An Analysis of Prehospital Trauma Registry After-Action Reviews in Afghanistan

Brandon M. Carius, DSc, MPAS[1]; Peter M. Dodge, BS, NRP[2]; Andrew D. Fisher, MD, MPAS, LP[3]; Paul D. Loos, 18D[4]; Dominic Thompson, NRP[5]; Steven G. Schauer, DO, MS[6]*

ABSTRACT

Background: After-action reviews (AARs) in the Prehospital Trauma Registry (PHTR) enable performance improvements and provide commanders feedback on care delivered at Role 1. No published data exist exploring overall trends of end-user performance-improvement feedback. **Methods:** We performed an expert panel review of AARs within the PHTR in Afghanistan from January 2013 to September 2014. When possible, we categorized our findings and selected relevant medical provider comments. **Results:** Of 737 registered patient encounters found, 592 (80%) had AAR documentation. Most AAR patients were male (98%, n = 578), injured by explosion (48%, n = 283), and categorized for urgent evacuation (64%, n = 377). Nearly two thirds of AARs stated areas needing improvement (64%, n = 376), while the remainder left the improvement section blank (23%, n = 139) or specified no improvements (13%, n = 76). The most frequently cited areas for improvement were medical knowledge (23%, n = 136), evacuation coordination (19%, n = 115), and first responder training (16%, n = 95). **Conclusions:** Our expert panel reviewed AARs within the PHTR and found substantial numbers of AARs without improvements recommended, which limits quality improvement capabilities. Our analysis supports previous calls for better documentation of medical care in the prehospital combat setting.

KEYWORDS: *trauma; prehospital; military; after-action review; performance*

Background

Substantial numbers of potentially preventable combat deaths occur in the prehospital environment, defined as points of care prior to arriving at a Role 3 military treatment facility or a forward surgical team.[1] Ongoing conflicts in Iraq and Afghanistan guided an evolution in battlefield care, including the use of modern tourniquets, hemostatic dressings, and improved means of fluid resuscitation. Mobile communication and computer advancements simultaneously improved patient documentation and tracking platforms, empowering researchers to examine prehospital interventions to refine best practices. These methods and subsequent retrospective analyses drove recommendations and clinical practice guidelines from the Committee on Tactical Combat Casualty Care (CoTCCC) and Joint Trauma System and established their prominence in battlefield medicine.[2]

Top tier units, such as the 75th Ranger Regiment, were quick to adopt CoTCCC concepts on battlefield care as early as 1999, but by nearly a decade later, the larger force had incorporated them more slowly and in a scattered fashion.[3] The 75th Ranger Regiment started capturing prehospital data as part of their own performance improvement in 2005.[3] Recognizing the importance of retrospective analysis for future improvement, command support was integral to the early success of this performance-improvement database. As described by Kotwal et al, [3] the major goals of data capture were not isolated to reducing troop morbidity and mortality on the battlefield but rather vital feedback on both command decision-making systems and training and practices of the medical response unit-wide. Practices reviewed included medical providers (physicians, physician assistants, medics) as well as non-medical personnel (such as infantrymen) with first responder training. Consistent feedback and improvement in the command, medical, and troop levels via the formalized data capture was credited with helping the 75th Ranger Regiment attain zero preventable deaths within their first 10 years of operations in Iraq and Afghanistan.[4]

Modeled after the performance-improvement systems built by Kotwal et al[3] in the 75th Ranger Regiment, the Joint Trauma System sought to build a similar capture system for the military at large—now known as the PHTR, previously described. Prior analysis has demonstrated notably higher rates of AAR documentation compared with TCCC card data.[5] As such, the PHTR sought to capture data in the form of AARs in addition to the TCCC card data. These reports, which are largely an unstructured free-text format, have not been previously described. We seek to describe areas of improvement noted on AAR forms in the PHTR to evaluate for medical and demographic trends in prehospital battlefield treatments.

