
The United States Military Joint Trauma System Assessment:

A Report Commissioned by the US Central Command Surgeon
Sponsored by Air Force Central Command

*A Strategic Document to
Provide a Platform for Tactical Development*



Vision

That every soldier, marine, sailor, or airman injured on ANY battlefield or in ANY theater of operations has the optimal chance for survival and maximal potential for functional recovery.

Michael Rotondo, MD, FACS
Thomas Scalea, MD, FACS
Lt Col Anne Rizzo, MD, FACS
Kathleen Martin, MSN, RN
Col Jeffrey Bailey, MD, FACS

Table of Contents		Page
I.	Preamble	3
II.	Background	4
III.	Overarching Principles of Trauma System Development, Structure and Function	6
IV.	Clinical Excellence	7
V.	Critical Observations and Strategic Recommendations	8
	a. Joint Theater System Authority	8
	b. Communication and Cohesion	9
	c. Informatics	10
	d. Performance Improvement	11
	e. Clinical Investigation	12
	f. Pre-Deployment Training	13
	g. Team Transition Training	14
VI.	Conclusions and Next Steps	15
 Appendix		
A.	2011 Travel Itinerary	17
B.	Map of Theater Travel	21
C.	ACS COT Trauma System Consultation Guide	22
D.	The 2006 HRSA Model Trauma Systems Planning Document	23
E.	Compendium of Medical and Military Acronyms	24

I. Preamble

At the invitation of US Central Command (CENTCOM) Surgeon and sponsored by the Air Force Central Command, a group of nationally recognized trauma experts visited US and NATO military medical facilities in Germany and Afghanistan. The consultant team was precisely selected due to their expertise in trauma critical care and leadership in trauma systems development, education, along with their integral relationship with US military trauma leaders. The team members collectively have close to 100 combined years of experience in trauma care and have held major academic and leadership position in American trauma systems, trauma surgery and trauma nursing organizations and academic institutions. This trauma system evaluation is provided to the Department of Defense for the intent of rendering strategic recommendations for the future direction of the Joint Trauma System (JTS) inclusive of the US CENTCOM Joint Theater Trauma System (JTTS), its optimal elements, integration and sustainment in order to improve performance.

The team consisted of:

- Michael Rotondo, MD, FACS, Professor and Chair, Department of Surgery, The Brody School of Medicine, East Carolina University and Director, Center of Excellence for Trauma and Surgical Critical Care, Pitt County Memorial Hospital, Greenville, NC. He is the Chairman, American College of Surgeons, Committee on Trauma (ACS COT) and former chair the ACS COT Trauma Systems Committee.
- Thomas Scalea, MD, FACS, Francis X. Kelley, Professor of Trauma, University of Maryland School of Medicine, and Physician and Chief, R. Adams Cowley Shock Trauma Center, Baltimore, MD.
- Lt Col Anne Rizzo, MD, FACS, USAFR, Associate Professor of Surgery, Virginia Commonwealth University, Vice Chair, Department of Surgery and Associate Surgical Residency Program Director; Associate Professor of Surgery, Uniformed Services University of the Health Sciences.
- Kathleen Martin, MSN, RN, Trauma Nurse Director, Landstuhl Regional Medical Center, Germany and is the Society of Trauma Nurses' Board of Directors' Chair of the Trauma Outcomes and Performance Improvement Committee.
- Col Jeffrey Bailey, MD, FACS, Director-Designate, Joint Trauma System, US Army Institute of Surgical Research (USAISR), and former Director, USAF Center for Sustainment of Trauma and Readiness Skills, St. Louis, MO; Adjunct Associate Professor of Surgery St. Louis University, MO.

The Joint Trauma System and the ACS COT have worked collaboratively over the last five years to enhance combat casualty care, holding to the highest standards in trauma systems performance. Utilizing a public health model for the JTS provides a paradigm for development of military trauma systems through a conceptual framework that emphasizes assessment, policy development and assurance.

The US Military Joint Theater Trauma System assessment was initiated at the request of the US Central Command Surgeon, sponsored by Air Force Central Command Surgeon (AFCENT/SG) and supported fully by the medical leadership at Task Force (TF) MED Afghanistan. The purpose of the visit was to:

- (1) Provide specific civilian surgeons who are involved in the military trauma system or in military medical education first hand observation from the viewpoint of system functionality in regards to the mission
- (2) Provide expert analysis of the findings of the existing military trauma system
- (3) Develop key strategic recommendations for future development and improvement.

The visit provided an opportunity for trauma systems experts to directly observe and contribute in multinational medical activities in a range of military treatment facilities and evacuation platforms, to interact with deployed military medical personnel and their leadership, and to evaluate systems for optimal care of the combat casualty along the continuum.

The review agenda consisted of a pre-visit to Landstuhl Regional Medical Center, a Level IV military treatment facility (MTF) in Germany by Col Jeffrey Bailey (JTS Director) who was joined by Drs. Rotondo, Scalea and Rizzo. The team moved via military air transport to the US CENTCOM Area of Responsibility (AOR) for nine days in Afghanistan visiting multiple Role 2, Role 3 facilities and en route care providers such as Medevac, Fever, Pedro and MERT. The team engaged in interactive dialogue with a broad range of representative military trauma system leadership and providers. There were opportunities for participation in formal ICU rounds, operative cases as well as informal discussion with the stakeholders. The team also participated in the second Afghanistan Trauma Conference held at Kandahar Air Field coordinated by CAPT Eric Kuncir, JTTS Medical Director. The team produced this consensus report which represents the groups' observation and recommendations gleaned from this visit. It is not meant to be a detailed evaluation of operational nuances of either the JTS or the JTTS but rather a strategic assessment of current progress and future opportunities.

