

The Interaction of the American Military, Medicine, and Society

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Abstract

This research article focuses on how the technical and social aspects of the American military serve to shape the course of medical development. Historical trends in this interaction are presented with a timeline of American military medicine from the Civil War to present day military campaigns. The modern situation is then outlined and explained, followed by a reinterpretation of this modern situation using ideas learned in the historical timeline. Finally, current and future solutions for long-term veteran care are addressed. Together, these topics reveal that, although military conflicts do often result in the progression of medical techniques, this progression is heavily skewed toward the development of more acute solutions, such as anesthesia, aseptic technique, and plastic surgery, and tends to neglect chronic care. Because of this fact, there seems to be a trend in interaction of the United States military and civilian medicine that results in inadequate long-term care for many veterans.

Introduction

The goal of the 2003 war against Saddam Hussein's Iraq was to locate and eliminate active chemical weapons in Iraq. It was generally reported that no chemical weapons were found over the course of the war, but this assertion was not entirely true. While there were no actively armed chemical and biological weapons found in Iraq, old caches of leftover chemical munitions were frequently found throughout the war, though this was not made public until recently. Improper disposal of these weapons resulted in the unnecessary and dangerous exposure of many soldiers to blistering agents and sarin. The mishandling of these weapons was kept classified to the point that doctors trying to treat the mustard gas patients were not informed of the fact that chemical weapons were involved. This withheld information eventually led to misdiagnosis and mistreatment of these soldiers, even though standards of care for mustard gas exposure had been developed decades earlier. The U.S. military continuously refused to acknowledge the mishandling of chemical weapons to the point that these soldiers were denied long term care even after returning home to their families after hazardous tours of duty spent destroying pre-1990's mustard agents and sarin (Chivers, 2014).

This incident is just one modern example of a decades-long disconnect between the goals of the United States military and the long term health of its frontline soldiers. Combat medicine is considered to be medical care of combat-related traumatic or chemical injury (Tsokos & Atkins, 2003). These injuries have a wide range of mechanisms ranging from blunt force trauma from explosives to poisonous infections caused by biological weapons. Nonetheless, all conditions encompassed by and discussed in combat medicine training do have one thing in common: they are all acute conditions. The scope of the treatments taught to combat medics, claim Tsokos and Atkins, is heavily skewed toward emergency treatments (Tsokos & Atkins, 2003). The scope of emergency medicine may still seem vast, as it incorporates a wide array of tissue damage mechanisms across many different organ systems. In a combat setting, this focus on short-term treatment makes sense, but the consequence of this focus is a military without the highly specialized chronic care experts that it needs.

This paper's first assertion is that because the primary focus of military technology is on field-ready equipment, the design and development of life-preserving military technology is far more developed than the lagging chronic care treatment needed after a tour of duty. A blending of technological and social factors has resulted in a broadening of the gap between these traumatic and chronic medical technologies and their relationship with the military. The social classification of frontline technology as "military" and chronic care technology as "civilian" is one source of this uneven technological development. Innate developmental delay between the moment that a technology is needed and the moment when a suitable solution is to be applied also contributes to this

phenomenon. Finally, general bureaucratic issues within the structure of the Department of Veterans Affairs further delay the treatment of chronically ill veterans in the United States.

A general alignment of life-saving frontline technology as “military” and military chronic care as “medical” has led to a fundamentally different organization of their research and development. For example, shrapnel-proof body armor generally has been developed by the Department of Defense and would probably be considered strictly military technology to a casual observer. The medical implications of this piece of technology, however, are farther reaching than simple life or death. If the body armor takes the form of a vest in order to protect vital organs, it may be assumed that, while the number of shrapnel-related deaths decrease, the number of amputees will increase. This increasing number of amputees will create a need for more chronic care and peripheral medical devices than the current medical system is calibrated to serve. The consequent need for higher quantity and quality prosthetics may lead to a surge in medical research in that area, but not without a significant research, development, and production delay. Currently, over half of combat wounds are orthopedic (Cross, Ficke, Hsu, Masini, & Wenke, 2011), indicating that this scenario is already underway. This divergence in the classification of new technological research can be caused by lack of forethought when it comes to development of military technologies. Long-term care is not as heavily funded by the military, causing it to become the responsibility of the civilian chain of care. This shortsightedness does not take into account the fact that every injured soldier becomes a civilian when they return home.

