of soldiers diagnosed with behavioral health issues is increasing; yet, the amount of funding towards rehabilitation and treatment is diminishing. Without proper treatment, these soldiers can develop suicidal thoughts and tendencies.

2. Electronic Medical Record Systems
The Department of Defense began utilizing Electronic Medical Records (EMR), or Electronic Health Records (EHR), as a result of a presidential directive issued in 1997 that focused on reinforcing the need for a centralized way to access patient records. An EMR is an all-encompassing clinical information management system that provides secure online access to service members’ health care records. In the military medical community, the EMR is used as a way to input and share medical data both on the base and battlefield, in addition to providing information to the Department of Veterans Affairs (VA) for verification of eligibility for services such as inpatient care and mental health care. This interoperability allows health care providers and military hospitals and clinics to look at patient records at virtually any location.

The need for a centralized, longitudinal patient record prompted the deployment of the of the theater environment information management solution, the Theater Medical Information Program, in 2003, followed by the worldwide implementation of the global system, the Armed Forces Health Longitudinal Technology Application (AHLTA), in 2004. In 2007, deployment of the military’s inpatient care documentation solution began. Today, the military’s EMR is used by more than 100,000 medical clinicians at military hospitals and clinics worldwide.\(^2\)

2.1. Medical Communications for Combat Casualty Care
Medical Communications for Combat Casualty Care (MC4) is a U.S. Army Acquisition Category III (ACAT III) program under the auspices of the Program Executive Office for Enterprise Information Systems, PEO EIS. MC4’s mission is to integrate, field, and support comprehensive medical information systems, enabling lifelong electronic medical records, streamlined medical logistics, and enhanced situational awareness for Army tactical forces. Funding for this program
is managed through the Office of the Surgeon General and Army Information Systems, and its Milestone Decision Authority is PEO EIS.\textsuperscript{3}

\subsection*{2.1.1. History}
During the Gulf War, the Army had numerous issues with retaining paper medical records. In the past, during deployment, paper medical records were either lost or destroyed because of situational and environmental conditions. Since many service members did not have records of their medical history, they had difficulty applying for Veterans Affairs benefits.

In 1997, the National Defense Authorization Act stated that records of health-care services given to service members during deployment must be centrally maintained to allow future access to those records. The MC4 was the Army’s solution to Presidential and Congressional objectives set-forth by U.S. Code, Title 10 \textsection{} 1074f, Medical Tracking System for Members Deployed Overseas in 1997, which had a goal to:

assess the medical condition of the members of the armed forces (including members of the reserve components) who are deployed outside the United States or its territories or possessions as part of a contingency operation (including a humanitarian operation, peacekeeping operation, or similar operation) or combat operation.\textsuperscript{4}

MC4 was first deployed for contingency operations at the beginning of Operation Iraqi Freedom in 2003 and has since fielded more than 43,000 systems to 750 deployed medical units throughout countries such as Iraq, Kuwait, Qatar, Afghanistan, Germany, Italy, Romania, and South Korea. Since its deployment, MC4 has facilitated the capture of approximately 22 million electronic health records. From 2006 to 2007, MC4 expanded the use of its systems to include Special Operations Forces and the U.S. Air Force, completing the largest fielding and training effort in the program’s history.\textsuperscript{3,5}

In 2010, MC4 directed the Johns Hopkins University Applied Physics Laboratory to conduct an analysis of alternatives for Web portal technologies to better manage and implement remote access capabilities of deployed systems. The intent was to reduce the time and manpower that was required during the distribution or update of software releases to hundreds of Army medical units in a theater of operations. Currently, to document medical care in the combat zone, medics are provided with a PDA-like device (handheld) that runs a localized electronic version of the field medical card (DD1380) for the creation of a medical encounter. Once the encounter is generated, the handheld device needs to be physically interfaced to the nearest MC4 notebook running the tactical version of AHLTA or AHLTA-T, which is the clinical application residing on MC4 systems for the documentation and processing of outpatient medical records. All deployable forces currently use AHLTA.\textsuperscript{3}

Last year, the Army was fielding a major software upgrade to MC4, which included an upgraded operating system, Windows 7, and an improvement to patient safety in relation to allergies and medication history. In addition, this upgrade will now require that the server to have a Public Key Infrastructure – Equipment, or PKI-E certificate. The PKI-E certificates will enhance security and assure the integrity of information transmitted through networks.\textsuperscript{6} The MC4 system is now able to operate on other devices, such as iPhone, iPad, and Android products.
President Barack Obama, in his 2009 speech to George Mason University, stated that in order to improve the quality and lower healthcare costs, that within the next five years, all of America’s medical records will be computerized. Despite this urgency, there continues to be a need to improve the acquisition and storage of electronic medical records.