*Correspondence to brandon.m.carius.mil@mail.mil

[1]**MAJ Brandon M. Carius** is affiliated with 121 Field Hospital, Camp Humphreys, Republic of Korea and Brian D. Allgood Army Community Hospital, Republic of Korea. [2]**SSG Peter M. Dodge** is affiliated with the New Hampshire Army National Guard, 3rd Battalion, 238th Aviation Regiment, Concord, NH. [3]**MAJ Andrew D. Fisher** is affiliated with Texas Medical Command, Texas Army National Guard, Austin, TX; Department of Surgery, University of New Mexico School of Medicine, Albuquerque, NM. [4]**SFC Paul D. Loos** is affiliated with the Office of Special Warfare, 1st Special Forces Command, Fort Bragg, NC. [5]**SFC Dominic Thompson** is affiliated with the 101st Airborne Division (Air Assault), Fort Campbell, KY. [6]**MAJ Steven G. Schauer** is affiliated with the US Army Institute of Surgical Research, JBSA-Fort Sam Houston, Brooke Army Medical Center, JBSA-Fort Sam Houston, and Uniformed Services University of the Health Sciences, Bethesda, MD.

Methods

The Joint Trauma System collected AARs for combat casualties injured in the Afghanistan theater of operations between January 2013 and September 2014, which were subsequently entered into the PHTR system. The US Army Institute of Surgical Research regulatory office reviewed protocol H-16-013 and determined it was exempt from institutional review board oversight. We obtained only deidentified data.

Most data descriptors were designated by the PHTR system to include mechanism of injury, evacuation status, military service component, and patient nationality. Descriptions of specific improvements noted were analyzed from a free-text comment section within the AAR. Given the diverse nature of the sources, the nonstandard format for users to report information, and the variable degree of detail in each report (ranging from 2 to more than 100 words), we applied unstructured qualitative methods to analyze the reports. An expert military medical panel then created a post hoc categorization scheme using the categories outlined in Table 1. This panel consisted of veteran military medical providers, including a flight paramedic, a special operations combat medic, a special forces medic, two physician assistants with conventional and special operations experience, and a physician with special operations experience. Combined, they had 95 years of military service, with 23 deployments and more than 15 years of time overseas. Data are reported in descriptive format and supplemented by selected quotes lifted from the sources to illustrate key themes.

TABLE 1 *After-Action Review Categorical Definition*

Training	Equipment	Documentation and Communication	Medical Practice
First Responder/ Nonmedic Integration Employment of combat lifesaver (CLS) and/or Tactical Combat Casualty Care (TCCC) techniques by nonmedic personnel	**Lack of Equipment** Equipment needed for proper lifesaving medical procedures missing because of poor supply or exhaustion of current supply	**Injury Documentation** Incomplete/ improperly filled TCCC/ MIST cards or other documentation for battlefield casualties prior to arriving at Role 3 facilities	**Vascular Access** Inability for prehospital medical personnel to successfully gain access via IV or IO means
Host-Nation Integration The use of host-nation medical and nonmedical personnel into medical treatment and/ or evacuation procedures	**Lack of Prehospital Medication** Shortages on medications carried by individual Soldiers, medics, and those found in Role 1 and Role 2 facilities	**Poor Evacuation Coordination or Categorization** Transportation delays attributed to poor coordination by command elements and/ or inappropriate priority categorization	**Lack of Knowledge/Poor Management** Improper use of medications, medical techniques, or overall improper patient management

IO, intraosseous; IV, intravenous; MIST, Mechanism, Injuries, Signs/ Symptoms, Treatment.

We performed all analyses using Microsoft Excel (version 10) and JMP Statistical Discovery from SAS (version 13). We present limited quantitative data metrics using descriptive statistics.

Results

Of the 737 registered patient encounters in the PHTR from January 2013 to September 2014, 80% (n = 592) had AAR documentation (Table 2). Most AAR patient encounters involved males (98%, n = 578), were prioritized for urgent evacuation (64%, n = 377), and were injured by explosion (48%, n = 283). Most encounters did not specify the ultimate mortality disposition of the patient (73%, n = 429), with only 25% (n = 149) classifying the patient as alive. Patient nationality was near-evenly split between American (46%, n = 270) and Afghan (49%, n = 289).

Nearly two-thirds of AARs noted areas for improvement (64%, n = 376), while a smaller portion (13%, n = 76) stated no improvement was needed (Table 3). A notable number of AARs (23%, n = 139) left this section blank without comment. Of those noting that improvement was needed, the largest areas included medical knowledge (23%, n = 136), medical evacuation coordination (19%, n = 115), and first responder training (16%, n = 95).

