

Committee on Tactical Combat Casualty Care Meeting Minutes 22-24 July 2008

1. Attendance

CoTCCC Members

Dr. Jim Bagian
Dr. Brad Bennett
Dr. Dave Callaway
Dr. Howard Champion
LTC Jim Czarnik
SFC Miguel Davila
COL Rocky Farr
CAPT Doug Freer
Dr. Jay Johannigman
Dr. Jim Kirkpatrick
LTC Russ Kotwal
Major Bob Mabry
Dr. Norman McSwain
MSG Harold Montgomery
MSG Chris Murphy
LTC Kevin O'Connor
Mr. Gary Pesquera
Mr. Donald Parsons
HMCS Glenn Royes
CAPT Jeff Timby

CoTCCC Staff

Dr. Frank Butler

Guest Presenters

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| COL Roger Gibson | Defense Health Board |
| MAJ Nick Withers | CANSOFCOM, Canada |
| LTC Homer Tien | Trauma Consultant, Canadian Armed Forces |

Guests

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| Dr. Jeff Cain | Former Vice-Chair of the CoTCCC |
| Mr. Bill Cauley | State Department |
| Mr. John Miles | Field Medical Trng BN, USMC |
| Ms. Lisa Blaser | Field Medical Trng BN, USMC |
| SSG John Maitha | 75 th Ranger Regiment |
| SFC Jeremy Williamson | 75 th Ranger Regiment |
| Mr. Kevin Joyner | MARCORSYSCOM |
| LTC John McManus | AMEDD C+S |
| LTC Paul Mayer | AMEDD C+S |
| Maj Al Beekley | MAMC |
| SGM Chet Sechrest | AWG |
| SGM Bruce Timmons | USA |

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| COL Steve Flaherty | USA Trauma Consultant |
| COL Warren Dorlac | USAF Trauma Consultant |
| Dr. Rick Hammesfahr | USSOCOM CEB Chair |
| Mr. Wing Chan Wong | Texas A+M |
| Ms. Amy Carrol | Texas A+M |
| Ms. Kathy Mechler | Texas A+M |
| Mr. Roger Anderson | Altarum |
| Mr. James Palmer | Altarum |
| Mr. Bruce Shabaz | Atarum |

22 July 2008

2. Dr. Frank Butler - Introductions and Admin Remarks

The TCCC First Responder Conference to be held in Tampa 9-11 September will replace the October meeting of the CoTCCC. The next meeting will be in San Antonio 3/4 February 2009.

3. COL Roger Gibson - CoTCCC Realignment

The realignment of the CoTCCC under the Defense Health Board (DHB) is ongoing. Almost all of the committee CVs have been received at Health Affairs. There are still 8 applications and Financial Disclosure statements outstanding. A CoTCCC update will be presented to the DHB on 4 September 2008. Items remaining to be accomplished in the transition are the CoTCCC component of the 2010 DHB POM build and rewriting the CoTCCC charter as a mission statement under the charter of the DHB.

4. Dr. Jeff Cain - TCCC/PHTLS Instructor Course

Dr. Cain reported that the presentations for this course are nearly complete pending whatever additional changes to the TCCC guidelines are made at this meeting. A letter of support for this course was sent to ASD Health Affairs by Dr. Jeffrey Salomone, who is the Prehospital Chair for the American College of Surgeons Committee on Trauma. The Navy Medical Personnel, Training and Education Command has elected not to pursue using this course through the Military Training Network to accomplish TCCC training for Navy corpsmen.

5. 2008 TCCC Award

Dr. Norman McSwain was selected by the CoTCCC members to receive the third annual Frank K. Butler TCCC award. Dr. McSwain has been one of the pioneers of prehospital trauma care in the United States and has been an invaluable liaison between the American College of Surgeons, the Prehospital Trauma Life Support Executive Council, and the CoTCCC.

6. Major Bob Mabry - TCCC First Responder Conference

The TCCC First Responder Conference will be held 9-11 September, 2008 at the Embassy Suites in Tampa. The conference will be invitation-only. 22 First Responder

Casualty Care presentations have been accepted for the conference. Outstanding items for the conference are:

- a) Finalization of the audiovisual support package
- b) Invitation of participants and guests
- c) Awards for best speakers
- d) Commendation letters for presenters
- e) Selection of topic discussion leaders
- f) Arrangement for taping and transcription of the proceedings
- g) Publication and dissemination of proceedings.