Sociologically, the media may have also play a part in perpetuating and widening the gap between traumatic and chronic medical technology in the military because of its basic method of casualty reporting. Some sources theorize that globalization of the media itself has accelerated and altered political decisions (Livingston, 2011). Can it also affect the conduct of war so profoundly that it also has an effect on the types of health and medical technologies that are developed throughout the course of a war? A substantial part of the public’s perception of conflict severity is derived from the casualty count that it hears through mainstream media. In the eyes of the media, the success of military confrontation can often be conveyed by a low count of killed in action (KIA). Hence, the most important medical technologies to society are those that preserve life. While this bias is not wrong, it may serve to increase funding for life-preserving technologies that may not consider the quality of post-traumatic life of a veteran.

The second proposition of this paper is that military and civilian medical technologies develop separately, but overlap in their utility. This assertion also suggests that a perceptible divide exists between the types of medical treatments and procedures developed for use in domestic medicine as opposed to military medicine. In this model, the battlefield is seen as a laboratory for traumatic and acute medical conditions because of

the sheer number of cases that are created by a war. Conversely, the home front becomes the laboratory for treatment techniques for chronic illnesses. This can be problematic because the enduring illnesses that affect the average American are substantially different from chronic combat injuries.

The methodology of this paper will start with a review of historical military medicine and surgery since the inception of aseptic techniques in the Civil War. This historical timeline will analyze how breakthroughs in medicine in general interact with and alter the courses of wars, while military technology has the same effect on civilian medicine. Historically, no two wars are the same, and to a degree, this reflects in specific kinds of injuries and ailments that are sustained in these conflicts. The second section focuses on the broader social and technological concepts that serve to shape the interaction between military and civilian medicine in the modern situation. Sociological and technological theories are used to explain how the technological gap between combat medicine and chronic veteran care has developed and progressed. Section three outlines how changing the understanding of social and technological interactions between the military, society, and medicine can help shape solutions to the problems at hand. Then, the steps that have been taken to address long-term care for veterans in the United States are examined. Finally, the conclusion outlines efforts that have been taken to predict the medical effect of an armed conflict and how this technological gap can be better managed.

A Historical Timeline of Military Medicine

S. M. Brooks has noted that the Civil War was one of the most disheartening times in the history of American medicine and highlights the era of early American combat medicine (Brooks, 1966). In terms of military medicine, the American Civil War is perched at a unique point in the development of surgical technique—between the development of anesthesia prior to the war and the practical understanding of aseptic technique, which became standard practice after the war (Bean, 1966). Early in the war, before anesthesia saw widespread use, surgeries were rudimentary and agonizing. Even after painful operations without pain alleviation, surgeries often failed. The lack of anesthesia resulted in a surgical environment where, as described by clinical professor of surgery Dr. Ira Rutkow, “clinical concerns were often of less consequence than the swiftness of the surgeon's knife” (Rutkow, 2005). While more soldiers may have survived because of the medics than would have without, the process was bloody and primitive. Cleanliness was not a substantial part of the surgical techniques taught to field medics, so even if a wound was properly sutured and closed, the rate of infection was high. An account by a Northern field surgeon claims that he only had one amputation heal without septic complications after performing more than seven hundred during the war (Bean, 1966). Even though germ theory was in its early

development, physicians still disregarded it by claiming that ballistic injuries were sterile by nature because of the heat of the bullet upon entry (Engelman, 1975).

Implementation of anesthesia drastically changed the state of battlefield surgery later in the war. Surprisingly, it may have also served to worsen the incidence of poor wound healing. Without having to cope with the writhing agony of the patient, field surgeons were given a new level of freedom to operate. Unfortunately, without also understanding the need for sterile surgical techniques, this freedom to operate did not lead to better prognosis for patients. The advent of anesthesia meant that surgeons could operate without time constraints, and ultimately, wounds were not closed as quickly on anesthetized patients. Military policies dictated that the standard of care for any compound fracture was complete amputation of the limb, and with their new techniques for more painless surgeries, surgeons on both sides of the war easily carried out this dictation (Bean, 1966).