2.1.2. Capabilities
There are several functions that electronic medical report systems provide to the warfighter that promote greater safety, quality, and efficiency in health care delivery:

- Improvement to the continuity of care by providing for a person without disruption, despite the potential involvement of different practitioners in different care settings.

- Provides units with automated tools facilitating patient and item tracking, blood management, medical reporting, and medical logistical support.

- Prevents repeat procedures as providers have up-to-date information regarding patients, which leads to lower costs and time reduction in duplicative procedures and examinations.

- Combatant commanders have access to medical surveillance information that provides improved medical situational awareness to better place their medical resources and personnel on the battlefield.

- If eligible, all soldiers are now able to apply for Veterans Affairs benefits because of the completeness and accuracy of medical records. All soldiers have a comprehensive, lifelong medical record of injuries and illnesses they suffer from, the treatments they received, and their exposure to different hazards.

- Army Medicine can deliver clinical Behavioral Health (BH) services at a distance via electronic communications, known as Tele-Behavioral Health (TBH). This communication leverages commercial technologies available in theater to create a video teleconference capability that enables mental health providers to conduct private consultations with soldiers at far forward operating bases who otherwise might go untreated. TBH can also be used for consultations between providers, as well as provider and patient education.\(^7\)

- The MC4 has operation capabilities on several different applications, including on smartphones or on an iPad, which provides medical personnel with a portable device in which they can easily input EMR data while moving from bed to bed in a Combat Support Hospital or from anywhere, including the point of injury, over global networks. Figure 1 shows the outpatient clinical application used by the Army tactical medical units on an iPad.\(^3\)
2.1.3. **Usability**

The use of MC4 usually includes a VPN connection to the garrison AHLTA server so access to ancillary services at the local medical treatment facility would be available. Today, all electronic medical records can be accessed via a central, worldwide database, and medical logisticians can facilitate medical supply management through the use of MC4.

Soldiers have been using the MC4 system to manage medical information for more than a decade, but training on the system is still being provided by field support representatives (FSRs), which presents a challenge at the National Training Center. Units continue to lack the skill sets needed to set up and configure MC4 systems without significant FSR support. When issues arise with MC4 systems, the brigade combat teams often return to the comfort of paper-based systems to order medical material. The reliance on FSRs to support MC4 systems has created a gap of knowledge and expertise that has yet to be filled by anyone in uniform, which is partly due to the lack of command emphasis on MC4. Units must be self-sufficient in setting up and using MC4, or they will continue to struggle with timely implementation of what is meant to be a comprehensive medical information system.  

**Fort Carson EMR Status.** MC4’s Train as You Fight initiative enables soldiers to routinely use the tactical medical IM/IT system in a garrison environment and/or during field training exercises. Ninety percent of all active Army units, as well as many Reserve and National Guard units, have received pre-deployment classroom training on MC4 systems. The 4th Infantry Division, Fort Carson, located in Colorado, is one of eight active duty divisions that are currently using MC4 in garrison battalion aid stations.

**Fort Hood EMR Status.** Fort Hood is one of seven region locations in the world that provides regional support for MC4. The MC4 Central Region Support Office currently supports MC4 customers in Arkansas, Iowa, Illinois, Kansas, Louisiana, Minnesota, Missouri, North Dakota, Nebraska, Oklahoma, South Dakota, Texas, and Wisconsin. Previously, in 2008, the nation’s largest active-duty domestic armed forces facility at Fort Hood, Texas worked with 3M on a $3.8

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**Figure 1. Outpatient clinical application on an Ipad.**
A million dollar contract to complete installation of a radio frequency identification system to track and manage the more than 150,000 medical files of U.S. Army personnel and their family members. One of the goals of this system is to provide instant accessibility to the complete medical records of those that require intensive and complex healthcare services. Since this installation, the Defense Logistics Agency (DLA) now requires all pieces of medical equipment throughout the entire distribution network to have an RFID tag for tracking.

