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**NAVAL WAR COLLEGE  
Newport, R.I.**

**JOINT THEATER TRAUMA SYSTEM:  
SAVING LIVES ON THE BATTLEFIELD**

by

**Susan A. Union**

**Lieutenant Commander, USN**

**A paper submitted to the Faculty of the Naval War College in partial satisfaction of the requirements of the Department of Joint Military Operations.**

**The contents of this paper reflect my own personal views and are not necessarily endorsed by the Naval War College or the Department of the Navy.**

**Signature: \_\_\_\_\_**

**23 April 2008**

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## **Abstract**

The Joint Theater Trauma System (JTTS) in Iraq and Afghanistan was developed and implemented as a joint effort amongst the Army, Navy, and Air Force to improve, advance, and coordinate how medical care is provided on the battlefield. This system has revolutionized battlefield medical care reducing fatalities and raising the quality of care to all-time high levels. It has achieved this by not only establishing a coordinated, organized approach to patient care but also by developing the Joint Theater Trauma Registry (JTTR). The JTTR is a tool used to collect data that is used to assess how well each part of the system is doing. The system analyzes combat data to determine new strategies for treatment, equipment, and training and focuses research to meet the goals and needs of today's battlefield. The JTTS is saving lives. This paper will show the JTTS has been successful in advancing combat casualty care, theater trauma management, and medical logistics and operational planning. Finally, this paper draws conclusions based on what is known about the JTTS and JTTR and recommends areas for further research, development, and analysis. The JTTS is helping to ensure that when decision makers or policymakers go forward, they are making decisions based on the best data available.

## INTRODUCTION

Combatant Commanders are critically aware of the two-fold effect combat trauma care has on the preservation of combat power. Highly capable combat trauma care:

- (1) directly impacts the size of the force by returning minimally wounded to the fight, and
- (2) enhances the force's willingness to fight because they know they have a high likelihood of survival if wounded. It is also emotionally important for the Commanders to know that everything possible was done to save fallen warriors, both personally and when facing family members of the fallen. For these reasons, the Joint Theater Trauma System (JTTS) was implemented in the United States Central Command (CENTCOM) in 2004 to continuously improve trauma care in Operations Iraqi Freedom and Enduring Freedom.

The JTTS was developed as a collaborative effort of the Service Surgeons General, CENTCOM, the American College of Surgeons Committee on Trauma, and the Army Institute of Surgical Research (USAISR).<sup>1</sup> The purpose is “to ensure that every soldier, marine, sailor, or airman injured on the battlefield has the optimal chance for survival and maximal potential for functional recovery. In other words, the system attempts to get the right patient to the right place at the right time.”<sup>2</sup> This paper will show the JTTS has been successful in advancing combat casualty care, theater trauma management, and medical logistics and operational planning. The JTTS helps ensure that when decision makers, policymakers, and leaders move forward, they make decisions based on the best information available.

## HISTORICAL PERSPECTIVE

*“The knowledge, systems of care, and clinical approaches from wars like Vietnam were transported to civilian trauma settings in the United States starting in the early 1970s. Many surgeons who had been deployed in Vietnam found their way into academia and nonacademic civilian practice and brought their “lessons learned” with them. They, in turn, seeded a generation of trauma surgeons who ushered in an unprecedented era of advancement of scholarly approaches to systems and outcomes for civilian trauma care. However, this knowledge garnered in the late 1970s and 1980s did not flow back into the military, where, ironically, peacetime allowed the core military medicine competence in combat casualty to languish.”<sup>3</sup>*

The military health system has continuously improved battlefield medical and surgical care, reducing fatalities and raising the quality of care to all-time high levels. David S. Chu, Undersecretary of Defense for Personnel and Readiness stated in a 2006 speech that, “injured service members are now more quickly transported from the battlefield to medical facilities where they can receive advanced care, and more of them are surviving because of it.”<sup>4</sup> During World War II, “approximately 30% or almost one-third of soldiers wounded in combat died from their wounds. In the Korean War, the number dropped to about 24%, and about 20% through the Vietnam and Persian Gulf Wars. In the current action in Iraq, the number has dropped dramatically to just about 9.1%.”<sup>5</sup> This continuous decrease in the number of soldiers who have died from their wounds suffered in combat can be attributed to the advances made in combat casualty care and improved capabilities.<sup>6</sup> These advances include things like better personal protective equipment, increased training for all medical personnel, improved pre-hospital care, as well as a variety of breakthrough medical technologies.