Afghan patient encounters constituted notable majorities for most improvement categories, including host-nation personnel integration (84%, n = 65), lack of prehospital medication administration (74%, n = 23), medical knowledge (63%, n = 86), first responder training (65%, n = 62), and vascular access issues (55%, n = 21). American units had the largest portion of recommended improvements for injury documentation (67%, n = 36) and medical evacuation coordination (47%, n = 54).

Subset analysis found that of patients classified as alive, only 9% (n = 13) were noted to have recommended improvements in care. The remaining cases were evenly divided at 45% each (n = 68) to have either no recommendations for improved care or the area was left blank. Of the patients listed as dead (n = 14), most (64%, n = 9) had recommended improvements in care, with only 1 (7%) stating no recommendations, and the remainder left blank.

Examples of category-specific AAR improvement comments are quoted in Tables 4 through 7.

Discussion

We reviewed nearly 600 AAR files from the PHTR system from an 18-month period covering the Afghanistan theater of operations from 2013 to 2014. Approximately two thirds of AARs noted areas of improvement; the remaining one third either stated no improvement was needed or the area had no input given. The most common areas of improvement cited first responder training, evacuation coordination, and medical knowledge. Categorical trends were largely driven by Afghan patient encounters. Our panel of six military experts reviewed the specific AAR comments and provided recommendations in each of four categories derived from this dataset.

As previously described in the literature, the paradoxical nature of military medicine is that those closest to the patient at points of injury usually have the least amount of medical training.[6] Combat troops with minimal medical training provide interventions prior to more advanced treatment from medics, physician assistants, or physicians. Approximately one eighth of AARs reviewed noted a need for improvement in what was

TABLE 2 *After-Action Review Demographic Analysis**

Factor	Overall (592)	US Conventional Military (137)	US Special Operations (133)	Afghan (289)	Other (33)
Demographics					
Male	98% (578)	98% (134)	98% (131)	98% (283)	91% (30)
Evacuation Status					
Routine	11% (68)	28% (39)	12% (16)	3% (9)	12% (4)
Priority	20% (120)	18% (24)	36% (48)	14% (39)	27% (9)
Urgent	64% (377)	45% (62)	48% (64)	81% (234)	52% (17)
NOS	5% (27)	9% (12)	4% (5)	2% (7)	9% (3)
Mechanism of Injury					
Burn	<1% (2)	1% (2)	0% (0)	0% (0)	0% (0)
Crash	5% (29)	9% (12)	7% (10)	1% (4)	9% (3)
Explosion	48% (283)	57% (78)	43% (58)	43% (124)	70% (23)
Fall	1% (8)	<1% (1)	5% (6)	0% (0)	3% (1)
GSW	39% (230)	17% (23)	35% (46)	54% (156)	15% (5)
Other	7% (40)	15% (21)	10% (13)	2% (5)	3% (1)
Status					
Alive	25% (149)	53% (73)	50% (67)	1% (3)	18% (6)
Dead	2% (14)	5% (7)	4% (5)	0% (0)	6% (2)
NOS	73% (429)	42% (57)	46% (61)	99% (286)	76% (25)

*All data are presented as percentage (total number) for their respective columns.
GSW, gunshot wound; NOS, not otherwise specified.

TABLE 3 *After-Action Review Improvement Categorical Analysis**

Factor	Overall (592)	US Regular Military (137)	US Special Operations (133)	Afghan (289)	Other (33)
Improvements					
Improves	64% (376)	61% (83)	47% (63)	72% (209)	64% (21)
No Improves	13% (76)	1% (2)	11% (14)	18% (53)	21% (7)
NOS	23% (139)	38% (52)	42% (56)	9% (26)	15% (5)
Training					
First Responder	16% (95)	12% (17)	9% (12)	21% (62)	12% (4)
Host-Nation Integration	13% (77)	2% (3)	2% (2)	22% (65)	21% (7)
Equipment					
Lack of Prehospital Medication	5% (31)	2% (3)	3% (4)	8% (23)	3% (1)
Lack of Equipment	10% (57)	9% (13)	8% (10)	11% (31)	9% (3)
Documentation/Communication					
Injury Documentation	9% (54)	17% (23)	10% (13)	6% (16)	6% (2)
Evacuation Coordination/Categorization	19% (115)	28% (39)	11% (15)	18% (52)	27% (9)
Practice					
Vascular Access	6% (38)	5% (7)	3% (4)	7% (21)	18% (6)
Knowledge	23% (136)	18% (25)	14% (18)	30% (86)	21% (7)

*All data are presented as percentage (total number) for their respective columns.
NOS, not otherwise specified.

often deemed nonexistent first responder treatment. A 2016 Department of Defense memorandum authorized replacing the decades-old Army combat lifesaver (CLS) model with Tactical Combat Casualty Care—All Combatants (TCCC-AC) for all service members every 3 years, and a refresher given within 12 months of deployment to a combat theater.[7] Compared with the CLS system, in which approximately one in nine soldiers was required to be trained, TCCC-AC requires every soldier to be trained.