The early 1900s saw the first progressive shift toward expanding the military hospital system. Walter Reed United States Army General Hospital was founded in 1909 as a flagship military medical institution with the goal to increase the quality of care available to American veterans. The early 1900s was a prime decade for this progressive healthcare shift thanks to the ending of the Spanish American War in the years prior to the threat of World War I. According to Adler, the hospital was founded based on a public obligation to treat those who had served their country and represented a reformist shift from the temporary mobile hospitals typically associated with the military to a more stable institutionalized military healthcare system (Adler, 2014).

The onset of World War I presented military physicians with the problem of mitigating the symptoms of new chemical weapons. Former dye factories were converted to chemical manufacturing plants for vast quantities of mustard gas, and the chemists that worked there were reemployed in the production of these toxic chemical reagents (Mukherjee, 2011). This military-backed retooling led to the development and isolation of hundreds of previously unknown chemicals of which only a few had any military utility. While most of these chemicals without military value never left the labs in which they were developed, a new idea in cancer treatment led many chemists to dust off these bottles for further research. The development of chemotherapy as a viable cancer therapy was given a substantial boost with the influx of chemicals discovered as byproducts in the development of chemical weapons. Ironically, the chemicals that were not effective killers on the battlefield were perfect candidates for killing cancer cells (Mukherjee, 2011).

World War II presented military doctors with a whole new set of challenges. Jack Lummus was an All-American end on the Baylor University football team when World War II broke out. Once the war came to the United States, he was not unlike many other patriotic young

Americans and enlisted to help the war effort, giving up promising careers in professional football and baseball to do so. Shortly after playing in the NFL championship game in 1942, he entered basic training and quickly became a second lieutenant. In 1945, Lieutenant Lummus entered the battle for Iwo Jima in the first wave of American troops on the islands and led his patrol across the island. In the process of taking Iwo Jima, Lummus tread on a live land mine, losing both of his legs. After the initial medical examination of his injuries, doctors deemed his injuries too severe to warrant Lummus taking up a space in the surgical ward. The use of explosives combined with the heavy use of ground forces meant that cases similar to Lummus' were common throughout the war. Battlefield surgery had still not yet reached the proficiency necessary to save many victims of traumatic injuries and, despite doctor's best efforts, Jack became one of the many young soldiers that died following a traumatic wounding. Because this was the common outcome of explosive injuries, the need for veterans' chronic care had still not reached its tipping point. This point would be reached much later when the number of soldiers needing long-term rehabilitation after surviving traumatic wounding surpassed the caregiving ability of the civilian healthcare system (Newell, 2006).

The heavy use of aviation during World War II also led to the development of a new field of medicine: plastic surgery. Airmen suffering burns from parachuting out of blazing aircraft were in dire need of facial reconstruction for both functional and aesthetic purposes. Early in the war, acid coagulation treatments were used to close and treat epithelial disfigurement, but these methods had many drawbacks. Often eyelids were stiffened to the point that they could not be opened and rampant infection and gangrene led to further loss of tissue in affected extremities. Interestingly enough, burned pilots that parachuted into the sea fared better in reconstructive treatments than those on land (Meikle, 2006). Because of the better wound-closing environment provided by the ocean, British plastic surgeons adopted a saline bath treatment over the tannic acid standard. Instead of using acid to cauterize the wounds, a saline bath leaves them preserved and malleable for reconstruction by surgeons. This advancement, among many others, was made possible by the self-proclaimed "Guinea Pig Club" of British airmen who underwent hundreds of experimental surgeries throughout the war (Meikle, 2006).