Each war provides a significant number of advances that are taken into the next conflict or war. During World War I the echelons of care system was put into place which allowed for the coordinated movement of patients throughout the theater. It began with the

soldier providing life-saving care on the battlefield to the injured warrior and progressed to definitive care in a fixed facility.<sup>7</sup> As the casualty was transferred from one echelon of care to the next, the capabilities of the medical system and the availability of staff improved. World War II saw the use of blood products on the front line.<sup>8</sup> Korea saw the use of helicopters and Mobile Army Surgical Hospitals or field hospitals to care for the injured.<sup>9</sup> In Vietnam, highly trained medics were placed on the front line and the casualty evacuation system was further improved.<sup>10</sup> The advances made during each of these conflicts not only changed military medicine, it is what ultimately led to the development of civilian metropolitan trauma systems.

A formal trauma system is important to increase the opportunity for sound triage, resuscitation, treatment, evacuation, and the eventual return of injured service members to duty or home.<sup>11</sup> Trauma care “begins at the point of injury on the battlefield and progresses through increasingly sophisticated levels of care as the injured combatant is evacuated from the battlefield several thousands of miles to the United States.”<sup>12</sup> According to Colonel Stephen Hetz, trauma surgeon, William Beaumont Army Medical Center, “what is unique about providing trauma care in the combat environment is the fact that this care can be projected and sustained in the most austere and remote locations on the earth and can be conducted under extremely chaotic and hazardous conditions.”<sup>13</sup>

Operation Desert Storm was the first armed conflict since the Vietnam War that deployed a large number of warriors and medical forces into a mobile, hostile, and austere environment.<sup>14</sup> Although Operation Desert Storm was not a long, protracted war and the casualties were limited, it did provide medical planners a glimpse into how the medical

forces perform in such an austere environment. It showed that military medicine's ability to manage traumatically injured patients had fallen behind the "successful construct fostered by civilian trauma systems."<sup>15</sup> The JTTS was developed to apply what has been learned in the civilian trauma networks to the combat environment. There is a small amount of irony in that the civilian trauma network that grew out of military experience is now contributing knowledge and processes to the less experienced military environment.

### **JTTS CONSTRUCT**

The Joint Theater Trauma System (JTTS) is an organized approach to providing improved trauma care across the continuum of care to traumatically injured patients on the battlefield.<sup>16</sup> The JTTS first and foremost depends on the collection and evaluation of data.

The mission of the JTTS is to:

- "Establish and maintain a Department of Defense (DoD) Registry System to capture data and provide information on care and outcomes of military and civilian trauma patients.
- Provide the Department of Defense and other authorized interests with timely and relevant information about care and outcomes of military and civilian injuries.
- Create a research strategy that supports reduction of morbidity and mortality in military and civilian trauma patients.
- Establish and maintain a trauma outcomes database to analyze and evaluate clinical decision making and measure subsequent outcomes for improving treatment modalities.
- Provide activities of each of the services with full and complete access to data resident in the DoD Trauma Registry."<sup>17</sup>

The goals of the JTTS include:

- "Provide the ability to perform data driven battlefield level process improvement of trauma care that drives morbidity and mortality to lowest possible levels.

- Expand across DoD to bring trauma systems into fixed facility care as well as theater care thus enhancing readiness to provide optimal trauma care to deployed Service members.
- Emphasize continuous improvement in medical record documentation.
- Capture and share patient data across all levels of care to enable evaluation and adherence to theater clinical practice guidelines and standard operating procedures.
- Identify training requirements, capture injury epidemiology, support research initiatives, and assess success of interventions and outcomes.”<sup>18</sup>

The registry system developed to meet the mission requirements above is the Joint Theater Trauma Registry (JTTR). The JTTR “captures details about wounds received and the medical care provided the injured warrior from combat support hospitals, aboard ships and aircraft and throughout the course of their treatment, as well as the results and outcome of their care.”<sup>19</sup> According to Colonel Harrison Hassell, Director of the Registry System, “the data in this registry allows for individuals to conduct scientific analyses on a variety of topics. Medical care providers analyze this registry data to obtain scientific evidence as to what treatments are the most effective as they apply those lessons learned to other patients with similar wounds.”<sup>20</sup> The data collected in the registry demonstrates the effectiveness of new medical devices, treatments, and techniques. According to USAISR:

“the data input into the registry has longer term implications, in that, it helps planners look to the future as they conceive the next generation combat support hospital and surgical units, better methods of evacuating patients from the battlefield, improved treatments, and improved protective equipment. In addition to improving the quality of trauma care, the registry is providing concrete data about a full range of issues of interest to military leaders and decision makers such as the effectiveness of the new Kevlar helmets, body armor, and the utility of the use of tourniquets at the point of injury.”<sup>21</sup>

The JTTS is administered by a group of medical experts headed by a medical director. The medical director reports directly to the Central Command surgeon who then reports to the Combatant Commander. The medical director is augmented by a staff of five

trauma nurse coordinators who are positioned throughout the theaters of Iraq and Afghanistan. The trauma nurse coordinators are responsible for the collection of data, coordination of theater research, training, and ensuring the medical staff is adhering to clinical guidelines.<sup>22</sup>

Historically, field medical recommendations to Commanders were based on assertions or small data sets that were difficult to collect. Today, the JTTS staff, using data collected across the theater in the JTTR can provide strong scientific evidence to back up their recommendations for change. According to Colonel John Holcomb, Director of USAISR, “the incorporation of the position of trauma system director as a general staff position within the theatre command has enabled him or her to recommend rapid implementation of actionable items such as data collection, implementation of standard practice guidelines, and performance improvement initiatives.”<sup>23</sup> This position also led to an improvement in the utilization of resources because medical forces are positioned not solely by the input of the field commanders alone, but following input from the trauma medical director.

Each month, medical personnel from all areas within the theater of operations, Landstuhl, the Army’s Institute of Surgical Research, Naval Medical Center Bethesda and Walter Reed Medical Center discuss cases in an effort to improve processes throughout the continuum of care.<sup>24</sup> The data that is collected in the theater is not only analyzed by the trauma team but is quickly sent to the USAISR for further review and analysis. To clarify, the USAISR is

“part of the U.S. Army Medical Research and Materiel Command and is co-located with Brooke Army Medical Center. It is dedicated to both laboratory and clinical trauma research. Its mission is to provide requirements-driven combat casualty care medical solutions and products for injured soldiers, from self-aid through definitive

care across the full spectrum of military operations; provide state-of-the-art trauma, burn, and critical care to Department of Defense beneficiaries around the world and civilians in our trauma region “<sup>25</sup>

### **ADVANCES AND IMPACT OF THE JTTS**

As OIF and OEF continue into 2008, the presence of the medical forces within the region is saving lives. The JTTS has led to a great deal of process changes within the theater which have improved the warrior’s chances of surviving traumatic injuries.

According to Colonel W. Bryan Gamble, Commander of Landstuhl Regional Medical Center in Germany, “this increased survivability for the combat wounded service member is directly attributable to accessible emergency medical treatment, surgical capabilities, decreased evacuation times, en-route medical care, and the use of body armor.”<sup>26</sup> These processes cross multiple commands and multiple layers of care and emphasize the difficulty of assessing processes in a complex environment across large geographic areas. The JTTS is meant to overcome these challenges.

Pre-hospital care has become one of the major focus areas addressed by the JTTS. Pre-hospital care is the care provided to the wounded warrior at the point of injury and en-route to the first location where advanced resuscitation can be provided. It is estimated that “ninety percent of combat wound fatalities die on the battlefield before reaching a medical treatment facility.”<sup>27</sup> According to Russ Kotwal, Regimental Surgeon, “leaders can significantly reduce the number of service members who die of wounds sustained in combat by simply targeting optimal medical capability in close proximity to the point of wounding. Survivability of the traumatized service member who sustains a wound in combat is in the hands of the first responder who puts a pressure dressing or tourniquet on and controls the bleeding of his fallen comrade.”<sup>28</sup>

Pre-hospital care is essential to the patient's outcome because early treatment of shock is a well established factor in survival. Data from World War I shows, "if the patient was treated within one hour of wounding, the mortality was 10 percent. After eight hours, the mortality rate was 75 percent."<sup>29</sup> This fact of war emphasizes the need for continued improvement in combat pre-hospital care.

JTTS was able to show the same physiologic response and led to advances in pre-hospital provider training. In combat, pre-hospital care providers, such as combat medics and corpsmen, are required to provide care while facing a host of difficult factors such as darkness, hostile fire, resource limitations, prolonged evacuation times, unique battlefield casualty transportation issues, and hostile environments. To address this phase of care the Tactical Combat Casualty Care Course (TCCC) was developed. This course teaches the combat medic how to provide the appropriate care to the injured individual while under fire.<sup>30</sup> In the field, the medics are both healthcare providers and defensive warriors. The main principle that is taught the combat corpsmen and medics is that, "good medicine with bad tactics is bad medicine."<sup>31</sup> If they get killed or wounded, there is no one to treat the patient. The corpsmen and medics are taught to return fire first and then treat, but holding off the enemy is critical. This advance in training has significantly impacted operational factor force in a positive way.