7. Dr. Frank Butler - TCCC Trademark Update

The U.S. Patent and Trademark Office responded to the Tactical Combat Casualty Care Trademark application with a request for additional information. The supplemental material requested included more descriptive material on the term "Tactical Combat Casualty Care", a clarification of the difference between Tactical Combat Casualty Care and other trademarked terms such as "Tactical Operator Care", and a CD with the TCCC course content. A response is in progress.

8. Dr. Frank Butler - Feedback from the New Hemostatic Recommendations

The CoTCCC voted in April to recommend Combat Gauze and WoundStat as the new primary and secondary hemostatic agents to be used on the battlefield based on new research from the U.S. Army Institute of Surgical Research and the Naval Medical Research Center. These recommendations were forwarded to the services as called for in the CoTCCC charter. Informal liaison with the services prior to this meeting indicated that the following actions are either underway or anticipated:

- Army - Proceeding with Combat Gauze and WoundStat
- Air Force - currently considering adding CG and WS to its IFAC
- Coast Guard - has already made the Combat Gauze buy
- Marine Corps – Proceeding with CG and WoundStat

9. Mr. Don Parsons – Proposed TCCC Guidelines Change - Tourniquet Use

Mr. Parsons proposed that the TCCC guidelines regarding tourniquet use be modified. The proposed change is outlined below.

Current Wording in the Guidelines

Care Under Fire

6. Stop *life-threatening* external hemorrhage if tactically feasible:
 - Direct casualty to control hemorrhage by self-aid if able
 - Use a tourniquet for hemorrhage that is anatomically amenable to tourniquet application
 - For hemorrhage that cannot be controlled with a tourniquet, apply Combat Gauze with 2 minutes of direct pressure

Tactical Field Care

4. Bleeding.
 - a. Assess for unrecognized hemorrhage and control all sources of bleeding. For compressible hemorrhage not amenable to tourniquet use or as an adjunct to tourniquet removal when

appropriate, use Combat Gauze as the hemostatic agent of choice with WoundStat as the backup (if the primary agent is not successful at controlling the hemorrhage or if the wound characteristics call for a granular agent).

- b. Assess for discontinuation of tourniquets once hemorrhage is definitively controlled by other means. Before releasing any tourniquet on a casualty who has been resuscitated for hemorrhagic shock, ensure a positive response to resuscitation efforts (i.e., a peripheral pulse normal in character and normal mentation if there is no traumatic brain injury (TBI)).

CASEVAC Care

Same as for Tactical Field Care above

Proposed Change

Care Under Fire

6. Stop *life-threatening* external hemorrhage if tactically feasible:
 - Direct casualty to control hemorrhage by self-aid if able.
 - Use a *CoTCCC-recommended* tourniquet for hemorrhage that is anatomically amenable to tourniquet application.
 - *Apply tourniquet high on injured limb, over uniform, tighten, and move the casualty to cover*

Tactical Field Care

4. Bleeding

- a. Assess for unrecognized hemorrhage and control all sources of bleeding. If not already done, use a *COTCCC-recommended* tourniquet to control life-threatening external hemorrhage that is anatomically amenable to tourniquet application *or for any traumatic amputation. Apply directly to skin 2-3 inches above wound.*
- b. For compressible hemorrhage not amenable to tourniquet use, or as an adjunct to tourniquet removal (if evacuation time is anticipated to be longer than two hours), use Combat Gauze as the hemostatic agent of choice with WoundStat as the backup (if the primary agent is not successful at controlling the hemorrhage or if the wound characteristics call for a granular agent). *Both agents should be applied with at least 3 minutes of direct pressure.* Before releasing any tourniquet on a casualty who has been resuscitated for hemorrhagic shock, ensure a positive response to resuscitation efforts (i.e., a peripheral pulse normal in character and normal mentation if there is no TBI).
- c. *Reassess prior tourniquet application. Expose wound and determine if tourniquet is needed. If so, move tourniquet from over uniform and apply directly to skin 2-3 inches above wound. If tourniquet is not needed, use other techniques to control bleeding. Control any other sources of bleeding.*
- d. *When time and the tactical situation permit, a distal pulse check should be accomplished. If a distal pulse is still present, consider additional tightening of the tourniquet or the*

use of a second tourniquet, side by side and proximal to the first, to eliminate the distal pulse.