The Korean War was an incredibly instrumental war in the relationship between the military and medicine and can be viewed as a turning point in their interaction. Helicopters were used as mobile ambulances to rapidly transport troops to field hospitals (M. S. Baker, 2012). In fact, helicopters became such an integral part of patient transport in the war that they were often described as "the mechanized angels" (Apel & Apel, 1998). The Mobile Army Surgical Hospital (MASH) was developed to allow wounded soldiers to see the same surgical care that they would experience at a permanent surgical facility (M. S. Baker, 2012). Before the development of MASHs, the surgical success of doctors

during previous wars had been hindered by surgical lag, where the surgeon would not see a wounded soldier until long after the injury (Apel & Apel, 1998). The idea of a MASH also addressed an administrative problem that had plagued mobile medical units in the past. Instead of being managed by a military officer and being assigned to a troop of soldiers, the MASH was an independent unit with designated personnel that moved autonomously to the frontline. This self-reliant unit resulted in a much more efficient and effective hospital environment (Apel & Apel, 1998).

The technological advancements that occurred during the Korean War were also numerous and beneficial. In the field of neurosurgery, watertight closures of cranial entry wounds and better grafting technologies led to lower mortality among the wounded (M. Baker, 2012). This technology was developed stateside for other traumatic cranial injuries and was moved to the frontline after its domestic development. Psychiatric protocols also saw improvement in Korea, as psychiatrists became standard personnel on naval hospital ships. Advances in renal treatment managed to reduce the fatalities due to potassium induced cardiac infarctions, a common killer among soldier with traumatic injuries (M. Baker, 2012).

Unfortunately, many of the procedural advancements in military medicine that were largely successful in Korea did not translate well to Vietnam, due to the change of climate. Tropical diseases, as opposed to combat casualties, became a chief medical concern in Vietnam. Malaria and dengue fever were rampant during the war (Beaumier, Gomez-Rubio, Hotez, & Weina, 2013), and because these diseases are not concerns in the temperate climates of North America, their treatment was not a priority of American medical research. Psychological effects of war did, however, begin to receive attention during Vietnam. The term post-traumatic stress disorder was coined shortly after the end of Vietnam, when the condition first began gaining research attention (Shalev, Yehuda, & McFarlane, 1999). After Vietnam, the United States entered a more modern era of battlefield medicine, defined by prolonged military operations in many countries.

The Modern Situation

There are institutional factors that lead to the progress of military medicine. Active and inactive sections of medicine have, until recently, allowed time for chronic care medicine to catch up with the emergency care that develops during wartimes. The frequency of modern war is a stark departure from the distinctly delineated wars of the past. Many military campaigns often occur at the same time, leading to an increased load on the military healthcare system. The fact that peacetime is becoming more rare in the modern political landscape means that this military healthcare system has no time to recover between military operations. In the 1990s, when most of the WWII veterans had stopped cycling through the VA healthcare system, most military experts thought

that there would be no more large wars, and based on these predictions, veterans' healthcare facilities were not upgraded or expanded. Currently, the United States has been at war for almost fifteen years. In addition, over fifty percent of returning troops are wounded (Powers, 2015). These two numbers alone foreshadow the impending healthcare crisis that the VA faces.

In addition to traditional casualties of war, the psychiatric effects of combat have also received increased attention. Of these combat-related mental illnesses, post-traumatic stress disorder (PTSD) has received a great deal of consideration in recent years because of an increased understanding of the cause and severity of the disorder. Historically, PTSD was simply labeled "shellshock" and psychiatric treatment was not readily available. Although medical problems like PTSD are often seen as scientifically detached from social contexts, the treatment of PTSD has been heavily influenced by social factors. The cultural ideals of the strong, stoic military veteran may have created a stigma against seeking treatment for PTSD or other psychiatric war trauma, and many veterans feel emasculated by the disorder (Chamberlin, 2012). The general social stigma surrounding all psychiatric disorders can also discourage veterans from seeking treatment, expounding the social pressure hindering PTSD acceptance and treatment.