There are three specific medical skills taught in TCCC resulting from JTTS analysis: (1) hemorrhage control through the use of the new field tourniquets, (2) airway management, and (3) treatment of tension pneumothorax.<sup>32</sup> There are also things that medics are taught not to do, such as starting intravenous lines in the field. The reasons for this are complicated medically but suffice it to say the result has been numerous saved lives. The capability and

knowledge this training provides prevents death in the first several minutes after wounding so the patient can be brought to surgeons who can provide necessary surgical interventions. Without those initial life saving procedures by the corpsmen and medics, we would have the same 30-50% of killed in action (KIA) dying in the first 10 minutes after wounding that occurred in Vietnam.<sup>33</sup> The corpsmen and combat medics are doing tremendous things in the field and their ability to provide care at the point of injury is saving a lot of lives.

Training and education for medical providers in the hospital phase of care is another area where the JTTS has made significant advances. In a review of Operation Desert Storm and the early phases of OIF and OEF, it was identified that the medical forces that were deployed to the region were poorly trained prior to their arrival; what they learned they learned while in the field.<sup>34</sup> Physicians, nurses, corpsmen and medics rarely trained in their regular jobs to provide battlefield medicine. Many individuals deployed had never taken care of anyone with any type of traumatic injury on the magnitude of those seen in OIF and OEF. This is a significant concern for the Combatant Commander. It is imperative to have an experienced force to ensure optimal outcomes.

To address this issue, the JTTS assessed and identified the training deficiencies and implemented numerous training programs.<sup>35</sup> The Emergency War Surgery Course and the Joint Forces Trauma Management Course have revolutionized the way medical providers are trained for wartime deployment.<sup>36</sup> In addition, trauma training programs have been established that allow medical personnel to care for patients suffering traumatic injuries from gun shot wounds, motor vehicle collisions, and other blunt and penetrating trauma.<sup>37</sup> This is necessary because medical personnel are not typically exposed to these types of patients on a daily basis. According to Trauma Surgeon Brian Eastridge, “these programs train providers

to treat combat injuries and prepare them for the realities of medical care on the battlefield.”<sup>38</sup>

The JTTS also addresses care outside the theater. In Iraq and Afghanistan patients are quickly flown to Landstuhl and medical facilities INCONUS. As previously described, the JTTS conferences “close the loop” so the providers in theater can adjust processes and procedures to avoid late complications from anything that may be identified. The conferences also provide an opportunity for cross discipline discussion on how to improve overall care to the warriors.

As our military forces continue to engage and fight on a “widely dispersed and nonlinear battlefield, patient evacuation and medical regulating have become significant issues of concern in medical planning.”<sup>39</sup> What is medical regulating? Medical regulating is “a system for coordinating and controlling patient movement through the various echelons of care. The system ensures the timely, efficient, and safe movement of patients, often over great distances, to the destination military treatment facility (MTF). Medical regulating is executed so that patient welfare is second only to the tactical mission's success. The system entails identifying patients to be evacuated, locating available beds, and coordinating evacuation means so each patient is moved to the proper MTF with the least possible delay.”<sup>40</sup> Medical regulating and patient evacuation in theatre is ultimately the responsibility of the operational commander.<sup>41</sup> The JTTS has provided the Commander with policies, protocols, and guidelines that have been effective in moving casualties swiftly and comfortably throughout the continuum of care. These measures have ensured the wounded warrior is evacuated to the appropriate level of care and capability not necessarily the closest. In fact, “the average time for transportation from the front line to a United States hospital has

decreased significantly from 45 days in Vietnam to four days in this Global War on Terrorism.”<sup>42</sup> This is a change in medical planning that has been difficult for the field commanders to understand but has been of the utmost important. Providing the right type of care early increases the likelihood that the injured service member will survive.<sup>43</sup> Taking a patient to a close facility without the capability to care for the patient ultimately delays care.