- e. *Expose and clearly mark all tourniquet sites with the time of tourniquet application. Use an indelible marker.*

Tactical Evacuation Care

Same as for Tactical Field Care above

Discussion

Although not commonly used in civilian trauma care, tourniquets have been clearly shown to save lives on the battlefield. Several large studies have confirmed the lifesaving benefit and low incidence of complications from prehospital tourniquet use in combat casualties. (Kragh 2008, Beekley 2008) One author noted that 57% of the seven deaths that occurred in a series of 165 casualties arriving alive at the 31st Combat Support Hospital in Baghdad could have been saved by the timely use of a tourniquet. (Beekley 2008) Other authors, noting these results, have called for expanded tourniquet use in the civilian prehospital environment when appropriate. (Doyle 2008, Richey 2007) Tourniquets are used frequently during orthopedic surgery procedures and are relatively safe if left on for less than two hours. Prolonged use of a tourniquet can potentially result in the loss of a limb. However, saving the life of the casualty must always take priority over salvaging the limb.

Tourniquets are frequently used early in the care of the combat casualty because of the tactical setting and the speed with which they can be applied. Specifically, tourniquets are the standard of care for the temporary control of life-threatening extremity hemorrhage during Care under Fire. Direct pressure and pressure bandages, while often effective, take more time and are less desirable than tourniquets in this setting. The delays inherent in using direct pressure and pressure bandages during Care Under Fire may result in the casualty and the rescuer not getting behind cover as quickly as possible, and direct pressure is not as effective in controlling hemorrhage while the casualty is being moved.

There are currently a variety of tourniquets available on the market. Some of these tourniquets may or may not be effective. In a comparative evaluation of tourniquets currently available on the open market, the US Army Institute of Surgical Research identified three that were one hundred percent effective in stopping arterial blood flow. These were the Combat Application Tourniquet (C-A-T), the Special Operations Forces Tactical Tourniquet (SOFTT), and the Emergency and Military Tourniquet (EMT), the later being an inflatable pneumatic device. The CAT and SOFTT are both windlass type devices that are lightweight and relatively inexpensive. These tourniquets can be readily applied to one's own or another's extremity, and are rugged, reliable, and small enough to be easily carried. The CAT has been designated as an item of individual issue to ground combatants in all services and has proven itself to be effective and reliable in the current conflicts.

Tourniquets should be placed just proximal to the site of the severe bleeding. They should never be placed directly over a joint. In the Care Under Fire phase, they should be tightened as necessary to stop bleeding from the distal injury. During this phase, time may not permit the exposure of the wound and the tourniquet may need to be placed over the casualty's uniform. While this is not the ideal application procedure, it may be necessary based on the tactical situation and the need to move both casualty and care provider to cover quickly. Once time permits, in the Tactical Field Care phase, the wound should be re-evaluated and the tourniquet applied directly to the casualty's skin.

Hemorrhage control does not stop with the initial tourniquet application. This intervention should be rechecked each time a casualty is moved to insure that the hemorrhage is still being controlled. When time and the tactical situation permit in the Tactical Field Care phase of care, the wound should be exposed and a distal pulse check

should be accomplished. If a distal pulse is still present, the tourniquet should be tightened or a second tourniquet applied side-by-side just proximal to the first. (Kragh 2008) A second pulse check should again be accomplished after the application of the second tourniquet. It is important that the distal arterial blood flow be stopped by the tourniquet. (Kragh 2008) If it is not, a compartment syndrome or expanding hematoma may develop in the limb, creating a significant complication for the casualty.

Tourniquet application typically causes significant pain to the casualty and is not an indication of incorrect application or that the tourniquet should be discontinued. Pain should be managed with analgesics as appropriate, taking care not to give narcotic analgesics to casualties in shock.

Tourniquet application time should always be noted on the casualty. This has customarily done by writing the letter "T" on the casualty's forehead along with the time. This method may be improved upon by utilizing an indelible ink marker and insuring this important information does not wash or wipe off. The involved extremity or a piece of tape applied to the casualty's chest are alternative locations for noting tourniquet application time. The information should also be recorded on the individual's TCCC Casualty Card.