II. Background

United States military medical forces deployed in support of the Global War on Terror have provided continuous casualty care in subsequent combat operations in Iraq and Afghanistan. Initially this effort lacked a cohesive and structured approach. Referencing the positive impact of civilian trauma systems developed in the decades following the Vietnam conflict on patient outcomes, a group of military clinicians advocated for a theater trauma system based on the civilian model. The US Central Command subsequently implemented an inclusive system of trauma care in its theater of combat operations, designated as the Joint Theater Trauma System. The JTTS initially focused on care of the injured within the theater and at the primary out of theater receiving medical treatment facility, located at Landstuhl Regional Medical Center, Germany. The system was eventually expanded to include CONUS (Continental US) and VA (Veterans) facilities. The theater system functionality has focused on collection of casualty care information into a theater trauma registry (Joint Theater Trauma Registry – "JTTR"); information sharing across the continuum, facility and system performance improvement and related combat injury clinical investigation, and development of evidence based clinical practice guidelines. Joint Theater

Trauma Registry-based publications have demonstrated measureable improvements in theater injury morbidity and mortality. This has served to validate the JTTS as a resource for improved patient care outcomes and these successes have garnered increased esteem and support for the system.

Although the JTTS is a US CENTCOM organization (headquartered in Tampa, FL), its functionality and continuity is centered at the USAISR in San Antonio, TX where a perpetual directorship and support infrastructure, including the collection and maintenance of the JTTR has been established (Figure 1). This USAISR imbedded organization has been designated as the Joint Trauma System (JTS) – to distinguish it from the Joint *Theater* Trauma System. This designation acknowledges that the functional domain of the JTTS is limited to the US CENTCOM Theater of operations, whereas the JTS is aligned to support a perpetual deployable global trauma systems capability for the US military. In recognition of the value of an enduring Joint Trauma System, the JTS became an official program within the US Department of Defense (DOD) in 2011 and is forecast to receive organization specific DOD appropriations beginning in Federal Fiscal Year 2013. Although the functional domain of the JTS is pan-service and global in scope, the JTS director reports to the Commander of the USAISR. This relationship proved to be extremely beneficial in the early stages of JTS development, but as the organization continues to evolve the relationship may serve as a detractor to its perceived true “*joint-ness*”

Figure 1. Joint Trauma System Directorate

The success of the JTS and JTTS is grounded in the concept that the US military medical service must be structured and resourced to support the combat mission regardless of tactics, terrain, distance, and environmental conditions. America has demonstrated its commitment to provide state of the art care for wounded warriors and expects that the system will achieve optimal outcomes. Therefore, the JTS and all future JTTS must continue to be immediately responsive, adaptable, and fully capable of achieving this mission in all aspects of US military combat, humanitarian and other contingency operations. To accomplish this, a highly sophisticated enduring system must continue to be refined and supported during times of peace and of war.

III. Overarching Principles of Trauma System Development, Structure and Function

A system must be considered in terms of both its elemental components as well as the interaction of those components as it relates to primary system function. Interestingly, even if all of the elements of a system are functioning effectively as individual components, it does NOT necessarily mean that the system as a whole is functioning optimally. The system can only function optimally if individual elements are linked in a meaningful way through the infrastructure that supports it and if it demonstrates effective relational function between elements. Moreover, in a system dependent in large part on human performance, participants must have a keen awareness of individual component function as it relates to the entirety of the system as well as an understanding of the overall function of the system itself. If all of these attributes are demonstrated, then and only then is the system truly integrated and optimally functioning. While the current JTTS demonstrates, for the most part, excellent elemental function, its integrative function is still somewhat limited. This is manifest by suboptimal performance at the component interfaces, a lack of understanding by the individual components of the function of other components and less than optimal understanding of the system overall. Moreover, due to a lack of doctrinal authority, the Joint Trauma System (JTS) functions in a very limited capacity as a lead agency for the system and therefore, at best functions as a finite infrastructure element only.

Applying the basic principles of a public health model to trauma system theory, the lead agency of the trauma system must be capable of continuous assessment of system structure, function and outcomes and it must be enabled to create policy and/or guidelines based on assessment analysis. Moreover, it must assure optimal system function through the measurement of both system and component performance against set benchmarks through a verification process which provides objective, external review of capability and performance. Each of these three functions (assessment, policy/guideline development and assurance) is central to adjudicating an effective trauma system and should be the responsibility of lead agency. Optimal characteristics of assessment include: the ability to thoroughly describe the epidemiology of injury within the theater jurisdiction and concurrent access to databases across the continuum of system care to scrutinize the efficacy of care. Optimal characteristics of policy/guideline development include: comprehensive authority to maintain trauma system infrastructure, planning, oversight and future development and command authority to create and enforce policy and guidelines on behalf of the welfare of the injured. Optimal characteristics of

assurance include: education and coalition building with leaders and participants across the system to foster cohesion and collaboration, the use of analytical tools to monitor performance and promote injury prevention and the ability to evaluate and verify that system components meet agreed upon criterion or clinical requirements.

While assessment data is generated at the component level of the JTTS, the assessment, subsequent analysis, guideline development and assurance should take place at the JTS level in conjunction with JTTS leadership and other JTTS leadership system components. At the moment, the limited in theater infrastructure to support the data assessment function, the divergence of the combat command and the medical command structure, and the multiservice multinational composition of the health care provider force prevent optimal system functionality. While the immediate solution to this complex problem is unclear, the goal should be that the JTS function as a lead agency in support of the JTTS through these three critical functions: assessment – policy/guideline development – assurance.