Afghan patient encounters had the highest number of improvements noted overall on AARs. Despite having less than half the total patient encounters, Afghan patients constituted the majority of improvements noted in six of the eight categories analyzed in this study. Many of these cases were directly documented as being under host-nation care. Areas of noted need for improvement ranged from tourniquet placement to medication dosage to indications for antibiotic therapy. This shallow knowledge base, partnered with inadequate resources (a previous study found more than one quarter of hospital facilities could not position a chest tube, and less than half had the capability to perform a cricothyroidotomy[8]), makes continued efforts at turnover difficult. The continued American military force withdrawal necessitates increased emphasis on host-nation capability and competency, improving their military medical system at all levels.

TABLE 4 *After-Action Review Comments Related to Training**

First Responder Training/Nonmedic Integration
• "First responder care possibly could have saved this person's life. Had first aid (tourniquets, pressure bandages, rapid trauma assessment) been administered... Lack of first responder care contributed greatly to the loss of life."*
• "No first aid administered at site of injury... First aid should have been performed at the scene of injury."
• "First responders waited on medics for additional supplies rather than using prestaged supplies at designated CCP"*
• "No pretreatment of casualty"*
• "No tourniquet was placed on the patient's leg at the time of injury; allowing uncontrolled hemorrhage for an unknown amount of time"
Host-Nation Personnel Integration
• "Mentor ANA providers on indications for antibiotics as this [patient] had no indication for antibiotic therapy."
• "Ensure the ANA have trained CLS in area. Other patient was the medic and due to no one else knowing what to do patient did not receive any treatment."
• "Medication dosing by ANA... ANA verbalized prior to 2nd dose of morphine that they were only going to give 5mg but subsequently gave the patient the entire 10mg dose."
• "Continue to mentor/train ANA regarding tourniquet technique (tourniquets were too high and not tight enough to completely stop the bleeding)."
• "Pre-hospital care by ANSF was lacking as evidenced by the incorrect placement of the initial tourniquets. Therefore, prompt removal of clothing is necessary."

*Denotes multiple of same comment.
ANA, Afghan National Army; ANSF, Afghan National Security Forces; CCP, critical care point; CLS, combat lifesaver.

TABLE 5 *After-Action Review Comments Related to Equipment*

Insufficient Equipment
• "Blade for laryngoscope. 3rd patient needlessly getting a [cricothyroidotomy] due to insufficient equipment."
• "CAT Tourniquet inadequate for controlling [junctional] bleeding."
• "Broselow tape did not match equipment in the bag... the IO included in the bag was a manual IO device with adjustable depth. The depth was not included on the Broselow tape."
• "Lack of hemostatic dressing being available at the point of injury (kerlix was used to pack the wound)."
• "C-Collars [need to be] on hand during mounted operations."
Lack of Prehospital Medication
• "Make sure attached Infantry deploy with combat pill packs."
• "No oxygen available... no pleurevac available."
• "A combat pill pack should have been administered while patient waited for air MEDEVAC"
• "No TXA"
• "No [antibiotics]; No TXA"

CAT, combat application tourniquet; IO, intraosseous; TXA, tranexamic acid.

Although the existence of an AAR system demonstrates an institutionalized attempt at cyclical improvement, disparities noted between AAR trends in this study and previous literature illustrate troubling gaps in performance assessment by military medical providers. Prior studies show documented prehospital medication lacking in approximately 30% to 96% of cases where it was recommended,[9–13] yet our analysis found that this area was noted to need improvement only 5% of the time. As noted elsewhere, although instances of intervention without documentation can occur, we cannot assume that this is the case in most patient encounters. Furthermore, medication administration without documentation can also endanger the patient because it puts them at risk for duplicate therapy.