Some changes have already taken place in this regard. In fact, the Joint Health Service Support doctrine has been changed to reflect this capabilities approach to care as opposed to traditional echelons of care. One of the challenges of this concept are the “drive in” casualties by commanders who want to get care to their men as fast as possible even though what they are doing actually hinders care. Training needs to be provided to the field Commanders regarding the need to use the medical regulating system so the casualty gets to the right type of care not necessarily the closest. Dr. Arthur Smith, Professor of Military and Emergency Medicine stated that “if appropriate priority is not given to forward medical care, evacuation, and a sophisticated casualty regulation network, a commander runs the risk of a huge logistical burden and an adverse impact on morale as the dead and injured accumulate. Inattention to these issues will mean the loss of trained troops who could have been treated, stabilized, and even returned to duty.”<sup>44</sup>

### **JOINT THEATER TRAUMA REGISTRY**

When making system wide change recommendations, evidence is of the utmost importance. It is difficult to implement medical change on the battlefield without it. A medical provider will not implement a new type of treatment unless he can prove that it works. The Combatant Commander will not modify the protective equipment his troops wear or the equipment they use unless he can prove it is better. Neither community makes

decisions based on assertions, assumptions, or unreliable information if they are not forced to do so.

The JTTS developed the JTTR to overcome the lack of clinical evidence coming from the battlefield. The JTTR has allowed the medical forces to collect a large range of data across the distributed medical assets on the battlefield that the forward deployed surgeons can use to implement change and medical operational planners can use to estimate resources required and staffing needed. This has become increasingly important with since the medical needs facing the military have increased and the supply of medical personnel has gotten tighter.<sup>45</sup> This has been an important step forward for trauma care in the combat theater.

The JTTR allows for the aggregation of data across the theater, gives visibility of data across the theater, and has been instrumental in the medical operational planning that takes place within the theater. The data has been key to how decisions are made regarding not only care but movement of forces and resources used. The coordinators of the system and the registry use the data to look for common themes and trends in trauma care to learn and to spread best practice guidance when found. The data has been also used to effect how the Combatant Commander equips his forces with protective gear. The JTTR data indicated that injuries were being suffered to the head and the extremities and as a result the Commanders ordered research to be conducted on a way to improve the protective equipment worn by the service members.<sup>46</sup> This research resulted in changes in the gear worn to protect them or lessen the severity of the injury. This information had a direct result in how body armor is used by the fighting forces.

Another of the benefits of the JTTR is that planners are able to utilize the data to conduct casualty forecasting for future operations. Casualty estimates and medical force planning tools are based on the previous war. With no previous experience from insurgency operations, medical planning for OIF/OEF has been an incremental growth. The data in the JTTR provides a solid basis for a new generation of medical planning tools. The data contained within the JTTR will be utilized in future missions to determine the necessary personnel and resources required to provide care to the estimated number of casualties expected.<sup>47</sup> The data also allows planners to gauge the necessary resources that will be required to support combat operations and provide quality care to the injured service members.

## **CHALLENGES**

One of the biggest challenges with any data collection is it is only as good as the individual inputting the data and as detailed as the information that is available. As a result, the data will never be perfect. Today, JTTR data is collected in a multi-step process. First, the physician documents his assessment of the patient in the patient's medical record which follows the patient. He then is required to complete an additional form with similar information which is then forwarded to the trauma nurse coordinator who then manually inputs the documented information into the registry database. This dual entry process leads to incomplete data.

In some of the JTTR studies that have been conducted assessing the efficacy of a particular treatment of care, the data necessary is unavailable or inadequate to obtain a large sample size, therefore recommendations are based on trends instead of statistically significant data. It was noted in a journal review that in one particular study documenting treatment

efficacy that, “nearly half the study subjects did not have complete records, which suggests a problem with the quality of data and recording.”<sup>48</sup>

Caution must be exercised when using non-statistically significant trended data to make major changes to care. In cases of a controversial treatment where conclusive data is not available is needed, providers may use the treatment in the most dire of cases where patients will die if it is not used. From those experiences, we learn and develop new techniques and processes. Recombinant factor VII is one of those examples and it is still controversial because of late complications several weeks after treatment. An article published in the Baltimore Sun highlights this controversy, “United States Army medical command considers Factor VII to be a medical breakthrough in the war, giving physicians a powerful way to control bleeding that can be treated otherwise only with surgery and transfusions. Guidelines at military field hospitals encourage its liberal use in all casualties with severe bleeding and doctors in Iraq routinely inject it into patients upon the mere anticipation of deadly bleeding.”<sup>49</sup> This same article goes on to state that the use of this drug “is based almost entirely on anecdotal evidence and its use persists despite public warnings and published research suggesting that Factor VII is not as effective or as safe as military officials say.”<sup>50</sup> What this indicates is more research needs to be conducted.