When evacuation of the casualty is anticipated to be longer than two hours and if the casualty is not in shock, the possibility of removing the tourniquet and transitioning to another method of hemorrhage control should be considered. In the TFC and Tactical Evacuation phases, with additional time available, it may be possible to use direct pressure, packing the wound with gauze and a pressure bandage, or a hemostatic agent to help control life-threatening bleeding.

Guidelines for tourniquet removal are contained in the PHTLS manual, derived from U.S. Army tourniquet guidelines. It is important to note that the tourniquet should never actually be removed from the limb, but slowly loosened after an alternative method of hemorrhage control has been utilized. Most importantly, tourniquet removal should not be attempted if the casualty is in shock, or if the evacuation time to a medical facility is expected to be two hours or less.

There are other tourniquets that may be useful in some situations. Combat medic experience has found that the Special Operations Forces Tactical Tourniquet may be a better choice if the casualty has unusually large thighs and needs a tourniquet in that location. The Emergency Medical Tourniquet has been found to perform very well in emergency departments (Beekley 2008), but is more expensive than the Combat Application Tourniquet and its inflatable cuff may present problems if it has had prolonged time in the field or has been exposed to shrapnel strikes.

All manufactured tourniquets are designed for a single use. There should be a separate group of tourniquets that are used for training. These training tourniquets should never be issued to individuals for personal use in combat. Many military units have evolved to a single-tour, single-use policy for tourniquets.

Note also that this change incorporates a change in the guidelines for the use of the hemostatic agents Combat Gauze and WoundStat. Both agents must be applied with sustained direct pressure over the bleeding site to be effective. The recommended time for which direct pressure must be applied to the wound site has been changed from 2 minutes to 3 minutes to reflect the manufacturers' recommendations.

References

1. Beekley AC, Sebesta JA, Blackbourne LH, Herbert GS, Kauvar DS, Baer DG, Walters TJ, Mullenix PS, Holcomb JB: Prehospital tourniquet use in Operation Iraqi Freedom: effect on hemorrhage control and outcomes. *J Trauma* 2008;64:S28-S37
2. Doyle GS, Taillac PP: Tourniquets: A review of current use with proposals for

- expanded prehospital use. Prehospital Emergency Care 2008;12:241-256
3. Kragh JF, Walters TJ, Baer DG, Fox CJ, Wade CE, Salinas J, Holcomb JB: Practical use of emergency tourniquets to stop bleeding in major limb trauma. J Trauma 2008;64:S38-S50
 4. Richey SL: Tourniquets for the control of traumatic hemorrhage: a review of the literature. World Journal of Emergency Surgery 2007

Vote

The proposed changes were approved by the Committee.

10. Dr. Jim Kirkpatrick – Proposed TCCC Guidelines Change – Evacuation Care Terminology

Dr. Kirkpatrick proposed that the TCCC guidelines regarding evacuation care terminology be modified. The proposed change is outlined below.

Current Wording in the TCCC Guidelines

The third phase of TCCC is currently designated as CASEVAC Care.

Proposed Change to the TCCC Guidelines

Change the term “CASEVAC Care” to “Tactical Evacuation Care.”

Discussion

Transportation of casualties from the battlefield may be accomplished by two types of evacuation. As defined in Joint Publication 4-02: Casualty evacuation (CASEVAC) “involves the unregulated movement of casualties aboard ships, land vehicles, or aircraft.” Medical evacuation (MEDEVAC) “refers to dedicated medical evacuation platforms staffed and equipped to provide en route medical care using predesignated tactical or logistic aircraft, boats, ships, and other watercraft temporarily equipped and staffed with medical attendants (MAs) for en route care.”

Use of combat-capable CASEVAC units carries the potential advantage of being able to extract casualties from non-secure landing zones and other high-risk tactical environments, whereas use of MEDEVAC assets allows the units to conserve their tactical platforms if the situation is such that the desired evacuation may be accomplished by a MEDEVAC platform.

Since both types of en route care could potentially be the next step in the continuum of care for casualties after Tactical Field Care, redesignating the third phase of care in TCCC as “Tactical Evacuation Care” addresses both possibilities. It also aligns TCCC terminology with that found in Joint Publication 4-02.