TABLE 6 *After-Action Review Comments Related to Documentation and Communications*

TCCC Cards/MIST
• "Patient recording did not include documentation of abdominal/pelvic exam or the performance of the FAST exam."
• "Continuity of patient care information – medic reported that the TC3 cards were disregarded."
• "Patient recording sub-standard, states that patient received Ancef on paper chart although patient [had] no reason to get antibiotics nor was he given them."
• "[Chain of command] reported on Z-MIST that patient had GSW to neck and recorder marked that patient suffered an isolated MVA causing injury – both issues caused patient to be rejected from admittance to LN care and patient had to be MEDEVAC'd again to Bastion."
• "TCCC card not filled properly (all the medics were treating casualties; had to rely on ancillary personnel)."
Poor Evacuation Coordination and Priority Categorization
• "Categorize patient as routine." [Patient was categorized as Urgent]
• "Triaging corpsman initially did not call casualty urgent... who fit criteria to be admitted to a civilian level 1 burn center."
• "There was an issue with calling in the nine line. It took us sending five different nine lines before we got a response."
• "Improve on reporting: no 9-line MEDEVAC was reported to higher chain of command."
• "RTO had difficulty contacting the BN IOT send up the 9-Line; BN needs to clear the net when a 9-Line is being sent up"

FAST, focused assessment with sonography in trauma; GSW, gunshot wound; IOT, in order to; MIST, mechanism, injuries, signs/symptoms, treatment; TC3/TCCC, Tactical Combat Casualty Care.

TABLE 7 *After-Action Review Comments Related to Documentation and Communications*

Vascular Access
• "Failed to have 2 large bore catheters in place for blood products for arrival at Role 2/3. IV access lost and trauma team lead was not notified... 2nd IV access not attempted."
• "IV access took longer than necessary, IO should have been attempted after multiple failed attempts at IV."
• "Several failed attempts at IV into R[ight] [antecubital]. Attempted IO twice into R[ight] tibial plateau. First attempt did not puncture skin and second was not deep enough."
• "Review and practice starting IV lines and remember need for tourniquet (There were a total of 7 sticks to start 2 IVs on the patient)"
• "Poor IO placement"
Lack of Knowledge and Poor Management
• "Corpsman ordered to place left chest tube, who felt like he had no confidence to accomplish task but did not verbalize so the task could be passed to another corpsman."
• "Setup of pleurevac was performed incorrectly and new pleurevac needed for chest tube… evacuation was delayed, due to technical problems with chest tube placement."
• "During the transfer of patient from first to second liter improper head and C-spine control was maintained."
• "incorrectly administered 5mg of Diazepam instead of 50mcg of Fentanyl."
• "Poor BVM; Failed intubation; Adherence to ATLS; Failed pelvic binder"

ATLS, advanced trauma life support; BVM, blood volume monitoring; IO, intraosseous; IV, intravenous.

Limitations

Our analysis is primarily limited by the incomplete data entry and the free-text nature of improvement feedback in the PHTR AAR system. No data in the PHTR AARs establish the interval between patient encounters and AAR completion, or to what extent the AAR reviewer was involved in treatment. These factors can therefore lead to marked perception and recall biases. Further, there is no standard given regarding how to fill out AAR documentation, limiting the consistency of

records and the ability to extract data accurately for analysis. These disparities may obscure whom the AAR commentary is intended to address if the provider is not directly identified (i.e., an Afghan medic versus an American medic).

Conclusions

Our expert panel reviewed AARs within the PHTR and found substantial numbers of AARs without improvements recommended, which limits quality-improvement capabilities. Our analysis supports previous calls for better documentation of medical care in the prehospital combat setting.

Acknowledgments
We would like to thank the Joint Trauma System Data Analysis Branch for their efforts with data acquisition.

Financial Disclosure
We have no relevant disclosures to report.

Funding
We received no funding for this study.

Disclaimer
The views expressed herein are those of the authors and do not reflect the official policy or position of Brooke Army Medical Center, US Army Institute of Surgical Research, the US Army Medical Department, the US Army Office of the Surgeon General, the Department of the Army, the Department of the Air Force, or the Department of Defense or the US Government.

Author Contributions
BMC and SGS conceived the study concept. BMC, PMD, and SGS analyzed the data. BMC wrote the first draft, and all authors read, provided critical revisions, and approved the final manuscript.