IV. Clinical Excellence

Clinical excellence, a core value of patient centered care is the yardstick by which all trauma care is measured within any trauma system. The JTTS has peculiar challenges to delivering such care in support of the combat mission. It must be flexible and responsive to changes in the battle space. Geography, huge surges in volume, the need to deliver care in austere environments and constantly changing conditions present a challenge to accomplish defined trauma system goals. The current function of the JTTS strives to meet these challenges and moreover, advance the field of injury care in search of true clinical excellence. As an example, Damage Control is a philosophic approach to severe injury developed in urban American trauma centers in the late 1980's when high velocity weapons became common. Only immediately life-saving procedures are performed at the initial operation followed by subsequent resuscitation in the ICU. The remainder of the operative care is staged and performed according to patient's condition at a later time. This concept was brought to the theater in Iraq and was extended to include transport between levels of care. Sequential damage control procedures were performed as the patient was transferred from a Forward Surgical Team (FST) through the system. The final stage of damage control and/or definitive surgical care was often completed at the Level 4 or 5 centers. These principles have been extended to the initial resuscitation of the patient. Damage Control Resuscitation (DCR) involves aggressive use of plasma early after injury. This has been shown to save lives. In Afghanistan, DCR has been pushed much further forward than ever before, often in the pre-hospital phase of care and across the continuum of care. This is an outstanding example of the adaptability of the current JTTS to the unique challenges of the war. Guidelines for care have been developed to treat common clinical problems. This has been done well for initial evaluation and resuscitation. Opportunities exist for further development of guidelines in areas such as infection control and complications of common problems.

Moreover, reinterpretation and adaption of standard trauma principles for use in the theater has tailored the care to the current conflict. For instance, the order of priority for civilian trauma is Airway, Breathing, and Circulation, termed the ABC's of injury care. In the theater, recognition of the importance of controlling exsanguinating bleeding has resulted in a new order of priorities. Catastrophic hemorrhage control is the first priority using tourniquets and packing wounds with hemostatic materials; this now starts the sequence. Thus, the priorities are C (catastrophic hemorrhage) then ABC in the current theater of operations in Afghanistan. The initial care is expertly delivered by medics on the ground and in the air who carry the necessary materials and are trained in courses such as TCCC (Trauma Combat Casualty Care).

Improvised Explosive Device (IED) injuries have been a real challenge as patients suffer devastating lower extremity, abdominal, pelvic and soft tissue injuries. Patients often need massive transfusion and multiple debridements and/or amputations. Early use of DCR stabilizes patients earlier facilitating definitive care earlier, preventing sepsis and acute renal failure. Innovative surgical techniques such as operative internal iliac vascular control has helped reduce the rate of those who die of wounds to under 5%, the lowest of any conflict.

The backbone of the system is the personnel who are committed to a singular mission and insist on clinical excellence. The absolute commitment and dedication to the mission of every clinician overcomes any and all obstacles. The teamwork is impressive. Each individual and each center executes their role without regard for personal glory. The willingness to do whatever is necessary to save every wounded warrior is apparent at every interaction with the system. This core value appears both immutable and invaluable. However, providers are sometimes swimming against a cumbersome inertial tide created by the continuum itself in an effort to achieve clinical excellence. With more sophisticated system support, the effort to achieve clinical excellence would be greatly enhanced. A highly functional JTS working as the lead agency for the JTTS is mandatory to knit the components together, set policy, review performance and adapt to the ever changing complexion of the battle space. For clinical excellence to exist there must not only be committed clinicians, but also empowered leadership and a fully integrated infrastructure system to support them.

V. Critical Observations and Strategic Recommendations

a. *Joint Theater System Authority*

Critical Observations

1. The JTS has no authority to develop or set policy or standards for trauma care. Although the JTTS director does report to the CENTCOM SG, the JTTS office is not specifically empowered to implement or assure standards of trauma care in the theater. This requires the JTTS to rely on

influence alone to leverage improvements as opposed to comprehensive authority to execute planning, oversight, and future development of the military trauma system.

2. The JTS has no authority to implement a verification process for facilities or the system as a whole. This has resulted in a variable commitment of facility leadership to the system.
3. The JTS is not optimally located in the organizational structure, nor does it function, as a DOD level asset. This undermines the credibility and efficacy of the organization to function as a global and joint resource.

Recommendations

1. Establish JTS as the statutory lead agency and DOD authority to set policy and enforce standards of excellence in the care of the injured. Compliance with policy and standards should be assured by a facility and systems verification process. This should also serve as a metric for component leadership evaluation and reporting.
2. The JTS should be empowered as the DOD delegated authority to recommend external system review.
3. The JTS should be elevated within the DOD in order to more effectively align its position with its joint and global responsibilities.

b. *Communication and System Cohesion*

Ideal communication is reliable, succinct, and transmits only the necessary information. In theater, the reliability of communication is spotty. Immediate patient care priorities often trump effective communications, even though high quality communication is necessary for good patient care. Clinicians do not consistently know how to contact colleagues and/or making that contact is difficult. Creating opportunities for face to face communication is essential. This allows interactions with colleagues and promotes exchange of ideas. Information flow is largely uni-directional up to the JTTS and JTS. For instance, at the recent Trauma Conference in Kandahar, valuable data on multi drug resistant bacteria were presented that was cutting edge, immediately applicable, would change patient care and likely improve outcomes. There should be a platform for immediate bi-directional dissemination across the continuum.

Critical Observations:

1. High quality communication is essential for efficient care and optimal outcomes. Without it, system elements function in isolation.
2. Clinical personnel spend large volumes of time performing clerical tasks reducing efficiency, delaying transfer and creating frustration.
3. Transmission of important clinical information like radiographs is difficult. Discs that accompany patients are often incomplete or do not open.
4. Clinicians encounter resistance when attempting to transfer patients. They believe that those at higher levels of care do not recognize their limitations.