Operations Enduring Freedom and Iraqi Freedom (OEF/OIF) yielded a high incidence of chronic pain patients with traumatic brain injuries. Almost half of OEF/OIF veterans report clinically significant chronic pain and as many as a quarter of OEF/OIF veterans have some form of traumatic brain injury (Bosco, Murphy, & Clark, 2013). The problem surrounding this comorbid combination of traumatic brain injury and chronic pain is that the two problems are usually treated as two separate conditions. A veteran may see a specialist for each condition independently, even though research shows that the two conditions are frequently associated with each other and should be treated as such (Bosco *et al.*, 2013). The communication between these two physicians is often lacking, and this leads to suboptimal treatment for veterans with these conditions. The relationship between these two increasingly comorbid conditions is also an under researched area, considering the frequency of traumatic brain injury and chronic pain in modern veterans.

While veteran homelessness has been a problem in the United States for as long as there has been an organized military, more recently it has created significant issues for VA medical centers. While these problems may not always be readily apparent, there are direct repercussions on the military healthcare system as a direct result of the number of homeless veterans that are reliant on its care. The homeless health problem becomes more apparent when considering the fact that five percent of patients are accountable for one fourth of emergency room (ER) visits (LaCalle & Rabin, 2010), and, on average, the homeless utilize the ER more frequently than the housed (Kushel, Perry, Bangsberg, Clark, & Moss,

2002). The difference between civilian homeless and military homeless is that many homeless veterans have the benefit of health insurance. The increase in ER burden put on military clinics by homeless veterans stems from two separate causes. First, these patients have less access to traditional healthcare facilities and services while simultaneously having relatively good health insurance coverage (Tsai, Doran, & Rosenheck, 2013). This allows them to take advantage of ER services without the typical financial burden associated with emergency care. Secondly, the living conditions of the homeless innately result in a higher incidence of infectious disease, and the homeless themselves are more likely to have substance abuse issues and psychiatric ailments (D'Amore, Hung, Chiang, & Goldfrank, 2001).

Peripheral effects of chronic war injuries play a large role in the care of recent war veterans. Eighty-five percent of the time, the sole caregiver of a veteran with a chronic spinal cord injury is the spouse (Ebrahimzadeh *et al.*, 2013). In these cases, quality of life considerations must account for both the veteran and the spouse. Psychological studies have found that caregiving for an extended period of time has adverse mental and physical health implications, effectively decreasing the quality of life for these caregivers (Ebrahimzadeh *et al.*, 2013). Another study found a significant decline in the physical, emotional, and social indicators of quality of life of caregivers especially when intensified by a spousal relationship and low income (Hughes, Giobbie-Hurder, Weaver, Kubal, & Henderson, 1999).

More recently, the Department of Veteran Affairs and Veterans Health Administration (VA/VHA) has come under fire for a low quality of care and inability to treat veteran patients in a timely manner in VA hospital systems. In May 2014, the Veterans' Affairs Committee of the Senate called on then Veterans Affairs Secretary Eric Shinseki to attest to a bookkeeping scandal that may have resulted in the deaths of up to 40 veterans. During his tenure, there were preventable deaths in many VA hospitals due to delays in treatment. After these deaths came to light, there was a falsification of waitlists to create the illusion that these deaths did not occur on the watch of an Arizona VA hospital. After investigations into the bookkeeping practices of other military hospitals, a Fort Collins, Colorado hospital was discovered to have also falsified records (Hicks, 2014). Secondary administrative problems like those facing the VA should not have a significant effect on the primary care of veterans, and solving these problems is an easy step toward increasing veterans' quality of care.

Reinterpreting Military Medicine

The United States military administration has already taken some steps toward managing the overwhelming number of veterans requiring chronic care. As with most large-scale social and political problems, the solution for providing care for chronically ill veterans is a multifaceted one. The purpose of these solutions is not to hinder the development of combatant medical equipment in any way, but rather to enhance the development of

chronic care solutions for veterans or change frontline policies in a way that reduces chronic combat injuries. At the root of these solutions is the problem of quantifying quality of life. The World Health Organization defines quality of life as “physical, mental, and social wellbeing” (Schnurr, Lunney, Bovin, & Marx, 2009). Obviously, these broad categories of health are difficult to measure comprehensively, which in turn makes quality of life a vague indicator of medical success. Creative ways to quantitate quality of life, especially after a traumatic battlefield injury, are still under development.

