

Leadership and a casualty response system for eliminating preventable death

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ABSTRACT: Combat casualties who die from their injuries do so primarily in the prehospital setting. Although most of these deaths result from injuries that are nonsurvivable, some are potentially survivable. Of injuries that are potentially survivable, most are from hemorrhage. Thus, military organizations should direct efforts toward prehospital care, particularly through early hemorrhage control and remote damage control resuscitation, to eliminate preventable death on the battlefield. A systems-based approach and priority of effort for institutionalizing such care was developed and maintained by medical personnel and command-directed by nonmedical combatant leaders within the 75th Ranger Regiment, U.S. Army Special Operations Command. The objective of this article is to describe the key components of this prehospital casualty response system, emphasize the importance of leadership, underscore the synergy achieved through collaboration between medical and nonmedical leaders, and provide an example to other organizations and communities striving to achieve success in trauma as measured through improved casualty survival. (*J Trauma Acute Care Surg.* 2017;82: S9–S15. Copyright © 2017 Wolters Kluwer Health, Inc. All rights reserved.)

Four brave men who do not know each other will not dare to attack a lion. Four less brave, but knowing each other well, sure of their reliability and consequently of mutual aid, will attack resolutely.—Col. Ardant du Picq, 1870

The mission of the 75th Ranger Regiment is to support the U.S. National Defense through the precise and timely execution of special operations and light infantry tactics.¹ To achieve this, rangers must be ready on short notice and also be proficient in conducting complex combat operations during both the day and night and in extremes of weather and terrain. The 75th Ranger Regiment is the U.S. Army's premier raid force and largest special operations combat element. Composed of more than 3,500 personnel, rangers conduct combat missions to include airborne, air assault, and other direct-action raids to seize key targets, destroy strategic facilities, and capture or kill enemy forces. Providing care to casualties during such missions can prove challenging.

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BACKGROUND

Critical Assessment

The success of a trauma system can be measured through lives saved.² Lives saved in combat can be directly correlated to improvements in casualty care and transport.³ Combat casualty care statistics can provide comparisons of trauma systems within a conflict,^{4–6} as well as between conflicts.^{6,7} These statistics provide a foundation for the general understanding of combat trauma data which may prove helpful for identifying areas for performance improvement; particularly, in the realms of killed in action (KIA) mortality, or prehospital death; died of wound (DOW) mortality, or hospital death; and all mortality, both KIA and DOW, through a combined case fatality rate (CFR).³

In October 1993, Task Force Ranger conducted a direct-action raid into a heavily armed and densely populated region of Mogadishu, Somalia. During the subsequent 15-hour battle, the task force sustained 125 casualties to include 14 who were KIA and 111 who were wounded in action (WIA). Of the WIA, 4 were DOW and 49 were rapidly returned to duty (RTD) with minor wounds.⁸ This event resulted in a %KIA of 18.4, %DOW of 6.4, and a CFR of 23.7. In contrast, from 2001 to 2010, rangers conducted more than 8,000 combat missions which were primarily direct-action raids and incurred a total of 419 casualties during 8.5 years of continuous combat in Afghanistan and 7 years in Iraq.⁵ For Afghanistan, rangers sustained 180 casualties to include 13 who were KIA and 167 who were WIA. Of the WIA, 2 were DOW and 76 were RTD with minor wounds resulting in a %KIA of 12.5, %DOW of 2.2, and a CFR of 8.4. For Iraq, rangers sustained 239 casualties to include 15 who were KIA and 224 who were WIA. Of the WIA, 2 were DOW and 81 were RTD with minor wounds resulting in a %KIA of 9.5, %DOW of 1.4, and a CFR of 7.1.

Between 1993 and 2001, critical assessments of the Somalia conflict with commensurate adjustments in “TTPs” or

tactics (employment and arrangement of forces), techniques (nonprescriptive methods to perform missions, functions, or tasks), and procedures (standards and detailed steps that prescribe how to perform specific tasks); personal protective equipment (PPE); and casualty care and transport have proved invaluable for saving ranger lives in subsequent conflicts.⁵ Although it initially came at a cost of ranger lives, a “silver lining” of the Somalia conflict was the subsequent ranger pursuit of eliminating preventable death during the Afghanistan and Iraq conflicts. As evidenced by ranger reductions in %KIA, % DOW, and CFR between conflicts, parallel efforts from the Department of Defense (DoD) Joint Trauma System and the Ranger Casualty Response System have been vital in mitigating morbidity and mortality through an integrated whole-community approach to a continuous learning health system and evidence-based performance improvement model.^{2,3,5,9,10} Of the 419 battle injury casualties incurred by rangers between 2001 and 2010, this model resulted in no casualties who died from injuries that were potentially survivable through additional prehospital medical intervention, and only one casualty who died from injuries that were potentially survivable in the hospital setting.⁵ A notable and integral component of this model of success was the leadership- and culture-driven integration of modern prehospital combat casualty care practices.

Ownership and Priorities

Responsibility, accountability, and ownership are core leadership traits. Developing a culture of personal accountability, where leaders and subordinates alike possess the freedom to make bold decisions and the courage to assume risk and take ownership, is a vital characteristic of a successful organization. Individuals who are invested in what they are doing, and engaged with the greater good of the organization, will exhibit ownership. Once individuals are engaged and have ownership, they will be compelled to accomplish tasks and innovate solutions for the betterment of the organization and to complete the mission.

Leadership is the key component of combat power, and combat power is the total means of destructive and/or disruptive force which a military organization can apply against an opposing force at a given time. As leaders can direct priorities of effort; and as leaders can enforce expectations or standards; and as leaders are also the standard bearers for their organization; leaders must retain visibility, ownership, accountability, and responsibility for major programs within their organization, regardless of subject domain. Subject matter experts can propagate a leader's intent by developing and continuously refining systems-based programs that achieve standards, goals, and expectations for performance as measured and analyzed through data and metrics. Thus, for combatant units, many challenges in military medicine can be overcome through ownership, prehospital trauma training and expertise, and data collection and metrics that inform leader decisions.^{11–14}

Combatant units within the U.S. Military are normally led by a leadership team comprised of a commanding officer and a command sergeant major or senior enlisted advisor. For the 75th Ranger Regiment from 1997 to 1999, this team was comprised of Colonel Stanley A. McChrystal and Command Sergeant Major Michael T. Hall. Early on, this command team decided to focus primarily on four major priorities—marksmanship, physical training, small unit tactics, medical training—which they called

“the Big Four.”¹⁵ As this team realized that they would not have the time to do everything that they wanted to do, they decided to do what they could do very well. Thus, prioritizing and continuously reinforcing high standards and a mastery within these four basic domains of effort. They accomplished this feat by upholding a regimented culture of excellence through standards while also inspiring all to “flatten the organization” so as to encourage leadership, innovation, and cohesion at all levels.

Cohesion is a critical factor for performance within an organization. Cohesion creates shared responsibility for success, while giving each individual the confidence that someone else is watching over them—“sure of their reliability and consequently of mutual aid.” As medical training and readiness became a leader priority, it created another cultural opportunity for cohesion that primed the regiment for a prehospital casualty response system.

Also imparting support to this system, was the fact that the other three leader priorities overlapped with the medical domain and were viewed as components of a holistic approach. Expert skills in marksmanship and small unit tactics translated readily into preventive medicine, and heightened physical training established a conduit for both prehabilitation and rehabilitation. Although additional study is needed, rangers have supported the concept that a conditioned body may be more apt to complete the mission and avoid injury, and if injured, may have improved outcomes and shortened periods of recovery.^{16–18} In addition, in 2005, the commanding officer of the regiment, then Colonel Paul J. LaCamera, added a fifth priority of “mobility.” Once again, this domain overlapped with medical training in respect to the transport and en route care of casualties.

Best Practices

Regardless of military or civilian sector, for trauma, the greatest opportunity to save lives is in the prehospital setting.^{2–8,11–14,19,20} Thus, for the military, efforts directed toward reducing KIA mortality, or prehospital combat trauma death, can have the largest impact on eliminating preventable death on the battlefield.^{2–8,11–14,19,20} As rangers and ranger leaders realized the importance of prehospital care early on, before the recent conflicts in Afghanistan and Iraq, they implemented best practices that would ultimately increase survival in their population.^{2,3,5}

For critically injured combat casualties, survival from trauma is associated with the time that has elapsed between injury and receiving a required intervention or capability.^{6,21} Although rapid prehospital transport to a higher level of medical care is important, it is rather the timely administration of a needed capability that is ultimately paramount.^{5,6,21–25} Thus, as demonstrated by the 75th Ranger Regiment, both medical and nonmedical first responders must have the capability to successfully provide life-sustaining prehospital trauma care.⁵ Because most potentially survivable combat deaths are from hemorrhage,²⁰ hemorrhage control and blood transfusion capabilities are paramount.

A modern-day revolution in prehospital trauma care was born from the principles of Tactical Combat Casualty Care (TCCC) in 1996.^{26–30} These principles have been continuously updated, refined, and propagated since the advent of the Committee on Tactical Combat Casualty Care in 2001,^{28–30} which currently resides under the DoD Joint Trauma System. The three core goals of TCCC are to treat the casualty, prevent additional

casualties, and complete the mission. These goals merge mission tactics with casualty care to optimize casualty response TTPs. The resultant protocols are a standard of care that should be expected from all first responders in a tactical or prehospital battlefield setting. The 75th Ranger Regiment integrated TCCC into training in the four years preceding the events of September 11, 2001.^{5,27} During more than a decade and a half of continuous involvement in combat thereafter, this standard of care has become interwoven into the very fabric of its organizational structure.

As has been previously described,¹¹ prehospital combat morbidity and mortality can be prevented by combatant and medical leaders at multiple levels through: (1) primary prevention; prevent injury incident through physical and mental conditioning, TTPs, and evidence-based findings from tactical and medical After Action Reviews (AARs), (2) secondary prevention; mitigate injury extent through tactical contingency planning and PPE, and (3) tertiary prevention; optimize injury care through properly executed TCCC, optimized tactical casualty response, and remote damage control resuscitation.

CASUALTY RESPONSE SYSTEM

The 75th Ranger Regiment has three line battalions staggered by three months onto a 9-month operational readiness training cycle. The cycle begins with individual training, moves through small unit collective training, and then culminates into large scale training exercises, which are followed by combat deployments as directed. Ranger leader integration of casualty care and evacuation into their operational readiness training cycle was absolutely vital, because it provided graduated levels of knowledge and skill application in the context of and synchronized with other combat-related TTPs that occur within fighting formations. Every stage of training was evaluated for opportunities to provide casualty care training, and where appropriate, the training was integrated for all personnel—medical officers, medics, nonmedical leaders, and nonmedical first responders. Thus, all received continuous casualty response training throughout the 9-month cycle. A key underpinning of casualty response training is the use of the term casualty response rather than medical training, as it conveys a communal obligation for the entire force to take action as with any other battle drill.⁵ When a casualty occurs on a mission, the incident is a tactical and leader problem to be solved and not just an isolated issue consigned to medical personnel alone. Although comprehensive medical training was previously implemented and described by one battalion in the regiment before the Somalia conflict,³¹ it was not ubiquitously practiced by all in a casualty response system, nor was it based on a standard dictated by TCCC guidelines.

Standards for the Nonmedic

Distributed knowledge and capability are major force multipliers.⁹ The principles of TCCC, coupled with the directive for all rangers to focus on four priorities of training to include medical readiness and casualty care, proved to be a timely catalyst for developing a TCCC-based Ranger First Responder (RFR) program of instruction in 1999.²⁷ The RFR course is taught to all personnel prior to assignment within the 75th Ranger Regiment, and on a recurrent basis thereafter.^{5,9,27,32} The initial and refresher 2-day course teaches critical first aid and advanced

combat lifesaver procedures through didactic lectures, hands-on skill stations, and realistic trauma lanes that were conducted during the day and night, and as frequently as possible, integrated into live fire and other training exercises.

Standards for training were based on TCCC guidelines, and all were expected to be current and competent on these standards. Regardless of military occupational specialty, this course afforded every ranger the basic knowledge and operational skills required to treat and save lives. Fundamental expectations are divided into three categories of familiarization, proficiency, and mastery within the fields of hemorrhage control, airway problems, breathing issues and chest trauma, and damage control resuscitation.⁹ The required skills to be mastered in this course are practiced, reinforced, and rehearsed continuously throughout the training cycle during the conduct of small-unit battle drills and training exercises at every level—team, squad, platoon, company, battalion, and regiment. For first responders with a propensity toward medicine, and in accordance with a command directive for at least one advanced nonmedic provider per squad or seven-man element, additional training was provided through Emergency Medical Technician (EMT) courses which has evolved into a more tactical advanced RFR training.

Confidence and competence was gained through training and real-world experiences. These real-world experiences, in both training and combat, prompted a cultural sense of immediacy where casualties are expected. Because confidence does not equate to competence, integrating performance measures was paramount. The key to training was conditioning all to do the right thing at the right time. Guidelines, protocols, and procedures were established based on best practices from the medical literature. Trainers were trained and provided performance measures based on guidelines so as to reduce variability in training.

Self and buddy care should be the foundation of a whole-community approach to reducing mortality from trauma. Because all have the potential to be a casualty, and all have the potential to be a first responder, then all were directed to carry a bleeder control kit with commensurate ability to provide and document initial care. Bleeder control kits were carried in a standard location with contents directed toward the rapid treatment of the three major causes of preventable death as outlined by TCCC guidelines—extremity wound hemorrhage, tension pneumothorax, and airway obstruction.²⁶ Included in the bleeder control kits were extremity tourniquets, hemostatic gauze, pressure dressings, needles for decompression of a tension pneumothorax, nasopharyngeal airways, and casualty cards. Notable was that these kits became a model for the modernization of individual first aid kits throughout the DoD. Additionally, ranger squads were also expected to carry aid and litter kits that contained a compact and collapsible lightweight litter and additional medical supplies for the TCCC management of casualties.

Standards for the Medic

Ranger medics are highly trained physician extenders with trauma care expertise. Although training standards for ranger medics have been previously described,³³ their training has continued to evolve as commensurate to the needs of the mission and their casualty population. Ranger medics are expected to teach and have a mastery of prehospital trauma care practices. Following initial EMT basic and TCCC training through the

Army medical department, ranger medics complete the Special Operations Combat Medic course where they receive EMT paramedic training combined with advanced TCCC applications as well as special operations-specific tactical medical emergency protocols. Recurrent training is received through formal refresher and certification courses, trauma center rotations, and a culminating combat trauma management and assessment and validation program. This program included written and oral tests, multiple hands on skill stations, and a variety of human patient simulator and live tissue scenarios. This assessment occurred each training cycle, just prior to large scale exercises or combat deployments.

Because knowledge plus experience equate to wisdom, those medics who gained real-world experiences in addition to the knowledge provided during training tended to perform better and to have better judgement when providing care as they had real-world applications and references for context. Thus, integrating trauma center rotations, ambulance ride along call, and clinical rotations into the training cycle was very important. These rotations provided a venue for applying judgement, skills, and knowledge. These rotations also provided experience and objective performance measures through patient outcomes of morbidity and mortality.

Knowledge products provided to ranger medics included TCCC guidelines and updates, the military version of the Prehospital Trauma Life Support manual,³⁴ and a comprehensive Ranger Medic Handbook that has been published and updated since 2001.³⁵⁻³⁸ The Ranger Medic Handbook succinctly outlines standards, a scope of practice, and details and algorithms on protocols and procedures that are expected of the ranger medic; and as stated in the handbook, ranger medics are expected to have a "Mastery in Close Combat Medicine."

Medical equipment and supplies carried by the ranger medic are primarily geared toward the acute prehospital management of trauma casualties, and secondarily tailored to support specific mission profiles. Ranger medic aid bag contents are synchronized with TCCC guidelines, and all medics pack in accordance with a standardized and routinely updated packing list. The regiment also maintained additional modified packing lists to accommodate specific mission profiles (e.g. airfield seizure) so as to assist medics with adjustments based on mission requirements. A ranger medic's kit worn on their body armor was standardized for the care of at least one acute multi-system trauma patient, and afforded the opportunity to rapidly provide life-saving treatment without the need to open their aid bag.

Standards for Ranger Leaders

Because tactical leaders manage all resources (e.g. personnel, training, equipment, time, money, etc.) dedicated to preparing for and completing a mission, it is this nonmedical leader who is ultimately responsible for the prehospital casualty response system. Thus, a Casualty Response Training for Ranger Leaders (CRTRL) course was developed and initiated in 1999,⁵ and has been integrated into initial training for leaders as they are assigned to the regiment; as well as during an internal team leader's course for enlisted personnel assuming their first leadership position. This training event focused primarily on providing each leader, at every level from team leader to ground force commander, with an enhanced understanding and expectation of their role and responsibilities in the casualty response system,

as well as how their individual decisions can affect both successful completion of the mission and survivability of casualties. In addition to leader management of casualty response TTPs, to include casualty evacuation procedures, contingency planning for the possibility of taking casualties during each phase of the mission was stressed as paramount to casualty survival and the overall success of the mission. Contingency planning and an appropriately conditioned tactical response to casualties are just as important as medical interventions for eliminating preventable death.

A critical component of CRTRL was the detailed instruction on capabilities, limitations, and employment methods of internal and external medical assets, because it was vital for leaders to understand the intricacies of getting the right capability to the right casualty at the right time and place; and balancing such so as to not misappropriate or misuse limited resources. Additionally, an important and routinely updated component of CRTRL was that of casualty vignettes and AARs from recent combat missions. These cases would demonstrate currency and relevance of training, highlight casualty events they would likely encounter, and prompt potential solutions for future casualty events.

Before and in response to casualty events, CRTRL teaches leaders to take charge and to develop TTPs that are based on organization-specific missions, assets, and capabilities; to imagine and rehearse contingency plans; and to leverage first responders as their most abundant and responsive resource. As leaders assume higher positions of responsibility, they are also taught to be cognizant of their broader casualty response role. A junior leader's first encounter and decision-making on behalf of a casualty should not be during a real-world event; it should be during training. Ranger senior leaders have often injected unexpected events (e.g., complex casualty scenarios) during training to challenge and progress the organization to a higher level,³⁹ and force junior leaders to think, react quickly, and execute contingency plans. As key leaders have often been designated as the casualty during training, junior leaders were also forced to assume higher-level roles and responsibilities while also ensuring care for the casualty. The practice of "next-man-up" drills have become a hallmark of ranger leader training and is paramount to the development of junior leaders.

Casualty Transport

During the planning phase of operations, contingencies to accommodate rapid casualty transport included standard medical evacuation as well as use of mission aircraft and ground vehicles. Some of the aviation units supporting rangers developed and provided highly-trained special operations casualty transport personnel; most achieving the level of critical care and flight paramedic certification. Preparatory and synchronized training with these casualty transport personnel, as well as with surgery and resuscitation teams, afforded a seamless transition and cohesive effort of care during combat operations.

Damage Control Resuscitation

In addition to implementing hypotensive resuscitation practices historically recommended by TCCC guidelines,^{26,30} Rangers have also been at the forefront of evolving techniques in tactical or remote damage control resuscitation.⁴⁰⁻⁴² Following the approval of a U.S. Army Special Operations Command and Food and Drug Administration (FDA) Investigational New

Drug protocol, ranger medical providers started routinely carrying French freeze dried plasma during combat missions starting in 2011. This effort, in combination with aggressive hemorrhage control techniques, attempted to provide a more homeostatic resuscitation fluid compared with colloids and crystalloids while retaining the ultimate goal of negating hemorrhagic shock and increasing survivability.

In 2014, after a revision to the TCCC guidelines which advocated use of blood products over colloid or crystalloid solutions,⁴⁰ continued ranger efforts directed toward preventing or reducing effects from hemorrhagic shock was initiated through the development of a unit-wide whole blood program.^{41,42} With active support from ranger leaders, this program identified blood group O rangers who demonstrated antibody (IgM to group A and B antigen) levels of less than 1:256. These individuals were categorized as ranger O Low Titer, or “ROLO,” and tested before deployment for standard transmittable diseases. This group served as an immediate walking blood bank of universal donors for prehospital casualty care. In 2015, the 75th Ranger Regiment deployed its first group of ROLO personnel. Since that time, every ranger task force has deployed with a fully functional ROLO program. In 2016, prescreened Low Titer O Whole Blood (LTOWB) was also supplied to ranger task forces from U.S. blood bank facilities. This permitted ranger medical personnel to rapidly use LTOWB, and if needed, also activate the ROLO walking blood bank to obtain additional whole blood within minutes.

As of December 2016, rangers have thus far administered freeze dried plasma to 10 combat casualties. Of these casualties, eight arrived alive at a surgical treatment facility. Rangers have also administered cold-stored LTOWB to three combat casualties with two receiving one unit and one receiving two units. Two of these casualties arrived alive at a surgical treatment facility, but only one ultimately survived. Company- and platoon-level leadership have been essential to the preparatory success of the ROLO program through integrated training and rehearsal of this protocol as a contingency battle drill. Although the person-to-person ROLO protocol has not been activated and used on a real-world combat casualty as of yet, this capability is ready and available.

Performance Improvement—Integrating and Distributing Lessons Learned

To continuously validate, refine, and solidify standards for TCCC practice, the ranger casualty response system integrated a performance improvement cycle, with components to include: (1) provide casualty care; (2) document care; (3) collect and consolidate data; (4) analyze data; (5) enact performance improvement by refining best practice guidelines and personnel, training, and equipment requirements; (6) publish findings internally and externally to activate force modernization, research and development, and to integrate and distribute lessons learned; and (7) provide casualty care. Lessons learned are not lessons learned unless you learn them; thus, a performance improvement cycle is required to preserve and advance lessons learned. Data and lessons learned can not only inform and educate they can also recruit and garner support from leaders.

Data help to drive requirements and authorizations for personnel, training, and equipment. Leaders appreciate data that informs decisions and justifies expenditures of time and monies.

However, data rely on personnel to document efforts, and documentation of prehospital care in combat has historically been suboptimal.^{3,6,11–13,43–45} In contrast, rangers developed, and their leaders mandated and enforced, two simple documentation tools—a casualty card and a casualty AAR—which have proven successful in collecting combat casualty care data since 2001.^{3,5,44–49} Additionally, as funded and supported by ranger leaders, a Web-based prehospital trauma registry (PHTR) was developed to consolidate and analyze data from cards and AARs for near real-time feedback, performance improvement, and sharing lessons learned.^{2,3,5,44–50} In addition to improving command and organizational visibility of casualties, the PHTR provided leaders with data-driven evidence for decision making; validated and refined casualty response system TTPs, PPE, and TCCC treatment strategies; and refined medical and nonmedical personnel, training, and equipment requirements through cost-effective and directed procurement.

For parent commands, ranger efforts have influenced medical sustainment training efforts within U.S. Army Special Operations Command (regulation 350–1, Appendix G) and special operations forces medical training within U.S. Special Operations Command (directive 350–29). As ranger medical personnel have been integral members of the CoTCCC since its inception, they have also routinely used data to influence and propagate novel practices and changes to TCCC guidelines which are distributed throughout the DoD and beyond.^{2,3,5,44–50} Ranger casualty cards, AARs, and PHTR have been, and continue to be, a vital component of ranger performance improvement. Additionally, this methodology has become a model of excellence from which to guide documentation and data collection for the Department of Defense.^{3,10,21,44,50,51}

Ranger medical force modernization efforts are based on requirements directly related to casualty care dictated by TCCC guidelines, battlefield lessons learned, and most importantly, the tactical mission. As self and buddy aid are paramount to rapid care and eliminating preventable combat death, medical capability development priorities start with the individual ranger or nonmedic first responder; then the ranger squad; followed closely by the ranger Medic. The Regiment’s medical force modernization efforts are synchronized with other special operations forces, as well as DoD research and development. Thus, the regiment is often a lead in the testing and evaluation of medical products and equipment.

CONCLUSION

The efforts described in this article support the charters for the 75th Ranger Regiment as mandated by former U.S. Army Chiefs of Staff General Creighton W. Abrams, General John A. Wickham, and General Gordon R. Sullivan,⁵² and reinforced by recent Army Chief of Staff General Raymond T. Odierno. The regiment is to lead the way in modernizing doctrine, tactics, techniques, procedures, and equipment to meet the challenges of the future, and will share its philosophy and standards.

Eliminating preventable death is an organizational and community issue that requires the attention of all leaders, both medical and nonmedical. It is a matter of morale and moral obligation that battlefield casualties receive the best care possible to optimize survival and recovery from traumatic injury. However, this should

not be left to chance. The ability to set, know, enforce, and exceed established standards is what sets a good organization apart from others. Good leadership can instill what is required to fight on to the objective to complete the mission, and good leadership can also instill what is required to save lives during such missions.

Continuous performance improvement processes and focused empiricism must be used to inform practice and evolve standards.² This article outlined several steps undertaken by the 75th Ranger Regiment to improve combat casualty care through organizational structure, culture, and strategy to include: (1) conduct a critical assessment of the organization's state of affairs; (2) establish priorities of effort and ownership for those priorities; (3) identify and integrate best practices into organizational structure as dictated by mission and culture; (4) establish cohesion and a flat organizational construct for which to develop subject matter experts and to train all to be masters of the basics through standards; (5) establish a continuous performance improvement cycle through metrics and data collection, consolidation, and analysis; and (6) share lessons learned.

The 75th Ranger Regiment institutional goal and commitment to the relentless pursuit of eliminating preventable death, which has been embedded within their special operations and infantry tactics and culture, has and will continue to help preserve advances in combat casualty care. Regardless of personnel and personality turnover, this organization and its systems-based approach has consistently and continuously sustained this goal for nearly two decades. Several challenges to improving combat casualty care and survival on the battlefield had to be overcome, particularly in the realms of ownership, prehospital trauma expertise, data collection, and metrics. For military medicine as a whole, these challenges and others remain as friction points to performance improvement.^{11–14} As U.S. national goals have now aligned to develop a national trauma action plan to pursue zero preventable deaths from trauma,^{2,53–55} intensified momentum of bidirectional translation of efforts will aid in overcoming challenges in both military and civilian populations.

The 75th Ranger Regiment model is readily translatable to others throughout the military and civilian sectors. Organizing, unifying, and training casualty response systems can provide all levels of leadership with invaluable insight into strengths and weaknesses found within their communities. As with leaders within the 75th Ranger Regiment, community leaders at the local, state, and national levels must recognize that severe and critical trauma injuries are inevitable, but death from such is not. Medical and nonmedical community leaders alike can take ownership of their casualty response systems, and promote awareness, cohesion, and creative solutions that will ultimately achieve the desired outcome of eliminating preventable death.

FINAL COMMENTS FROM CURRENT RANGER LEADERSHIP

“Standards of excellence for providing care to our fellow rangers were firmly established and have become an integral part of the Ranger Regiment culture. A mastery of the basics—marksmanship, physical training, small unit tactics, and medical proficiency—remain fundamental to our training and critical to our success on the battlefield. An RFR's ability to master the basics of casualty care remains a top priority of the Regiment.

Likewise, our medical personnel must deliberately maintain a learning posture that seeks to develop and implement innovative approaches to confront and overcome the innate difficulties of providing care to battlefield casualties. Accounting for the challenges inherent to the extreme conditions in which we are expected to operate, the Ranger Regiment will continue to maintain focus on mastering the basics while also seeking cutting edge solutions for trauma care. We will do this first and foremost through our investment in our people—by providing realistic training that holds every individual ranger and leader accountable for medical skills proficiency and ensures all are the best trained on the battlefield.”

Rangers Lead The Way!

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AUTHORSHIP

All authors contributed to the draft and critical revision of this manuscript.

DISCLOSURE

The authors declare no conflicts of interest.

REFERENCES

1. U.S. Army overview of 75th Ranger Regiment mission. (Accessed October 13, 2016 at <http://www.goarmy.com/ranger/mission.html>).
2. Berwick D, Downey A, Cornett E. *Committee on Military Trauma Care's Learning Health System and Its Translation to the Civilian Sector; National Academies of Sciences, Engineering and Medicine (NASEM) report. A national trauma care system: integrating military and civilian trauma systems to achieve zero preventable deaths after injury*. Washington DC: The National Academies Press; 2016. Available at: <http://nationalacademies.org/hmd/reports/2016/a-national-trauma-care-system-integrating-military-and-civilian-trauma-systems.aspx>. Accessed October 13, 2016.
3. Haut ER, Mann NC, Kotwal RS. Military trauma care's learning health system: the importance of data driven decision making. Commissioned manuscript, National Academies of Sciences, Engineering, and Medicine Committee on Military Trauma Care's Learning Health System and Its Translation to the Civilian Sector. (Available at: <http://nationalacademies.org/hmd/~media/Files/Report%20Files/2016/Trauma-Care/Importance-of-Data-Driven-Decision-Making-CP.pdf>). Accessed October 13, 2016).
4. Kelly JF, Ritenour AE, McLaughlin DF, Bagg KA, Apodaca AN, Mallak CT, Pearse L, Lawnick MM, Champion HR, Wade CE, et al. Injury severity and causes of death from Operation Iraqi Freedom and Operation Enduring Freedom: 2003–2004 versus 2006. *J Trauma*. 2008;64(Suppl 2):S21–S26.
5. Kotwal RS, Montgomery HR, Kotwal BM, Champion HR, Butler FK Jr, Mabry RL, Cain JS, Blackburne LH, Mechler KK, Holcomb JB. Eliminating preventable death on the battlefield. *Arch Surg*. 2011;146(12):1350–1358.
6. Kotwal RS, Howard JT, Orman JA, Tarpey BW, Bailey JA, Champion HR, Mabry RL, Holcomb JB, Gross KR. The effect of a golden hour policy on the morbidity and mortality of combat casualties. *JAMA Surg*. 2016;151(1):15–24.
7. Holcomb JB, Stansbury LG, Champion HR, Wade C, Bellamy RF. Understanding combat casualty care statistics. *J Trauma*. 2006;60(2):397–401.
8. Mabry RL, Holcomb JB, Baker AM, Cloonan CC, Uhorchak JM, Perkins DE, Canfield AJ, Haggmann JH. United States Army Rangers in Somalia: an analysis of combat casualties on an urban battlefield. *J Trauma*. 2000;49(3):515–528.
9. Fisher AD, Callaway DW, Robertson JN, Hardwick SA, Bobko JP, Kotwal RS. The ranger first responder program and tactical emergency casualty care implementation: a whole-community approach to reducing mortality from active violent incidents. *J Spec Oper Med*. 2015;15(3):46–53.

10. Joint Trauma System. The Department of Defense Center of Excellence for Trauma. (Available at: http://www.usaisr.amedd.army.mil/10_jts.html. Accessed October 13, 2016).
11. Kotwal RS, Butler FK, Edgar EP, Shackelford SA, Bennett DR, Bailey JA. Saving lives on the battlefield: a Joint Trauma System review of pre-hospital trauma care in Combined Joint Operating Area? Afghanistan (CJOA-A) Executive Summary. *J Spec Oper Med*. 2013;13(1):77–85.
12. Mabry RL, DeLorenzo R. Challenges to improving combat casualty survival on the battlefield. *Mil Med*. 2014;179(5):477–482.
13. Sauer SW, Robinson JB, Smith MP, Gross KR, Kotwal RS, Mabry RL, Butler FK, Stockinger ZT, Bailey JA, Mavity ME, et al. Saving lives on the battlefield (part II)? One year later a joint theater trauma system and joint trauma system review of prehospital trauma care in Combined Joint Operations Area-Afghanistan (CJOA-A) final report, 30 May 2014. *J Spec Oper Med*. 2015;15(2):25–41.
14. Butler FK, Smith DJ, Carmona RH. Implementing and preserving the advances in combat casualty care from Iraq and Afghanistan throughout the US Military. *J Trauma Acute Care Surg*. 2015;79(2):321–326.
15. McChrystal SA. *My share of the task: a memoir*. New York, NY: Penguin Group; 2013:66–67.
16. Jones BH, Hauschild VD. Physical training, fitness, and injuries: lessons learned from military studies. *J Strength Cond Res*. 2015;29(Suppl 11):S57–S64.
17. Gabbett TJ. The training-injury prevention paradox: should athletes be training smarter and harder? *Br J Sports Med*. 2016;50(5):273–280.
18. Myers JN, Fonda H. The impact of fitness on surgical outcomes: the case for prehabilitation. *Curr Sports Med Rep*. 2016;15(4):282–289.
19. Bellamy RF. The causes of death in conventional land warfare: implications for combat casualty care research. *Mil Med*. 1984;149(2):55–62.
20. Eastridge BJ, Mabry RL, Seguin P, Cantrell J, Tops T, Uribe P, Mallett O, Zubko T, Oetjen-Gerdes L, Rasmussen TE, 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):S431–S437.
21. Nohrenberg JL, Tarpey BW, Kotwal RS. Data informs operational decisions: the tactical evacuation project. *US Army Aviation Digest October-December*. 2014:17–19. Available at http://www.rucker.army.mil/aviationdigest/images/AVN_DIG_2014_10-12.pdf. Accessed October 13, 2016.
22. Mabry RL, Apodaca A, Penrod J, Orman JA, Gerhardt RT, Dorlac WC. Impact of critical care-trained flight paramedics on casualty survival during helicopter evacuation in the current war in Afghanistan. *J Trauma Acute Care Surg*. 2012;73(2 Suppl 1):S32–S37.
23. Kragh JF Jr, Walters TJ, Baer DG, Fox CJ, Wade CE, Salinas J, Holcomb JB. Survival with emergency tourniquet use to stop bleeding in major limb trauma. *Ann Surg*. 2009;249(1):1–7.
24. Kragh JF Jr, Littrel ML, Jones JA, Walters TJ, Baer DG, Wade CE, Holcomb JB. Battle casualty survival with emergency tourniquet use to stop limb bleeding. *J Emerg Med*. 2011;41(6):590–597.
25. Kragh JF Jr, Dubick MA, Aden JK, McKeague AL, Rasmussen TE, Baer DG, Blackburne LH. U.S. Military use of tourniquets from 2001 to 2010. *Prehosp Emerg Care*. 2015;19(2):184–190.
26. Butler FK Jr, Haggmann J, Butler EG. Tactical combat casualty care in special operations. *Mil Med*. 1996;161(Suppl):3–16.
27. Veliz C, Montgomery H, Kotwal R. Ranger first responder and the evolution of tactical combat casualty care. *J Spec Oper Med*. 2010;10(3):90–91.
28. Blackburne LH, Baer DG, Eastridge BJ, Kheirabadi B, Bagley S, Kragh JF Jr, Cap AP, Dubick MA, Morrison JJ, Midwinter MJ, et al. Military medical revolution: prehospital combat casualty care. *J Trauma Acute Care Surg*. 2012;73(6 Suppl 5):S372–S377.
29. Blackburne LH, Baer DG, Eastridge BJ, Butler FK, Wenke JC, Hale RG, Kotwal RS, Brosch LR, Bebartha VS, Knudson MM, et al. Military medical revolution: military trauma system. *J Trauma Acute Care Surg*. 2012;73(6 Suppl 5):S388–S394.
30. Butler FK Jr, Blackburne LH. Battlefield trauma care then and now: a decade of tactical combat casualty care. *J Trauma Acute Care Surg*. 2012;73(6 Suppl 5):S395–S402.
31. Donovan W, Mellen PF. Clinically intensive medical training for combat. *Mil Med*. 1989;154(11):546–548.
32. U.S. Army overview of 75th Ranger Regiment training. Available at: <http://www.goarmy.com/ranger/training.html>. Accessed October 13, 2016.
33. Pappas CG. The ranger medic. *Mil Med*. 2001;166(5):394–400.
34. Butler FK, Giebner SD, McSwain NE, Pons PT. *National Association of Emergency Medical Technicians. Prehospital trauma life support manual, 8th military edition*. Burlington, Massachusetts: Jones and Bartlett Learning Publications; 2014.
35. Kotwal RS, Miller RM. *Ranger medic handbook 2001*. Fort Benning, Georgia: Fort Benning Publications; 2001.
36. Miller RM, Montgomery HR. *Ranger medic handbook 2003*. Fort Benning, Georgia: Fort Benning Publications; 2003.
37. Kotwal RS, Montgomery HR, Hammesfahr JF. *Ranger medic handbook 2007*. Las Vegas, Nevada: Cielo Azul Publications; 2007.
38. Montgomery HR, Donovan W. *Ranger medic handbook*. 4th ed. Greer, South Carolina: North American Rescue; 2012.
39. Puckett R. *Words for warriors: a professional soldier's notebook*. Tucson, Arizona: Wheatmark; 2007:165–166.
40. Butler FK, Holcomb JB, Schreiber MA, Kotwal RS, Jenkins DA, Champion HR, Bowling F, Cap AP, Dubose JJ, Dorlac WC, et al. Fluid resuscitation for hemorrhagic shock in tactical combat casualty care: TCCC guidelines change 14-01-2 June 2014. *J Spec Oper Med*. 2014;14(3):13–38.
41. Fisher AD, Miles EA, Cap AP, Strandenes G, Kane SF. Tactical damage control resuscitation. *Mil Med*. 2015;180(8):869–875.
42. Cap AP, Pidcock HF, DePasquale M, Rappold JF, Glassberg E, Eliassen HS, Bjerkvig CK, Fosse TK, Kane S, Thompson P, et al. Blood far forward: time to get moving! *J Trauma Acute Care Surg*. 2015;78(6 Suppl 1):S2–S6.
43. Eastridge BJ, Mabry RL, Blackburne LH, Butler FK. We don't know what we don't know: prehospital data in combat casualty care. *US Army Med Dep J*. 2011;11–14.
44. Kotwal RS, Butler FK, Montgomery HR, Brunstetter TJ, Diaz GY, Kirkpatrick JW, Summers NL, Shackelford SA, Holcomb JB, Bailey JA. The tactical combat casualty care casualty card TCCC guidelines? proposed change 1301. *J Spec Oper Med*. 2013;13(2):82–87.
45. McGarry AB, Mott JC, Kotwal RS. A study of prehospital medical documentation by military medical providers during precombat training. *J Spec Oper Med*. 2015;15(1):79–84.
46. Kotwal RS, O'Connor KC, Johnson TR, Mosely DS, Meyer DE, Holcomb JB. A novel pain management strategy for combat casualty care. *Ann Emerg Med*. 2004;44(2):121–127.
47. Kotwal RS, Meyer DE, O'Connor KC, Shahbaz BA, Johnson TR, Sterling RA, Wenzel RB. Army ranger casualty, attrition, and surgery rates for airborne operations in Afghanistan and Iraq. *Aviat Space Environ Med*. 2004;75(10):833–840.
48. Murray CK, Hospenthal DR, Kotwal RS, Butler FK. Efficacy of point-of-injury combat antimicrobials. *J Trauma*. 2011;71(2 Suppl 2):S307–S313.
49. Fisher AD, Rippee B, Shehan H, Conklin C, Mabry RL. Prehospital analgesia with ketamine for combat wounds: a case series. *J Spec Oper Med*. 2014;14(4):11–17.
50. Kotwal RS, Montgomery HR, Mechler KK. A prehospital trauma registry for tactical combat casualty care. *US Army Med Dep J*. 2011:15–17.
51. Robinson JB, Smith MP, Gross KR, Sauer SW, Geracci JJ, Day CD, Kotwal RS. Battlefield documentation of tactical combat casualty care in Afghanistan. *US Army Med Dep J*. 2016:87–94.
52. Woods KT. *Rangers lead the way: the vision of General Creighton W. Abrams. Strategy research project*. Carlisle Barracks, Pennsylvania: US Army War College; 2003. Available at: <http://www.dtic.mil/cgi-bin/GetTRDoc?AD=ADA415822>. Accessed October 13, 2016.
53. Jenkins DH, Cioffi WG, Cocanour CS, Davis KA, Fabian TC, Jurkovich GJ, Rozycki GS, Scalea TM, Stassen NA, Stewart RM. Position statement of the Coalition for National Trauma Research on the National Academies of Sciences, Engineering and Medicine report, a national trauma care system: integrating military and civilian trauma systems to achieve zero preventable deaths after injury. *J Trauma Acute Care Surg*. 2016;81(5):816–818.
54. Jenkins DH, Winchell RJ, Coimbra R, Rotondo MF, Weireter LJ, Bulger EM, Kozar RA, Nathens AB, Reilly PM, Henry SM, et al. Position statement of the American College of Surgeons Committee on Trauma on the National Academies of Sciences, Engineering and Medicine report, a national trauma care system: integrating military and civilian trauma systems to achieve zero preventable deaths after injury. *J Trauma Acute Care Surg*. 2016;81(5):819–823.
55. Rasmussen TE, Kellermann AL. Wartime lessons—shaping a national trauma action plan. *N Engl J Med*. 2016;375(17):1612–1615.