References

1. Joint Publication 4-02

Vote

The proposed change was approved by the Committee.

11. Dr. Norman McSwain - PHTLS Manual Seventh Edition Update

The Seventh Edition of the Prehospital Trauma Life Support Manual will be published in September 2010. Revised TCCC chapters for this edition are due to Dr. Butler by January 2009. New photos for the TCCC chapters in the Seventh Edition are being supplied by MSG Montgomery and his Ranger medical cadre. MS Word versions of the current chapters will be sent out to authors in the near future. Assigned authors for the Seventh Edition are:

Introduction – Dr. Frank Butler (Chapter 19)
Care under Fire – HMCM Shawn Johnson (Chapter 20)
Tactical Field Care – Dr. Frank Butler (Chapter 21)
Tactical Evacuation Care – COL Jay Johannigman (Chapter 22)
Triage – COL Paul Cordts (Chapter 23)
CASEVAC, MEDEVAC, and Aeromedical Evacuation – COL Jay Johannigman/SMSgt Tom Rich (Chapter 24)
Injuries from Explosives – Dr. Howard Champion (25)
Medical Support of Urban Operations – Major Bob Mabry (Chapter 26)
Ethical Considerations for Combat Medics – COL Frank Anders (Chapter 27)

A new chapter on medical mission planning based on Section 4 of the Ranger Medical Handbook was proposed by SGM Chet Sechrest. This chapter will also be considered for inclusion in the Seventh Edition.

12. Dr. Mel Otten - Numask

Dr. Otten did a presentation on Numask, which is a new airway device designed for patients requiring assistance with their ventilations. The device fits into the mouth with a translucent soft vinyl mouthpiece. It can be used in conjunction with a bag-valve-mask (BVM) or an oropharyngeal airway. It is advertised to be easier to use than a standard mask to provide assisted ventilations with a BVM and may have a role in first responder trauma care.

Wednesday 23 July

13. Major Nick Withers - TCCC in the Canadian Armed Forces

Major Nick Withers, the Command Surgeon for Canadian Special Operations Forces, provided a review on TCCC use in the Canadian Armed Forces. Canada has about 60,000 people in their Armed Forces with approximately 500 medics. The concepts of TCCC are being taught to all soldiers in the Canadian Army, although some aspects of care such as needle decompression of suspected tension pneumothorax are considered outside the scope of non-medic care. There is a Tactical Medicine course that includes TCCC being taught to all medics who will be operating “outside the wire” in deployed settings. The 11-day TACMED course also includes tactical extraction techniques using the K-sling device and a minimum of two realistic casualty scenarios presented to each medic. There are also both shooting and field exercises. At the end of the course, the medics sign a document in which they acknowledge that the TCCC management strategies are intended for use only in deployed tactical settings.

The Canadian military is now using WoundStat and QuikClot. They are currently working to get Combat Gauze approved by HealthCanada. The present plan is to use

WoundStat as the primary agent with Combat Gauze as the backup once the latter agent is approved.

The Canadian military has had good experiences using the swine model to teach cricothyroidotomy. They use a midline vertical incision with cric hooks for the procedure. Other similarities between Canadian and U.S. TCCC are the use of the PYNQ FAST-1 intraosseous device, Combat Application and Special Operations Forces Tactical Tourniquets, and fentanyl lozenges. They restrict the use of tactical tourniquets to both single-use and single-tour.

One difference with TCCC in the Canadian military is that they use a 250-cc bolus of Hypertonic Saline/Dextran (HSD) for fluid resuscitation of individuals in shock. HSD is currently not approved by the FDA for use in the United States.

14. LTC Homer Tien – Success of TCCC Interventions in Combat Casualties

LTC Tien is the Trauma Consultant for the Canadian Armed forces. He noted that TCCC began to be used by the Canadian counterterrorist unit in the late 1990s. It did not catch on with the conventional forces until Operation Enduring Freedom in 2002. He and his colleagues recently did two studies on TCCC interventions.

In the first, the authors looked at tourniquets and needle decompressions in 134 trauma patients at a multinational medical unit in Kandahar. They found that 6 patients had a total of 8 tourniquets applied. The tourniquets were judged to be life-saving in five patients. They also noted that one tourniquet was not adequately tightened and that one was left on too long (4 hours). There was no residual damage from the tourniquet left on for 4 hours. They found seven cases in which they judged needle decompression to be underused in that the casualties arrived with vital signs absent without needle decompression being attempted.

In their second study, which addressed needle decompression in a civilian trauma setting, they reviewed the records of 1135 severely injured trauma patients. Seventeen of these patients received 18 needle decompressions. The authors found that the decompressions were being done too medially. Although there were no major complications resulting from this factor, the paper proposes that the need to have the entry point at or lateral to the nipple line be emphasized in paramedic training in this skill, since the midpoint of the midclavicular line may be difficult to determine without reference to this landmark.

The authors also noted that one patient arrived at the emergency department with an unrelieved tension pneumothorax because the needle used for decompression was of insufficient length.

References

1. Netto F, Shulman H, Rizoli S, et al: Are needle decompressions for tension pneumothoraces being performed appropriately for appropriate indications? American J Emerg Med, in press.
2. Tien HC, Jung V, Rizoli SB, Acharya SB, MacDonald JC: An evaluation of tactical combat casualty care interventions in a combat environment. J Am Coll Surg 2008;207:174-178

15. SFC Mike Davila – Proposed TCCC Guidelines Change - Hemostatic Use in Care Under Fire

SFC Davila proposed that the TCCC guidelines regarding hemostatic use in the Care Under Fire phase be modified. The proposed change is outlined below.

Current Wording in the TCCC Guidelines

Care Under Fire

1. Return fire and take cover.
2. Direct or expect casualty to remain engaged as a combatant if appropriate.
3. Direct casualty to move to cover and apply self-aid if able.
4. Try to keep the casualty from sustaining additional wounds.
5. Airway management is generally best deferred until the Tactical Field Care phase.
6. Stop *life-threatening* external hemorrhage if tactically feasible:
 - Direct casualty to control hemorrhage by self-aid if able
 - Use a tourniquet for hemorrhage that is anatomically amenable to tourniquet application
 - For hemorrhage that cannot be controlled with a tourniquet, apply Combat Gauze with 2 minutes of direct pressure

Proposed Change to the TCCC Guidelines

Care Under Fire

1. Return fire and take cover.
2. Direct or expect casualty to remain engaged as a combatant if appropriate.
3. Direct casualty to move to cover and apply self-aid if able.
4. Try to keep the casualty from sustaining additional wounds.
5. Airway management is generally best deferred until the Tactical Field Care phase.
6. Stop *life-threatening* external hemorrhage if tactically feasible:
 - Direct casualty to control hemorrhage by self-aid if able
 - Use a tourniquet for hemorrhage that is anatomically amenable to tourniquet application

* *Omit reference to Combat Gauze in this phase of care*

Discussion

The risk of additional injuries being sustained at any moment is extremely high during Care Under Fire for both casualty and First Responder. Treatment should be limited to life threatening hemorrhage control using a tourniquet and movement of the casualty to cover.

First responders must understand that the most important aspect of the “Care Under Fire” Phase is to move the casualty to cover as quickly as possible. If a casualty has an open non-extremity hemorrhage, it should be treated in the Tactical Field Care Phase. Applying a pressure dressing or a hemostatic agent in the care under fire phase is time consuming and increases the risk of additional casualties. Additional time spent while under fire degrades survivability of both the casualty and First Responder.

Vote

The proposed change was approved by the Committee.

16. USSOCOM Medal Presentation Ceremony

The USSOCOM Medal was presented to COL John Holcomb by Admiral Eric Olson, Commander of the U.S. Special Operations Command, at a ceremony conducted at the Center for the Intrepid at Fort Sam Houston.

17. USAISR Change of Command Ceremony

COL Lorne Blackbourne assumed command of the U.S. Army Institute of Surgical Research, relieving COL John Holcomb. The ceremony was held at the Center for the Intrepid and was presided over by MG George Weightman, Commander of the Army Medical Research and Materiel Command.

18. MSG Montgomery/LTC Kotwal - Ranger Prehospital Trauma Registry

The 75th Ranger Regiment developed the Ranger Casualty Card that has previously been endorsed by the CoTCCC as the current preferred method for documenting TCCC care on the battlefield. Ranger command policy is that a powerpoint version of this card then be filled out within 72 hrs after mission completion.