References
1. **Eastridge BJ, Mabry RL, Seguin P, et al.** Death on the battlefield (2001–2011): implications for the future of combat casualty care. *J Trauma Acute Care Surg*. 2012;73(6 Suppl 5):431–437.
2. **Eastridge BJ, Mabry RL, Blackbourne LH, Butler FK.** We don't know what we don't know: prehospital data in combat casualty care. *US Army Med Dep J*. Apr-Jun 2011;11–14.
3. **Kotwal RS, Montgomery HR, Mechler KK.** A prehospital trauma registry for tactical combat casualty care. *J Spec Oper Med*. 2011; 11(3):127–128.
4. **Kotwal RS, Montgomery HR, Kotwal BM, et al.** Eliminating preventable death on the battlefield. *Arch Surg*. 2011;146(12): 1350–1358.
5. **Schauer SG, April MD, Naylor JF, et al.** A descriptive analysis of data from the Department of Defense Joint Trauma System Prehospital Trauma Registry. *US Army Med Dep J*. Oct-Dec 2017; (3-17):92–97.
6. **Schauer SG, Naylor JF, Maddry JK, et al.** Prehospital airway management in Iraq and Afghanistan: a descriptive analysis. *South Med J*. 2018;111(12):707–713.
7. **Department of Defense Instruction 1322.24.** *Medical Readiness Training*. Office of the Under Secretary of Defense for Personnel and Readiness. Washington, DC; 2018. https://www.esd.whs.mil/Portals/54/Documents/DD/issuances/dodi/132224p.pdf?ver=2018-03-16-140510-410
8. **Contini S, Taqdeer A, Cherian M, et al.** Emergency and essential surgical services in Afghanistan: still a missing challenge. *World J Surg*. 2010;34(3):473–479.
9. **Schauer SG, Fisher AD, April MD, et al.** Battlefield analgesia: adherence to Tactical Combat Casualty Care guidelines. *J Spec Oper Med*. 2019;19(1):70–74.
10. **Schauer SG, Robinson JB, Mabry RL, Howard JT.** Battlefield analgesia: TCCC guidelines are not being followed. *J Spec Oper Med*. 2015;15(1):85–89.
11. **Schauer SG, Fisher AD, April MD, et al.** Prehospital administration of antibiotic prophylaxis for open combat wounds in Afghanistan: 2013-2014. *J Spec Oper Med*. 2018;18(2):53–56.
12. **Fisher AD, Carius BM, April MD, Naylor JF, Maddry JK, Schauer SG.** An analysis of adherence to Tactical Combat Casualty Care guidelines for the administration of tranexamic acid. *J Emerg Med*. 2019;57(5):646–652.
13. **Kaji AH, Schriger D, Green S.** Looking through the retrospectoscope: reducing bias in emergency medicine chart review studies. *Ann Emerg Med* 2014;64(3):292–298.

The Special Operations Medical Association's Official Journal

JSOM

JOURNAL *of* SPECIAL OPERATIONS MEDICINE™

Summer 2021
Volume 21, Edition 2

THE JOURNAL FOR OPERATIONAL MEDICINE AND TACTICAL CASUALTY CARE

Inside this Issue:

- FEATURE ARTICLES: Tourniquet Practice Models
- Atherosclerosis in Elite Special Operations Forces
- 23.4% Hypertonic Saline for TBI
- The Effect of Airdrop on Fresh Whole Blood
- Military POCUS › Unconventionally Acquired Brain Injury
- Prehospital Trauma Registry After-Action Reviews in Afghanistan
- Telemedicine Capabilities of Special Operations
- Targeted Intervention in Patients With mTBI
- Back Pain in Italian Helicopter Aircrews › TXA Use in TEMS Providers
- CASE REPORTS: TXA Use in TEMS Providers › Infectious Myositis › Bacteria on Female Urinary Diversion Devices
- IN BRIEF: Far-Forward Blood Donation
- ONGOING SERIES: Human Performance Optimization, Infectious Disease, Injury Prevention, Law Enforcement & Tactical Medicine, Research: How To, Veterinary Medicine, TCCC Updates, *and more!*

Dedicated to the Indomitable Spirit, Lessons Learned & Sacrifices of the SOF Medic

A Peer Reviewed Journal That Brings Together The Global Interests of Special Operations' First Responders