5. There is no consistent system for discussion between clinicians. The communication that does exist is often service specific and at times acrimonious.
6. There are limited vehicles for effective transmission of information from the JTTS and JTS to the front line clinicians
7. Medical Treatment Facility trauma medical directors rotate every six months. There is loss of “corporate memory” following transition so systems are re-designed with every rotation. They rarely meet with their inter-facility colleagues and there is little opportunity for discussion among them.
8. There is insufficient opportunity for clinicians in Role 1 and 2 centers to track patient outcomes.

Recommendations:

1. The communication system must be modified to support the clinical mission. Potential examples include dictating operative notes with immediate transcription and/or having administrative support available to support clinical personnel. The video teleconference (VTC), recent advances in emailing clinical information between colleagues and the every other weekly trauma directors’ conference help, but those efforts must be amplified.
2. Information transfer of key clinical information such as operative notes and radiographic images must be streamlined. Images could be transferred via a secure internet connection. Leadership must commit to resourcing communication technologies at the necessary level.
3. Clear protocols for transfer between levels of care should be developed.
4. Clinical and administrative protocols should be developed to reduce whole scale re-engineering with every rotation. Agreed upon changes could then be adopted system wide, when applicable.
5. Opportunities for interaction between both clinicians and trauma medical directors should be significantly enhanced. Trauma conferences such as those held recently at Kandahar is one such example that significantly enhanced system cohesion. Other opportunities to improve system cohesion should be implemented.
6. Bi-directional flow of information up to the JTTS and JTS and back down to the front lines should be enhanced and fully resourced. This includes information on patient outcomes. The VTC should be focused on providing patient outcomes to all providers as a potent communication forum.

c. Informatics

Critical Observations:

1. There is no unified, contiguous electronic health record across the military continuum of care. This leads to an inadequate transition of vital clinical information between interfaces across the levels of care. This causes both frustration and dissatisfaction on the part of providers and

creates the incessant need for communication “work-arounds”, such as phone calls, emails, hand written operative notes passed along to the next place of care. This inadequacy and inefficiency is a direct threat to the goal of ensuring clinical excellence for our wounded warriors in theater.

2. While the JTTR is a critical capability for the ongoing assessment and assurance within the system, there is inadequate support for consistent collection of data on all injured war fighters across the continuum. Moreover, data for significant portions of care are not consistently captured, especially forward of Role 3. This shortfall is a direct threat to assessment and assurance activities. JTS and JTTS efforts have resulted in a measureable improvement in out of hospital data collection – specifically Point of Injury Aeromedical Medical Evacuation and En Route Care (tactical intra-theater, inter-Role 2 and Role 3). Collection of Tactical Combat Casualty Care and Role I data into the JTTR is scant and undefined.
3. Informatics capabilities for performance improvement across the system are primitive at best. The JTTR platform should be expanded to provide access to data entry and access to real-time benchmarked performance reports for healthcare elements in theater. Without this, bona fide performance assessment and improvement is impossible.

Recommendations:

1. The military should develop an expeditionary, deployable electronic medical record which is facile, readily taught, increases productivity, and is secure, web based/instantly visible from all levels including the Veterans Administration (VA), and built by established experts in information systems with input from practicing military providers. The deployed Electronic Medical Record (EMR) must fit backwards into existing DOD database(s) to ensure continuity of the medical record and trauma registry.
2. Increase system wide support for concurrent data collection across the continuum to include TCCC and Role I care.
3. Expand the JTTR platform to provide continuous real-time performance assessment.

d. *Performance Improvement/Patient Safety and Transparency*

Critical Observations:

1. The trauma performance improvement (PI) and patient safety process is fragmented. The awareness, implementation and integration of structured PI processes vary by level of care, branch of service and coalition partners. This less than desirable state results in a loss of transparency and creates difficulty in performing concurrent, multidisciplinary PI and stifles the communication and learning between and amongst levels of care.
2. Efforts to implement rudimentary trauma related PI were present at each military trauma facility. Morbidity and Mortality (M&M) review varied widely from no review, to an exclusionary physician only review with little documented analysis or corrective actions, to a

casual multidisciplinary verbal debriefing with no recorded corrective actions or loop closure documented in any of these observed systems.

3. There was varied evidence of effective communication of PI events or trends forward or backward to allow for analysis, corrective action and sustained resolution.
4. There is no clear metric by which the trauma directors or the command structure are held accountable for the optimal outcomes of the injured.

Recommendations:

1. The JTS must develop an overarching PI and Patient Safety Plan which clearly outlines the role of the JTS, the role of the JTTS and the role of all elements of the military trauma system which describes the process that continually monitors, evaluates and improves trauma care from point of injury, through transport, between levels of care and on to rehabilitation in real time. This process should be documented in a written plan.
2. The plan should encompass a system wide process for event identification, development of corrective action plans, methods of monitoring, reevaluation and bench-marking. This includes standardized tools to operationalize this process across the continuum. It should include metrics which continually measure the maturity and effectiveness of the PI process, be sustainable despite turnover, and be able to identify opportunities for improvement in combat casualty care.
3. The JTS, as the lead agency for the system, and the JTTS leadership in theater must possess a system wide supportive infrastructure with authority over the continuum of care for the PI process. Under the direction of JTS and JTTS leadership, the trauma leadership at each facility and the leadership along the evacuation chain, must have the authority and administrative support to lead and manage their component with accountability to JTS leadership for performance related to care of injured.
4. A robust informatics platform must be a key infrastructure element for the process and all elements of the system must be included.

e. *Clinical Investigation*

Research is a systematic evaluation that results in generalizable knowledge, predicts outcomes, and examines relationships. It must be relevant and not hinder combat operations. Subjects must be protected. Challenges to data collection, present in the US are even more pronounced in the theater. Despite this, there are over 240 publications during the last two years from theater data.