3. Reporting Methods for PTSD, TBI, and Suicide

About 2.5 million service members have been deployed to Iraq and Afghanistan since 2001. Out of these 2.5 million, approximately 20 percent of them will return and suffer from post-traumatic stress disorder (PTSD) or depression and around 320,000 have sustained a traumatic brain injury (TBI). Those with PTSD were 4.7 times more likely to report past-year suicidal tendencies.11,12

PTSD is a mental health disorder that is induced by exposure to a traumatic event. After a traumatic event occurs, a patient is diagnosed with PTSD if the patient develops symptoms that cause clinically significant distress or impairment lasting for more than one month. These symptoms include:

- Re-experiencing the traumatic event, such as having recurring and distressing recollections or nightmares;
- Avoidance of stimuli associated with the trauma, such as thoughts, feelings, and conversations, along with diminished responsiveness and loss of interest in activities; and
- Hyper arousal, such as irritability, anger, hyper vigilance, insomnia, or difficulty with concentration.13

Several recent studies have estimated the prevalence of PTSD among those who deployed to overseas contingency operations in Iraq and Afghanistan. Many have relied on the commonly used 17-item PTSD Checklist (PCL), in which veterans report their own symptoms, to screen for PTSD14; relatively few of those studies surveyed members of all four military services or included reserve and National Guard as well as active-duty personnel.

A 2008 Research and Development (RAND) study, based on a telephone survey of 1,965 service members and veterans who had returned from overseas contingency operations, found that 14 percent screened positive for PTSD. Within that group, higher rates were observed among Army soldiers and National Guard and reserve personnel, those with longer deployments, and those seriously injured during their deployment.

A separate study by Smith and others reported new cases of PTSD in as few as one to four percent of deployed service members in the Air Force who did not experience combat exposure, but up to nine percent for Army soldiers who had experienced certain combat-related traumas or exposures.15

Other studies have estimated the prevalence of PTSD from data on service members’ responses to the Department of Defense’s (DoD’s) screening test for that condition. Some estimates based on that test were on the higher end of the spectrum. For example, a study by Milliken and others found that between 6 and 12 percent of active Army personnel and between 6 and 13 percent of
Army reservists screened positive for PTSD immediately upon returning from deployment in the Iraq war. The same study showed that assessments conducted three to six months after deployment yielded positive screening rates of 9 to 17 percent for active soldiers and 14 to 25 percent for reserve soldiers.¹⁶ Caveats exist within these reports as these numbers potentially do not produce accurate estimates.

TBI is known as an injury to the head resulting from a blunt force or penetration trauma or from acceleration-deceleration forces that result in one or more of the following:

- Decreased level of consciousness;
- Amnesia regarding the event itself or events preceding or following the injury;
- Skull fracture;
- A neurological or neuropsychological abnormality such as disorientation, agitation, or confusion; or
- An intracranial lesion such as a traumatic intracranial hematoma, cerebral contusion, or penetrating injury.¹⁷

Researchers generally estimate that the proportion of service members deployed to overseas contingency operations who experienced a TBI (including those who were no longer symptomatic) is between 15 and 23 percent, depending on the study’s methodology and sample; their estimates of the portion of service members who continue to experience symptoms over the longer term (that is, who continue to have symptomatic TBI) range from four to nine percent.¹³

A study by Hoge and others found that 15 percent of soldiers in two Army infantry brigades returning from deployment to Iraq screened positive for experiencing a mild TBI.¹⁸ A 2008 RAND study that was based on a telephone survey of overseas contingency operations (OCO) service members and veterans reported a probable TBI prevalence of almost 20 percent.¹⁹

A paper by Terrio and others estimated that 23 percent of soldiers in an Army brigade combat team returning from a one-year deployment to Iraq had experienced a TBI while deployed. The paper also examined the frequency of continued medical complaints that could be attributed to TBI, including headache, irritability, dizziness, balance problems, and memory difficulties. The authors found that nine percent of personnel within the brigade reported at least one ongoing symptom potentially related to TBI, and four percent reported a minimum of two ongoing symptoms at the time of the screening, a few days after returning home from deployment.²⁰

By comparison, VHA researchers have found that seven percent of OCO veterans who are screened receive a diagnosis of symptomatic TBI. In part because there are no validated clinical criteria for symptomatic TBI, estimates from these studies are not comparable.²¹

Suicide, or the act of intentionally causing one’s death, is an infrequent but devastating outcome of mental illness among service members and veterans. The rise in suicide rates is of particular concern to policymakers and others as the service member rate of death from suicide has surpassed the general population rate.
In 2009, the suicide rate for military members serving on active duty was 21.9 per 100,000, the highest since 1980. The following year, that rate dropped to 17.0. Figure 2 shows a summary of the data obtained regarding the number and rate per 100,000 person-years of suicides involving U.S. Army Soldiers. From 2003 to 2010, the DoD confirmed nearly 2,000 suicides among active-duty service members, 300 of which occurred during deployment. Roughly 50 percent of suicides in 2010 occurred among military members who had deployed to overseas contingency operations. Suicide rates were higher in the Army and Marine Corps than in other branches of the military. Historically, the general population has had greater rates of death for all causes than service members.