One recent solution for increasing the success of the military healthcare system has involved a focus on peripheral healthcare workers. Any successful healthcare system relies on a strong core of trained medical professionals assisted by professional peripheral contributors. During the recent campaigns in Iraq and Afghanistan, the peripheral specialized healthcare workers that garnered the most attention were physical therapists (PTs). Stationing therapists as close to the front line as possible greatly increases the prognosis of combatants with musculoskeletal injuries. While PTs have provided support in past wars, it was not until recently that the contributions of PTs resulted in a policy change in military medicine. While war is not a game, treating some musculoskeletal combat injuries similarly to athletic injuries has many benefits. Moore *et al.* claim that viewing soldiers as tactical athletes leads to better treatment at the point of injury, while increasing the success of treatment later in life (2013). Since fifty-four percent of combat wounds in OIF/OEF were orthopedic (Cross *et al.*, 2011), these PTs have the potential to positively affect over half of all wounded soldiers. This reduction of chronic morbidity is an important consideration for the United States military as it preemptively solves the problem created when better frontline medical technology results in a higher prevalence of chronic injury patients. Further incorporation of a diverse corps of trained and specialized medical technicians and professionals would progress the military healthcare system and reduce the burden on the domestic military hospitals.

While the currently implemented solutions to enhance the veterans’ healthcare system are a step in the right direction, these policies are far from being total solutions to the problem. In order to reduce a gap between emergency military medicine and chronic care military medicine that has been perpetuated since the advent of the modern military presence, a wide array of large-scale solutions must continue to be developed and implemented. A solution that can alleviate the disproportionate burden that homeless veterans place on the emergency departments of veterans hospitals involves an efficient referral system for their most common medical problems. Because the homeless have large incidences of substance abuse and mental health issue, a social service referral system specializing in these areas would most efficiently address homeless patients (Tsai *et al.*, 2013). This referral system would remove the burden

of care from each individual emergency department and, through referrals, spread it among a variety of more specialized healthcare professionals based on the patient's specific problem.

There have been numerous instances of war catalyzing the development of crucial technologies across many fields, including medicine. Warfare has widespread effects on research and development of medical technologies, and often provides the urgency needed to spark medical discoveries.

Long-Term Care in the United States

In the wake of the VHA scandal involving the deaths of as many as 40 veterans due to delays in care, President Obama promised to overhaul the veterans' healthcare system. This overhaul would address the long delays for healthcare seen at many VA hospitals, allegedly due to falsified waiting lists. Since this promise has been made, Congress has approved a \$16 billion budget increase for the VA. This budget increase includes \$10 billion allocated to hire private doctors in the short term to address the overflow of veterans who are not receiving timely care. Another \$6 billion will go toward the hiring of more full time VA doctors and nurses to staff the 27 new VA clinics opening across the country. The VA will also be expanding facilities dedicated to treating veterans with mental illness, with a focus on PTSD and early detection of suicidal tendencies and adding mental health training regiments to the duties of many currently existing VA hospital staff members (Devi, 2014).

As a result, psychological illness support within veteran healthcare communities has also undergone an overhaul (Hoshmand & Hoshmand, 2007). Continuity of care has become an emphasis, as military personnel are frequently moved away from their established support systems. A shift away from a self-contained military community toward community integration with civilians has increased the scope of the physiological support system available to military patients by filling the gaps in service that were previously created by budget constraints (Hoshmand & Hoshmand, 2007).

Still, the United States seems to neglect the chronically ill, whether they are veterans or not (Anderson & Knickman, 2001). U.S. civilian healthcare systems have been shown to have the same problems as the military. Care for acute symptomatic illness has become a priority and addressing underlying problems is lagging, which is exactly the opposite of the demographic trend of illnesses affecting Americans. As a result, chronic illnesses are directly responsible for about seventy five percent of healthcare spending, translating to 125 million Americans with one or more chronic illnesses (Anderson & Knickman, 2001). This effect is attributed to inadequate clinical information systems, preventable hospitalizations, insurance policies, payment systems, and coordination of care. Most clinical information systems currently do not integrate information between care providers (many providers do not know what

care a patient is getting outside the exam room). As a result, it is easier for physicians to address acute symptoms, rather than chronic illnesses. Preventable emergency hospitalizations also consume healthcare dollars, as the chronic care patient plays the role of the metaphorical boiling frog and waits until his or her chronic condition results in an acute condition. Insurance coverage, including government-sponsored insurance, also provides better coverage for acute illnesses than for chronic conditions. For example, Medicare does not provide coverage for many services designed to slow the progression of a chronic illness, such as physical therapy. Payment systems also create a situation in which a physician stands to make more money treating many acute illnesses, than providing long term care for a chronic illness (Anderson & Knickman, 2001).