The JTTR is robust including data from over 100,000 patient records. It is the basis for CPG's, but there is insufficient relationship between the JTS, JTTS, JTTR and research. Data requests to the JTS Analysis Section are numerous, exist in isolation and are often duplicative.

Critical Observations:

1. Despite significant challenges, the track record of publications is impressive.
2. The interface between performance improvement and clinical research is indistinct. PI projects in the civilian sector are considered research by the military in some instances limiting quality data acquisition.
3. Clinical investigative projects often last longer than a typical 6 month deployment requiring need for multiple principal investigators and undermine execution of the investigation.
4. Clinicians may be interested but inexperienced in research. This typically requires multiple protocol revisions before IRB approval. This can take as long as 6 months, longer than the length of time for some deployments and longer than is customary for most research organizations.
5. Multiple potential investigators at various levels of care may be interested in similar issues creating competition for resources resulting in inefficient utilization of assets.
6. Even if data is generated and analyzed, not all is reported or published.
7. The JTTR is a robust database.
8. There are multiple databases in existence that do not communicate.
9. There is little or no relationship between the JTS, JTTS and the IRB process.

Recommendations:

1. The PI and research missions must be reconciled to allow for unencumbered data collection, effective performance improvement and robust clinical investigation.
2. The IRB process should be significantly streamlined.
3. Educational efforts must be undertaken to educate clinicians as to rules for conducting clinical investigation including study design, data analysis and statistical methods.
4. The Director of the JTS should be intimately involved with the IRB process relative to studies that involve wounded warriors.
5. All requests for clinically important data should be coordinated through the office of the JTS Director. That office could be charged with oversight for trauma related clinical investigation.

f. *Pre-Deployment Training***Critical Observations:**

1. There is no consistent pre-deployment training for medical personnel prior to deployment to theater. Current pre-deployment training is largely focused on combat skills training and is variable based on service affiliation, position and location of deployment.
2. There is a lack of effective tactical placement of clinical expertise throughout the theater (example: deploying a specialty trained surgeon as a primary care provider or general surgeon without consideration of optimal tactical placement of the individual's primary specialty).

3. The pre-deployment trauma training that exists appears to focus primarily on individual, as opposed to team training. This provides an opportunity for enhancing the team element of training that would allow for a better balance. The British Hospex training program is an example of a “just in time” facility and site specific team building training platform. This training platform provides opportunities to identify team and individual strengths and weaknesses in order to achieve optimum role assignments as well the means to familiarize deployers with the facility and its function.
4. The JTS has no authority to specify pre-deployment training although recommendations have been made in the past.

Recommendations

1. Continue combat skills training aimed at force protection as appropriate, but balance that with training to assure optimal preparation to care for severely injured patients.
2. Consistently align specialty and skill with deployed responsibility at the tactical level.
3. Establish consistent standards for pre-deployment training for medical services to include leadership and clinical personnel that is scaled to deployer combat casualty care and system experience, knowledge, and skills. Leadership (command, administrative and clinical) should have a clear understanding of the system and its function as a whole. Trauma care providers and ancillary clinical personnel should have a facile working knowledge of the theater trauma system, current clinical practice guidelines (CPGs), medical informatics (joint electronic medical record system), performance improvement, clinical practice excellence, communications, team building and logistics.
4. Trauma directors at every Role 3 facility should have leadership and combat surgery experience. They should have comprehensive understanding of the Role 3 facility, the JTTS and JTS. Civilian partnership programs are a valuable resource in the sustainment of trauma care currency and competency.
5. The JTS should have oversight on standards of pre-deployment training as they pertain to trauma care.

g. Team Transition Training

Critical Observations:

1. Each theater of operation has a unique role, terrain limitations and institution specific practices.
2. Effective team transition is not always possible due to logistics

Recommendations:

1. Trauma system facilities and/or units should consistently develop a manual or equivalent repository of institution specific information that is appropriately updated to reflect current practice based on contemporaneous practice change and after action reporting. This should

serve as the unit working reference for team transition and hand offs. Collectively these documents should roll up to the JTTS and the JTS.

2. Direct hand off between providers should be assured with sufficient time for effective team transition; “left seat-right seat” helps foster camaraderie and augments communication between the teams.

VI. Conclusions and Next Steps

As a result of this assessment and analysis, the following immediate steps should be taken to facilitate the development of the JTS and the JTTS to more effectively support the combat mission. By working to achieve the strategic recommendations included herein, the system will be integrated across the continuum; wounded warriors will receive better care; and clinical excellence will be enhanced; system efficiency will improve; health care provider satisfaction and esprit de corps will elevate; significant advancements in care will be achieved through research and most importantly, critical attributes of this integrated health care system will be forever memorialized and embedded in the American Military System.

1. Seek support of the leadership of the uniformed services, and civilian leadership in the DOD, for fundamental change in the command structure to enable the JTS as the lead agency for assessment – policy development – assurance for combat casualty care.
2. Task the office of the JTS Director to do the following:
 - a. Thoroughly review and complete the document entitled: *“Joint Trauma System: Development, Conceptual Framework, and Optimal Elements”*. This document, authored by a team of active duty military trauma surgeons working under the direction of the office of the JTS Director in conjunction with the Trauma Systems Planning and Evaluation Committee of the American College of Surgeons Committee on Trauma, provides the theoretical basis of the development of the JTS and the JTTS. This document explains the critical attributes and rationale for a fully integrated system that responds to the needs of wounded warriors at a moment’s notice in support of the combat mission. This document should receive full endorsement by the DOD and should be sustained as a living breathing military doctrine. This should be completed in no more than 2 months of the date of submission of this report.
 - b. Create a JTTS Operations Manual which describes the structure, function and tactical deployment of the JTTS. This document should capture all currently available stand-up and operational procedures for all elements of the system. This *“Field Manual for JTTS Deployment”* will be vital in the event that a conflict arises in the future in some other part of the world. This too should be memorialized as doctrine and should be completed in no more than 6 months of the date of submission of this report.
 - c. Create a *Tactical Implementation Plan* to achieve the strategic goals as outlined in this report on a clear timeline with demonstrable developmental milestones for the immediate (6 months), intermediate (18 months) and long term (36 months), with the

expectation that this plan will be completed by the end of three years. That is to say that for each strategic recommendation included herein, clear executable tactical actions will be delineated and completed.

3. Solicit appropriate support in the form of human resources, a functional budget, political support, and a functional command structure for the office of the JTS director to achieve this mission.

Appendix A

2011 Theater Trauma System Consultation Itinerary (Local Times)

Pre-travel

Travel approved by US CENTCOM; travel arrangements coordinated by USAF SG, AFCENT SG, TRANSCOM SG, AMC SG, LPMC team, US CENTCOM JTTS team, TF MED-A

Sept 26 Monday

1200 Col Jeffrey Bailey, Joint Theater System Director-Designate arrives Landstuhl Regional Medical Center for orientation and assessment. Meeting with Commander Jeffrey Clark, hospital tour, ICU rounds, PI meeting, registry orientation, trauma PI orientation, research briefing, and visit to the flightline with CCATT patients.

Sept 29 Thursday

1000 Drs. Scalea, Rotondo, Rizzo arrive Germany and join Col Bailey and Kathleen Martin

1900 Dinner with LPMC Commander, COL Jeffrey Clark

Sept 30 Friday

0730 Acquire Personal Protective Equipment (PPE) from Ramstein Air Base Logistics unit

1100 LPMC Level 1 Trauma Center Celebration

1300 Surgeons observed two cases at Landstuhl (abdominal/tracheostomy /open chest case)

1700 Debriefing, antiterrorism training

1900 LPMC staff dinner

Oct 1 Saturday

1100 Briefing, finalize travel plans, verify flights with PAX

1300 JTS and AOR Briefing by Col Bailey and way forward discussion

Oct 2 Sunday

1100 Showtime at Ramstein PAX

1530 Depart TRANSCOM SG arranged KC 135 aircraft (Rhode Island ANG) aircraft traveled with 8 Aeromedical Evacuation (AE) staff.

Oct 3 Monday

- 0045 Landed Bagram Air Field, Afghanistan
- 0100 CAPT Eric Kuncir, JTTS Director met team at flightline and escorted to billeting.
- 0700 Col Kevin Connelly (AFCENT forward surgeon) and Col Todd Carter (CCATT CENTCOM Director) joined team.
- 0730 Meeting with Craig Joint Theater Hospital (CJTH) and TF MED Regional Command (RC) East Commander Col Guillermo Tellez, Deputy Commander for Clinical Services Lt Col Peter Learn, and Trauma Director Maj Mark Gunst and participated in hospital morning report.
- 0800 ICU rounds with 4 patients in ICU. Trauma surgeons went onto the OR.
- 1000 Surgeons to OR with Drs. Learn and Gunst
- 1000 JTTS Trauma Nurse Coordinators (TNC) brief to K Martin
- 1300 Briefs by CJTH physicians on Urologic Trauma, Infection Control, and Abdominal Wall reconstruction.
- 1400 Col Tellez took team on tour of Craig Joint Theater Hospital and Bagram Air Field.

Oct 4 Tuesday

- 0700 Morning report, ICU rounds, surgeons to OR with pediatric case
- 1000 Movement to flight line
- 1300 "Weasel Ops" movement on C130 aircraft from Bagram Air Field to Camp Bastion/Camp Leatherneck, in Laskar Gah
- 1600 Briefing with CAPT Jeffrey Timby (Navy), Commander, Task Force MED Southwest and CDR Martin Bell (British Army), Executive Officer, on medical operations in RC Southwest.
- 1800 Briefing by CAPT Andy Burgess, Royal Navy, Deployed Medical Director British Navy and Carol Betteridge, Commander Bastion Role 3 and 25 members of the Bastion medical staff; Additional briefing by Bastion TNC, Patrick Fitzpatrick with a 6 month role up of Role 3 JTTR data.

Oct 5 Wednesday

- 0800 Briefing continued by CAPT Jeffrey Timby on the mission to train the Afghan medical elements in RC Southwest.
- 0900 JTTS TNCs brief with K Martin
- 1000 Team moved from Camp Leatherneck billeting to Bastion Role 3 CASF

- 1100 CASF, AE, and CCATT orientation
- 1300 Pedro orientation
- 1500 Fever orientation
- 1600 MERT orientation with MAJ Steven Davies

Oct 6 Thursday

- 0700 CASF Bus to flightline
- 1000 Bastion to Tarin Kowt on C27 aircraft
- 0900 Combined Joint Special Operation Task Force: Afghanistan Forward Surgical Element (FSE), Camp Ripley orientation by FSE team
- 1100 FSE Nurses brief on Role 2 trauma database and performance improvement to K Martin
- 1300 Tarin Kowt Role 2, orientation by LCDR Elliott Jesse/ LCDR Tamara Kensley
- 1630 Participate in weekly patient teleconference from Role 2 at Tarin Kowt.
- 1700 Dinner with team and members of FSE and Role 2 staff.
- 1900 Flew Tarin Kowt to Kandahar Air Field on C27 aircraft

Oct 7 Friday

- 0800 Meet Kandahar Role 3 hospital, attend ICU rounds, surgeons to observe in the OR
- 0900 JTTS TNCs briefing with K Martin
- 1300 Kandahar Air Field Role 3 CO CAPT Meneley and XO COL Goheen briefing with Team
- 1400 Tour jets A-10 squadron with Maj Siu
- 1500 Team debriefing

Oct 8 Saturday

- 0730 Day 1 Afghanistan Trauma Conference (see addendum)
- 1730 Team Debriefing

Oct 9 Sunday

- 1100 Day 2 Afghanistan Trauma Conference
- 1600 Showtime at Kandahar flightline

1800 C130 aircraft to Kandahar Airbase to Bagram Air Field

Oct 10 Monday

0900 Team debriefing

1100 Briefing for COL Don West, Commander Task Force Medical Afghanistan with COL Fields, Executive Officer and two members of the Grey Team (MG Horoho's representatives)

1200 Team lunch with COLs West and Fields

1300 Team report writing JTTS office

Oct 11 Tuesday

0900 Team Report writing in conference room provided at CJTH

2000 Staging for flight at Bagram Air Field AE Squadron (AES)

Oct 12 Wednesday

0330 Team and equipment loading on C17 aircraft Bagram Air Field assisted by AES personnel

0500 Depart on TRANSCOM SG arranged AE flight Bagram Air Field

1000 Arrive Ramstein Air Base, team rest

1400 Dr. Rotondo teleconference with Col (ret) Don Jenkins, member of the Defense Health Board

1830 Team dinner with LRMC Trauma group

Oct 13 Thursday

0700 Return PPE to Ramstein Air Base Logistics unit

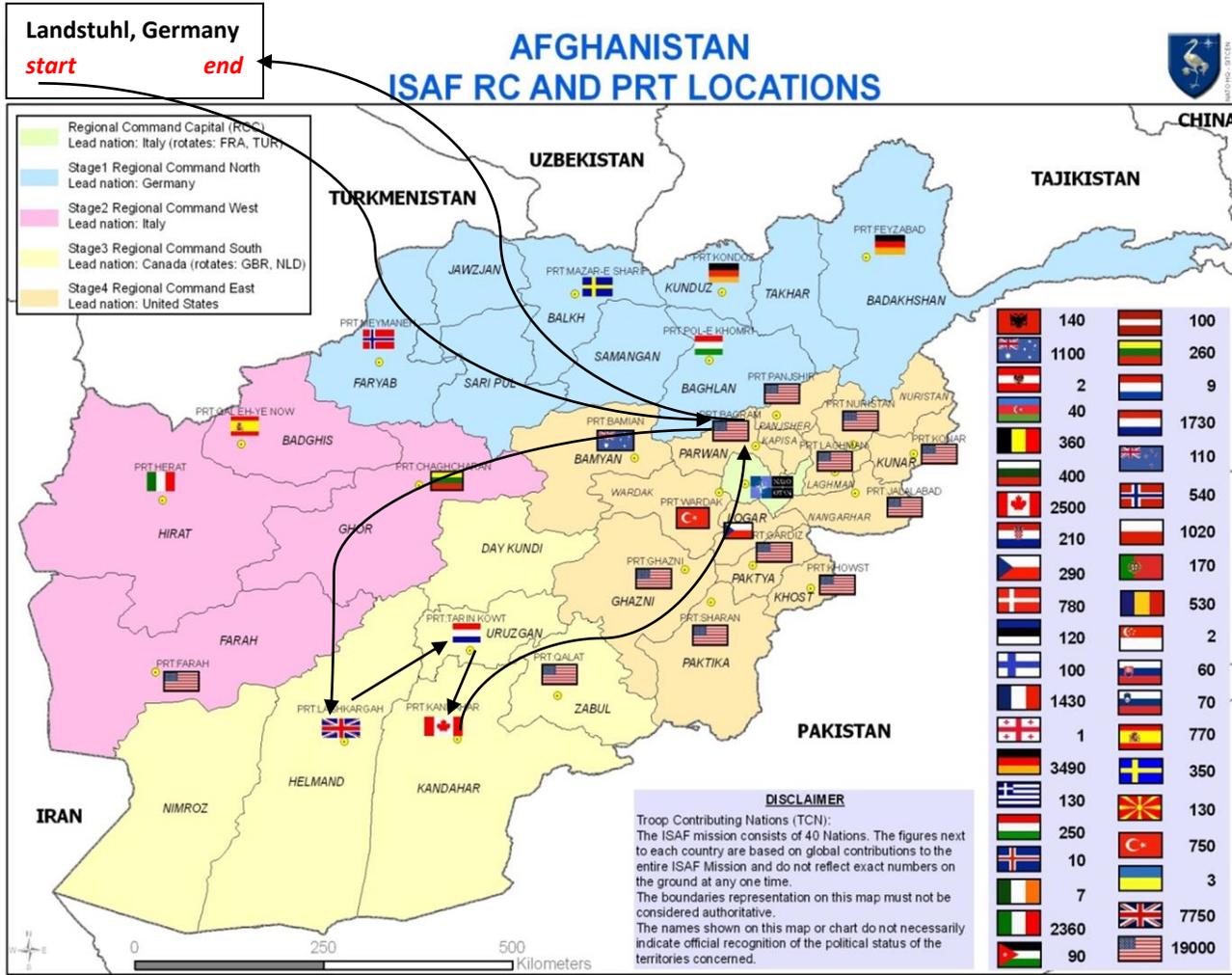
0800 Team report writing

1800 Dinner with LRMC Trauma Directors and LRMC Commander hosted at home of Lt Col Fortuna

Oct 14 Friday

0600 Team departure from Ramstein via shuttle to Frankfurt and back to CONUS

Appendix B Map of Theater Travel Trajectory



Appendix C

ACS COT Trauma Systems Consultation Guide

<http://www.facs.org/trauma/tsepc/pdfs/consultationguide-prq.pdf>

Appendix D
The 2006 HRSA Model Trauma Systems Planning Document

<ftp://ftp.hrsa.gov/ruralhealth/QualityThroughCollaboration.pdf>

<http://adph.org/ats/assets/ATSQAQIWorkgroupMtgAttachments061909.pdf>

Appendix E
Compendium of Medical and Military Acronyms.