<table>
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<td>17</td>
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<td>18.2</td>
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*Note. Data obtained from Army G-1 and National Vital Statistics System. (—) = rate not available.

Figure 2. Number and Rate per 100,000 Person-Years of Suicides Involving U.S. Army Soldiers.

4. Suicide Prevention Program/Training

The Army Suicide Prevention Program (ASPP) is an integral component of Army’s Ready and Resilient Campaign (R2C). Its mission is to improve the readiness of the Army through the development and enhancement of policies, training, data collection and analysis, and strategic communications designed to minimize suicide behavior and to encourage service members to seek help, thereby preserving mission effectiveness through individual readiness and resilience for Soldiers, Army civilians, and family members.

As part of the Veterans Health Administration’s expansion of mental health services, the agency’s suicide-prevention program is wide ranging. Initiatives include screening OCO veterans for selected mental health conditions; establishing suicide-prevention programs in each VHA hospital and large community-based outpatient clinic; operating a 24-hour suicide-prevention hotline staffed by VHA mental health professionals; and developing a system for flagging the records of patients at high risk of suicide. Suicide prevention program notes are also kept in EMRs for continuous reference when dealing with a patient.
The EMR system is able to store a large quantity of clinical notes. Many providers have found that they can utilize these notes by using a search engine to easily identify service members who have attempted suicide at some point in their lives. Past attempts are the most compelling sign of future risk along with the next-best predictor, major depression. Researchers have developed an automated text search that was about 80 percent accurate on zeroing in on red flags that indicate past suicide attempts. By using text and data mining for large clinical databases extracted from electronic health records, a better study of suicidal behavior and risk in larger populations can be accomplished.

5. FY2015 Budget
The Obama Administration’s fiscal year (FY) 2015 budget requests a total of $560.4 billion in funding for the DoD, including $495.6 billion in the base discretionary budget, $6.2 billion in mandatory funding, and $58.6 billion in supplemental funding for Overseas Contingency Operations (OCO). The budget also requests $285.7 billion in defense-related funding outside of the DoD budget, including $19.3 billion for defense-related atomic energy programs, $8.3 billion for defense-related activities in other agencies, and $161.2 billion for veterans benefits and services. This budget does not detail specific amounts that are specifically used towards behavioral health research and suicide prevention. However, the Senate Appropriations Committee (SAC) added almost $800 million for medical research with a special focus on Peer-Reviewed Medical Research and Peer-Reviewed Cancer Research.

Despite the increased need for funding for assisting warfighters with behavioral health and suicide prevention, managing research and treatment procedures is becoming more difficult with the continuing budget cuts to the DoD. In 2013, even though it was a difficult year regarding the budget, the Military Health System’s top doctor promised that funding for traumatic brain injury and post-traumatic stress disorder research will be protected. Combined, DoD and VA have spent more than $1.5 billion during the past six years for psychiatric treatment, counseling, and the development of peer-help groups to assist service members who need care for mental illness.

In 2013, $7.1 million was awarded towards the Detection and Computational Analysis of Psychological Signals (DCAPS) program, which was responsible for developing automated information systems that identify group and individual trends indicative of post-traumatic stress disorder (PTSD) and anomaly detection algorithms that identify emerging physical and psychological crises. These tools complement commercial offerings that have not focused on issues specific to the warfighter. DCAPS recognizes that security and privacy are critical to user acceptance and Health Insurance Portability and Accountability Act compliance and incorporates strong authentication and other security mechanisms as needed to protect patient data. Furthermore, users will opt-in prior to using the DCAPS tools, ensuring controlled access to personally identifiable information. The program developed partnerships with key DoD organizations working in this area, and transition activities are underway with the Veterans Affairs Center for Innovation and the Defense Suicide Prevention Office. Since 2013, no other funding has been provided towards this program.

6. Conclusions
The DoD and Veterans Affairs have continued to increase electronic health information interoperability. This interoperability will help provide the Army with predictive indications for
risks in a soldier’s health or well-being. Providers are able to talk with the soldiers about what’s going on from a behavioral health perspective, which helps the soldier get to a positive outcome and return to duty. The increased suicide rates within the military highlight the importance of the broad range of mental health disorders and stressful events with regard to suicidal behaviors and indicate the need for more detailed studies of the impact to the warfighter. By focusing on the reduction of risk factors at the population level, early identification of soldiers at high risk, and early intervention and treatment, this approach would facilitate the reduction of a wide spectrum of negative outcomes, in addition to suicide.
7. References:


