Tactical Combat Casualty Care in Operation Iraqi Freedom

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Introduction

In the mid-1990s, the U.S. Army Special Operations Command developed a new set of guidelines concerning the treatment of casualties on the battlefield. These guidelines, called Tactical Combat Casualty Care (TCCC), have been updated since their initial proposal and have been widely practiced with excellent results throughout the Special Operations community.[1] However, there has been very little spread of the use of the TCCC guidelines into conventional units. This article reviews the use of the principles of TCCC by a mechanized infantry unit in Operation Iraqi Freedom One (OIF 1).

Background

When Task Force (TF) 1-15 Infantry (TF 1-15 IN), part of the Third Brigade Combat Team of the Third Infantry Division, deployed to Kuwait in Jan 03 in preparation for war, I was assigned by the Professional Officer Filler System (PROFIS) as their Battalion Surgeon. While the infantrymen were training over the next several months for urban combat, trench warfare, and long-range movement, our medical platoon simultaneously underwent a rigorous train-up in preparation for combat. First Lieutenant Robert (Brian) Fox, the battalion physician assistant (PA), SFC Christopher Parker, the medical platoon sergeant, our other medical noncommissioned officers (NCOs) and I concentrated on teaching our 38 enlisted medics the principles of TCCC. Briefly, TCCC breaks up battlefield medicine into three stages:

- *"Care Under Fire"* is care rendered by the medic on the battlefield while under hostile fire with an aid bag as the only equipment.

- *"Tactical Field Care"* is treatment provided once the casualty and his unit are no longer under hostile fire, with equipment limited to that carried into the field.

- *"Combat Casualty Evacuation Care" (CASEVAC)* is treatment provided once the casualty has been picked up by aircraft, vehicle, or boat.

The training of medics by the battalion surgeon and PA, together with the medical NCOs, is probably the most important job assigned to these professionals. However, it is frequently overlooked or not done well. This is particularly true for health care providers who normally work in hospitals and are assigned as PROFIS health care providers just prior to deployment. Despite the inherent difficulties, assigned health care providers have to make the training of medics their first priority. Health care providers who normally work in hospital settings will need to make a concerted effort in their training to get out of the Advanced Trauma Life Support (ATLS) mindset and into one based around battlefield medicine, with its completely different scenarios. Intense daily training is the best way to accomplish this.

Health care providers assigned to Level I positions, such as a Battalion Aid Station (BAS), have a particularly important role to play since up to 90% of combat deaths occur on the battlefield before a casualty ever reaches a medical treatment facility.[2] Hemorrhage from wounds remains the number one cause of mortality, accounting for 50% of all deaths.[3] In Vietnam, 50% of combat deaths were due to wounds with uncontrolled bleeding, with about 11% of these in sites accessible by first aid treatment.[3,4] Ryan et al assert that approximately one-third of all killed in action (KIA) could potentially be salvageable and point to data from Oman in 1973 and Panama in 1989 in which the stationing of emergency medicine physicians at casualty collection points close to the point of wounding resulted in lower KIA rates than in previous conflicts.[5-7]

With this in mind, we undertook to train our medics and ourselves in the precepts of TCCC with the goal of lowering battlefield morbidity and mortality. We concentrated first and foremost on the importance of stopping hemorrhage promptly and efficiently with the use of tourniquets. We also reviewed again and again various battlefield procedures such as needle decompression of tension pneumothorax, nasopharyngeal airway insertion, and cricothyrotomy. The medics worked on starting intravenous (IVs) in all kinds of conditions, including in the dark with night vision goggles.

Emphasis was placed on the simple recognition and treatment of common battlefield injuries. For instance, medics were trained to recognize shock by assessing pulses and mental status, rather than with blood pressure cuffs and stethoscopes which have little use on the battlefield. The principles of hypotensive resuscitation were reviewed, as well as in what

situations the judicious use of IV fluids was appropriate. We avoided teaching procedures like endotracheal intubation and CPR which are of little use to frontline medics in combat.

Each of the medics, alone and in teams, was run through repeated reality-based combat scenarios featuring other Soldiers acting as casualties with the types of wounds likely to be encountered on the battlefield. The medics learned to quickly triage casualties first, then going through the actual steps involved in their treatment. Again and again they were made to demonstrate the actual steps involved in each medical procedure. In addition, we talked through various scenarios, especially those encountered by medics in Mogadishu in 1993. Given the likelihood of impending war at that time, it was not difficult to get 100% effort from the medics in their training. By the time our unit moved north, we had reviewed these techniques and scenarios with our medics so many times that recognition and treatment, at times, simply involved muscle memory, which is important in the stress of combat.

Overview of the Battle

On 21 Mar 03, TF 1-15 IN attacked across the Kuwaiti border into Iraq as part of the Third Infantry Division assault. Over the next 25 days of continuous combat operations, the TF covered over 800 kilometers of open desert and urban terrain and fought in eight major engagements for two Brigade Combat Teams. Major battles were fought at Nasiriyah, Tallil Airbase, as Samawah, and in Baghdad. The TF conducted the first major attack across the Euphrates River and was the Army's main effort in destroying the Republican Guard Medina Division and securing the southern approaches into Baghdad.

Casualties

Over these 25 days, TF 1-15 IN sustained 32 wounded in action and 0 KIA or died from wounds. Friendly casualties with penetrating wounds broke down as follows:

Injury Location	Number of Casualties
Extremity	23
Thorax	0
Head/Neck	2
Pelvis	0
Abdomen	2

Table. Anatomical Distribution of Penetrating Wounds Sustained by TF 1-15 IN Soldiers in OIF 1, 21 Mar 04-14 Apr 04

In addition, two Soldiers were treated for blast injuries and three Soldiers for motor vehicle accidents. As in previous conflicts, approximately 70% of our casualties with penetrating wounds involved the extremities.[8] Body Armor obviously played an important role in limiting significant truncal injuries. Though our sample is very small, our lethality from war wounds was 0%, going along with the decreasing lethality seen in Iraq and Afghanistan as compared to previous wars. As of 16 Nov 04, lethality from war wounds in Iraq and Afghanistan was approximately 10%, as compared to 30% in World War II and 24% in Vietnam.[9]

We treated a significant number of Iraqi casualties over this time as well, though accurate records are not available. In contrast to U.S. casualties, the majority of wounded Iraqis – who did not have body armor – sustained multiple serious injuries of the trunk and extremities. Often these wounds were as a result of fire from weapons with heavy firepower, such as the 25 mm gun on the Bradley Fighting Vehicle. Their morbidity and mortality were thus significantly higher, though again, good statistics are not available.

Lessons Learned – Care Under Fire

The first lesson learned concerned the importance of additional firepower provided by medics, proving that the best medicine on any battlefield is fire superiority. On numerous occasions, TF 1-15 IN medics were subject to both direct and indirect fire and confronted uniformed and nonuniformed enemy combatants. Particularly upon movement into southern Baghdad, our medics played an important role in engaging and destroying enemy fighters prior to treating casualties.

Tourniquets played a decisive role in quickly and effectively stopping hemorrhage under fire and keeping a number of Soldiers with serious extremity wounds involving arterial bleeding alive until they could eventually undergo emergent surgery at the Forward Surgical Team (FST). Medics under fire, based on their training, had a very low threshold for applying tourniquets to extremity wounds with heavy bleeding and, therefore, a significant number of our casualties received them. Given the intense conditions under which our medics treated casualties, it would have been absolutely impossible for them to have attempted to hold pressure over wounds while continuing to fight and treat other wounded. All of our medics carried with them at all times an improvised tourniquet designed from tying together two cravats by 1LT Fox, our PA, and this tourniquet stood up well in battle.

Once Soldiers were seen by a PA or physician at the BAS, in most cases within an hour, they would be reevaluated. In some cases, when appropriate, the tourniquets were removed and replaced with pressure dressings and in others,

particularly amputations, they were left on. In the majority of these cases, these Soldiers received treatment at an FST within several hours. Though long-range follow-up on these wounded Soldiers is not available, evidence that is available suggests that long-term complications due to the use of these tourniquets have been minimal. As for pressure dressings, the combination of Kerlex bandages with Ace wraps supplied effective pressure.

Though we had trained our medics on the use of the hemostatic agent QuickClot, in only one instance did one of our medics have occasion to use it – in a gunshot wound to the thigh involving heavy bleeding from the femoral artery in which the medic was unable to apply sufficient force with an improvised tourniquet to completely stop the bleeding, and was able to do so by pouring QuickClot into the wound. The medic poured the QuickClot into the wound carefully, and as a result, there was no damage to surrounding skin, as sometimes happens with this product. We cannot report on hemostatic dressings as we were not issued them.

Lessons Learned – Tactical Field Care and CASEVAC

Our treatment rendered in the arenas of Tactical Field Care and CASEVAC also bore out many of the TCCC principles. Upon our initial entry into the southern outskirts of Baghdad, the situation developed into a mass casualty scenario, with 10 U.S. casualties, dozens of seriously wounded Iraqi Soldiers, and seven injured Iraqi civilians. As the lead element in the battle, we waited over 12 hours for the FST to advance and set up, and were forced to care for the casualties on our own in the interim, while the battle was ongoing and evacuation was impossible. Before this occurred, we were already low on supplies since we had not been resupplied since fighting had begun 2 weeks prior. As a result, we were forced to seriously partition supplies.

None of our friendly casualties had wounds which affected the airway and thus there was no need for extensive airway interventions among our own casualties. Many Iraqi casualties with sucking chest wounds were treated with Asherman chest seals with good results. Some have reported that they do not adhere well under battlefield conditions, but we did not have that problem despite temperatures around 95^{0}F. A number of the Iraqi casualties with thorax injuries developed increasing respiratory difficulty. As we had trained our medics to treat a penetrating thorax injury with increasing respiratory difficulty as tension pneumothorax, these casualties received needle decompression. Again, we do not have good evidence on their outcomes, but a number did survive until treated much later at the FST. A portable pulse oximeter is an indispensable tool in caring for casualties with these types of injuries.

We adhered throughout to the principles of hypotensive resuscitation, using IV fluids only when appropriate. Casualties not in shock were encouraged to take fluids orally. Those casualties in shock received 1000 cc of Hespan, the colloid available to us. It was very effective in resuscitating casualties without complications noted. Given our low supplies and little room to transport everything throughout the length of Iraq, we found colloids to be a better choice of fluid for resuscitation.

We did use crystalloids for dehydrated casualties, and in some cases, both types of fluid. One of our first serious casualties was a young scout with a large fragmentation wound to the back of the leg involving the peroneal nerve and rapid bleeding from the popliteal artery. The medic on scene rapidly stopped the bleeding and saved his life with a tourniquet, but he had lost enough blood by the time he arrived at the BAS that he was in grade IV hypovolemic shock. He was initially resuscitated with 1000 cc of Hespan. Because he remained tachycardic and hypotensive, and there was no danger of "busting the clot" since a tourniquet remained in place, he received another 2 liters of normal saline while awaiting air evacuation to the FST. He received blood immediately upon landing at the FST and then quickly went into surgery. He survived and kept his leg with only some residual peroneal nerve deficits.

As for analgesia, our experiences confirmed the traditional wisdom that Soldiers in battle with serious wounds often experience very little or no pain in the immediate hours after the injury, particularly if the battle is continuing. Soldiers who could continue to fight received Tylenol and those who could not were given IV morphine, all without noted complications.

We gave antibiotics to all of our casualties with open wounds, even relatively minor fragmentation wounds. None of our casualties developed wound infections. We could not obtain the exact antibiotics recommended in the TCCC guidelines, but found suitable alternatives. Soldiers who could take oral medicines received Levofloxacin, which was convenient due to its once daily dosing. Those wounded who could not take medicines orally received IV Cefazolin for extremity wounds and IV Ceftriaxone for abdominal injuries.

Finally, the quick evacuation of casualties was of prime importance. When air evacuation was available, we were very aggressive in ensuring it arrived rapidly. When not available, wounded Soldiers need to be rapidly evacuated by ground to FSTs, even if the battle is ongoing and conditions are difficult. We were fortunate in often having FSTs stationed fairly short distances away, but our ambulance drivers often demonstrated real heroism in evacuating casualties despite repeatedly being fired upon. Our goal in treating any casualty was to quickly make any needed potentially lifesaving interventions, and then to arrange for evacuation as rapidly as possible.

Recommendations for the Future

Our experiences suggest a number of recommendations for future practice. First, the Army Medical Department (AMEDD) needs to continue to make an effort to rapidly disseminate and organize training on the TCCC guidelines. These guidelines have proven to be lifesaving and their widespread dissemination should be first priority. There is no good reason why wounded Soldiers are continuing to die on the battlefield from extremity bleeding.

Combat Lifesaver training needs to be overhauled as well, away from an emphasis on the application of first aid dressings and starting IVs, and toward the principles of TCCC, especially stopping hemorrhage on the battlefield with tourniquets and perhaps new technologies in the future.

The AMEDD should make the development and distribution of effective tourniquets top priority. All Soldiers should go into battle with a tourniquet on their web gear which is lightweight, easy to use, and capable of being applied with one hand. And all Soldiers should be trained on its application.

Experience has also shown that best results are obtained when PAs and physicians are deployed far forward on the battlefield. The first minutes after wounding are critical and treatment on the scene by an advanced health care provider can be lifesaving. Furthermore, the AMEDD should continue to support and fund research into technologies which can be effective on the battlefield, in particular, items such as hemostatic dressings, various types of tourniquets, and methods of hypotensive resuscitation that have important ramifications for Level I care.

Army health care providers who normally work in hospitals or clinics and are assigned to combat units as part of the PROFIS system should realize that they need to get away from the ATLS mindset and adopt a battlefield-focused approach. At Level I, this means following the TCCC guidelines. And it's the duty of physicians and PAs to ensure that their medics undergo rigorous, intensive training in these principles prior to going into battle.

Conclusion

The adoption and implementation of the principles of TCCC by the medical platoon of TF 1-15 IN in OIF 1 resulted in overwhelming success. Over 25 days of continuous combat with 32 friendly casualties, many of them serious, we had 0 KIAs and 0 died from wounds, while simultaneously caring for a significant number of Iraqi civilian and military casualties. This success should serve as a model for other conventional combat units throughout the Army involved in Level 1 treatment. The principles of TCCC are well-researched and proven effective and should be the foundation for the treatment of battlefield casualties.

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