### **COUNTER-ARGUMENT**

Some may argue that since the data in the JTTR is suspect because of the manner it is entered, it should not be used to build evidence for change, especially when it is not statistically significant. These critics argue that only statistically significant data should be used to effect change in a medical setting. Critics of the system may also say that the JTTS is a bad system because the information contained within the system is incomplete or missing.

## **REBUTALL**

Even though the information that is contained and analyzed within the JTTS is not always statistically significant information, the information is important nonetheless. Each individual case documented in the system tells a story and collectively these cases provide trends, allow for analysis, promote learning, and lead to advances. The most significant advance provided by the JTTS through the JTTR is the ability to aggregate data across the theater to look for global trends and promote best practice.<sup>51</sup> This cannot happen with local collection only, especially when some sites are surgically slower than others. The JTTS is a system that is interoperable among the services and can be accessed and utilized at every level of care from the combat medic and corpsmen to the CONUS facilities as well as by the Combatant Commander. Without the system true scientific analysis of the injury data would not have been possible and care would not have become as standardized as it has. It is of the utmost importance that to truly advance combat casualty care that concrete data is collected that can be scientifically analyzed or assessed for trends. Granted, appropriate caution is required when analyzing the data, but to not utilize the system as it is being developed would have negated all of the advances already described. The JTTS provides the process and the tools to implement change throughout the battlefield.

The advances provided by the JTTS/JTTR allow continuous improvement of the combat trauma system and therefore preserve combat power by returning more wounded to duty and increasing the will of the force to fight. This system provides the Combatant Commander with strong evidence that he can utilize to make decisions. This system provides the concrete information necessary to make decisions affecting the warrior.

## RECOMMENDATIONS

Future theaters of operations have the potential to be considerably different from the theaters in Iraq and Afghanistan. The type of weaponry, the enemy, and how the enemy fights may be considerably different than the theaters the United States military operates in today. It is important that the JTTS system become formalized and adaptable to any and all military operations whether it is large or small. Adaptability and interoperability is the key.

It is also important to streamline the process of how data is collected and input into the JTTR. The current system is tedious and time consuming resulting in information being lost or omitted. Throughout military medicine there is a computerized medical record called Armed Forces Health Longitudinal Technology Application (AHLTA) DoD medical health system.<sup>52</sup> This system allows the provider to document the assessment and care provided and is visible to providers throughout the continuum of care. Within AHLTA there is a data analysis tool that researchers use to aggregate data. There is a theater component to AHLTA that is in its infancy. It is important that military planners and medical personnel that this theater component to AHLTA be advanced and fielded as soon as possible. The implementation of this type of system will improve the quality and reliability of the data because the person providing the care is inputting the information. The data is automatically collected because the original documentation is the only input required. This system will eliminate the dual entry problem and facilitate analysis of data in real time.

Finally, the time has come to look at just how significant the formulation of a Joint Medical Command would be to the operational aspect of warfare. There have been many recent episodes of jointness in medical support on the battlefield, but nothing in doctrine supports the premise. On the battlefield today, the medical forces are assigned together and

work as a joint force but as mentioned without doctrine support. The development of the JTTS is a step in the right direction to providing a joint effort within the theater. A joint medical command would enable the operational Joint Forces Commander to have the depth and flexibility to better support the needs of his units by developing a truly integrated medical force. Having a joint medical command would improve not only the interoperability but would provide unity of command.

## **CONCLUSION**

An integrated trauma system such as the JTTS is essential to properly triage, resuscitate, treat, evacuate, and eventually return the injured warriors to duty or back to their families.<sup>53</sup> The JTTS implemented during OIF and OEF has been successful in advancing combat casualty care, theater trauma management, and medical logistics and operational planning. It is helping to ensure that when decision makers or policy makers go forward, they are making decisions based on the best data available. The system has improved care in and on the battlefield to a level that has not been seen before by allowing for the aggregation and analysis of data across the battlefield and continuum of care. The data has shown that this medical system and the personnel that are a part of it have saved the lives of an unprecedented 90% of the soldiers wounded in battle.<sup>54</sup> It is important to maintain a credible medical system that provides timely and efficient evacuation of battlefield casualties, improved combat casualty care, and improved surgical trauma care. Soldiers will fight harder and longer knowing that if they get wounded, they will receive top-notch medical and surgical care, if necessary. The JTTS provides a mechanism for continuous improvement of combat trauma care that allows the confidence of the warrior to be maintained.

## ENDNOTES

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