Conclusion

As outlined in this paper, military research is generally focused on short-term solutions, resulting in a lack of consideration for the long-term effect of these technologies. Because the primary focus of military technology is on field-ready equipment, the design and development of life-preserving military technology is far more developed than the lagging chronic care treatment needed after a tour of duty. Although military conflicts do often result in the progression of medicine, this progression is heavily skewed towards the development of acute solutions, such as anesthesia, aseptic technique, and plastic surgery. Very rarely does a military conflict progress the treatment for a chronic disease (as happened with the development of chemotherapeutic agents in World War II), and even when this does occur, it is by happenstance rather than coordinated effort. These characteristics of the developmental history of military medicine also confirm the model that the battlefield is a laboratory for acute medical care and leaves the development of chronic care treatments on the home front.

Although this paper may imply that military and medical development walk hand in hand, that is not truly the case. Throughout the vast majority of history, war has led to an overall decline in public health, both at the site of conflict and on the home front (Wiist et al., 2014). Detriments to public health in warzones are fairly obvious when unintentional civilian casualties and displacement are common occurrences. The extent of these damages, however, is more severe than most assume, with civilian casualties comprising almost ninety percent of all war related casualties (Mendez, 2007). More indirectly, war affects the households of millions of military families, where the care of physically or mentally ill veteran is the sole responsibility of the closest family member. Troop gatherings themselves even foster unwanted public health consequences, as almost a third of military women report sexual assault (Campbell et al., 2003). The incidence and prevalence of suicide are also increasing among active duty military personal (Hyman, Ireland, Frost, & Cottrell, 2012), which may be a direct result of an increasing mental health problems among soldiers. In addition to mental health issues, frequent family repositioning, long

combat tours, and hazardous assignments leads to an increase risk of domestic violence. In addition to these documented public health issues, the potential public health implications of war must also be taken into consideration. The prevalence of nuclear stockpiles means that a public health disaster in the form of an unprecedented nuclear catastrophe is not as farfetched as it may seem. It would make sense that with these public health risks that are associated with combat, public health centers, such as the Center for Disease Control (CDC), would fund war prevention research. Illogically, the CDC currently funds no grants for the prevention of war, only the prevention of war related diseases (Wiist *et al.*, 2014). Based on these assertions, it would make sense that any true public health advocate must also be an advocate for peace. Consequently, armed conflict should never be condoned based on the medical innovations that it catalyzes, but the fundamental effect of the United States military on domestic medicine is significant and sometimes beneficial.

Throughout history, there seems to be a trend in interaction of the United States military and civilian medicine that results in inadequate long-term care for many veterans. The technological developments that occur as a result of wartime motivation are often shortsighted and have numerous unintended consequences. Often, an unintended consequence of war is overwhelming numbers of chronically ill veterans in need of medical care that the United States healthcare system cannot adequately provide. However, the fact that this occurs in every major war means that while these consequences are unintended, and may be unpredictable, they are not unexpected. Most of the time, real-time systematic analysis of the types of injuries that occur on a battlefield can probably predict the chronic conditions that will occur as result. Reinterpreting the function and scope of military medicine and utilizing this predictive capability may lead to better long-term care for American veterans. With fifty percent of returning troops suffering from one or more combat related wounds, the current war is producing more wounded troops than ever before (Powers, 2015). Without proper foresight, these veterans are poised to catastrophically overload a healthcare system that they risked their lives to protect. With the proper planning and allocation of resources, development of the long-term healthcare system available to veterans may serve as a model for eventually addressing the chronic care problems faced by American citizens, both military and civilian.

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