ACS	American College of Surgeons
AE	Aeromedical Evacuation
AECT	Aeromedical Evacuation Control Team
AFCENT	Air Forces, Central Command
AFRICOM	Africa Command
AFSC	Air Force Specialty Code
AFSOC	Air Force Special Operations Command
AHLTA	DoD Outpatient Electronic Medical Record
ALRT	Acute Lung Rescue Team (LRMC)
AMC	Air Mobility Command
ANA	Afghan National Army
ANP	Afghan National Police
AOR	Area of Responsibility
ARDS	Acute Respiratory Distress Syndrome
ATACCC	Advanced Technology Applications in Combat Casualty Care (annual meeting)
BAF	Bagram Air Field
CASEVAC	Casualty Evacuation (typically rotary wing, non medical)
CASF	Contingency Aeromedical Staging Facility
CCATT	Critical Care Air Transport Team
CD-ROM	Compact Disk Read-Only Medium
CENTCOM	Central Command
CJTH	Craig Joint Theater Hospital
CME	Continuing Medical Education
CONUS	Continental United States
COIN	Counter-Insurgency
CO2	Carbon Dioxide
COT	Committee on Trauma
CoTCCC	Committee on Tactical Combat Casualty Care
CPG	Clinical Practice Guideline
CRRT	Continuous Renal Replacement Therapy
CSAR	Combat Search and Rescue
CT	Computerized Tomography
CTSC	Combat Trauma Surgery Committee
D5W	Dextrose 5% in Water
D10W	Dextrose 10% in Water
DHB	Defense Health Board
DMRTI	Defense Medical Readiness Training Institute
DNBI	Disease Non Battle Injury
DoD	Department of Defense
DCCS	Deputy Chief of Clinical Services
DTSC	Definitive Trauma Surgery Course
ECMO	Extra Corporal Membrane Oxygenation
EMR	Electronic Medical Record
EMT-B	Emergency Medical Technician-Basic
EMT-I	Emergency Medical Technician-Intermediate
EMT-P	Emergency Medical Technician-Paramedic
ENT	Ear, Nose and Throat (surgical subspecialty)
EWS	Emergency War Surgery Course

EUCOM	Europe Command
FDA	Federal Drug Administration
FEVER	AFSOC C-130 Medical Evacuation Mission
FFP	Fresh Frozen Plasma
FOB	Forward Operating Base
FP=C	Flight Paramedic- Certified
FST	Forward Surgical Team
GCS	Glasgow Coma Score
HOSPEX	Hospital Exercise (British)
ICU	Intensive Care Unit
IDE	Investigational Device Exemption (with FDA)
IED	Improvised Explosive Device
IRB	Investigational Review Board
ISR	Institute of Surgical Research
ISS	In-Service Select
JCCRT	Joint Casualty Care Research Team
JTS	Joint Trauma System
JTTR	Joint Theater Trauma Registry
JTTS	Joint Theater Trauma System
LRMC	Landstuhl Regional Medical Center (Level IV and ACS Verified Level I Trauma Center)
MED	Medical
MASCAL	Mass Casualty
MEDEVAC	Medical Evacuation (on helicopters for this review)
MERT	Medical Evacuation and Resuscitation Team (British)
MOS	Army Medical Specialty Code
MRAP	Mine Resistant Ambush Protected
MRMC	Medical Research and Materiel Command
MTF	Medical Treatment Facility
NASA	National Aeronautical and Space Administration
NATO	North Atlantic Treaty Organization
NCO	Non -Commissioned Officers
NTDB	National Trauma Data Bank
OEF	Operation Enduring Freedom (Afghanistan)
OIF	Operation Iraqi Freedom
OSD	Office of the Secretary of Defense
PAD	Patient Administration
PAX	Passenger Terminal
PCA	Patient Controlled Anesthesia
PEDRO	Call Sign for Pararescue MEDEVAC platform
PI	Performance Improvement
PIPS	Performance Improvement Patient Safety (program)
POI	Point of Injury
PJ	USAF Pararescuemen
PMR	Patient Movement Request
PMI	Patient Movement Items (equipment)
PRBC	Packed Red Blood Cells
RC	Regional Command (Afghanistan)
RN	Registered Nurse
SEALS	Navy Special Operations Unit
SG	Command Surgeon
TACEVAC	Tactical Evacuation (medical personnel on board)
TC2	Theater Inpatient Electronic Medical Record
TCCC	Tactical Combat Casualty Care

TEG	Thromboelastogram
TF MED-A	Medical Task Force Afghanistan
TOC	Tactical Operations Center
TOPIC-M	Trauma Outcomes and Performance Improvement Course- Military
TMDS	Theater Medical Data Store
USFORA	United States Forces- Afghanistan
VA	Veterans Administration
VRC	Verification Review Committee (ACS Committee on Trauma subcommittee)
VTC	Video Teleconference
WWI	World War I
WWII	World War II