A new web-based system for documenting battlefield trauma care was desired and a project was launched in 2008 to address this need. The USAISR, Texas A+M, and Altarum Corporation have been partnering with the Rangers on this effort and a prototype web-based system is now nearing completion. This system will allow for query and will allow trauma data entries from multiple sites. Beta testing is being done at present, with plans to begin data entry in September 2008.

Some of the points raised during this discussion were that: 1) data needs to be available when the casualty arrives at the medical treatment facility; 2) it would be desirable to have the ability to make electronic copies of the record that could be entered into the casualties' longitudinal Electronic Medical Record; and 3) pending the development and evaluation of this web-based system, the preferred solution remains the paper TCCC Casualty Card. The Army is currently considering a policy statement to that effect.

19. Dr. Frank Butler – Proposed TCCC Logo

Dr. Butler displayed a proposed TCCC logo. The logo is based on a photograph supplied by MSG Harold Montgomery and depicts a Ranger helping his wounded Ranger buddy after a combat injury. A tourniquet has been applied to a thigh wound and both individuals are maintaining a combat posture as the casualty is helped to cover. The photograph was incorporated into the logo by Dr. Cheryl Casey of Pensacola, FL. The logo carries the inscription "Tactical Combat Casualty Care" at the top of the top and "PHTLS" at the bottom. The committee unanimously approved the adoption of this logo for TCCC.

20. CAPT Jeff Timby - TCCC Outreach Program

CAPT Timby discussed the continuing efforts of the TCCC Outreach program to keep military medical audiences informed on the latest developments in TCCC. CAPT Timby will be doing a presentation at the ATACCC conference in St. Petersburg next month; Major Mabry will be speaking at the San Antonio Trauma Conference in August; and Dr. Butler will be coordinating a TCCC Update panel for the SOMA meeting in December.

CAPT Freer noted that we need to include line commanders in this effort and reach individuals such as the Marine Expeditionary Force commanders. LTC Czarnik also noted

that the Capstone and Keystone courses would be excellent forums in which to make leaders aware of new developments in TCCC.

21. Dr. Jim Kirkpatrick - Prehospital Use of Factor VIIa

Dr. Jim Kirkpatrick presented a discussion on the options for First Responder interventions that might be employed to control non-compressible hemorrhage, which remains one of the leading causes of potentially preventable deaths from combat trauma.

Some of the desired characteristics of an agent that could be used by First Responders for this purpose are:

- Proven safe and effective
- FDA-approved
- Able to be stored at ambient temperatures
- Long shelf life
- Ready for infusion in less than 5 min
- Able to be used for all blood types

Some modalities that have been suggested for this purpose are Factor VIIa, freeze-dried plasma, platelet-derived hemostatic factors, freeze-dried platelets, and metabolic cooling. Of these interventions, Factor VIIa is the only one that could be employed in the near term.

Dr. Kirkpatrick noted that while Factor VIIa has been shown in JTTR data to save lives in the hospital setting in theater, no good trials have been completed that document efficacy of this agent in the prehospital setting. He inquired of the CoTCCC members if they had any first-hand experiences that could be shared regarding the fielding and use of Factor VIIa by First Responders in their units. None of the members present had any information that they were able to provide on this topic.

Thursday 24 July

22. Dr. Frank Butler - Presentation to LTC Cain/Ms. Worthy

Ms. Rose Worthy, former Senior Administrative Assistant to the CoTCCC, and Dr. Jeff Cain, former Vice-Chairman of the CoTCCC, were awarded plaques with the new TCCC logo in recognition of their outstanding service to the committee.

23. Dr. Mel Otten – Proposed TCCC Guidelines Change - Management of Open or Sucking Chest Wounds

Dr. Otten proposed that the TCCC guidelines regarding management of sucking chest wounds be modified. The proposed change is outlined below.

Current Wording in the Guidelines

Care Under Fire

N/A

Tactical Field Care

3. Breathing.

- b. Sucking chest wounds should be treated by applying a three-sided dressing during expiration, then monitoring for

development of a tension pneumothorax.

CASEVAC Care

Same as above for Tactical Field Care

Proposed Change

Care Under Fire

N/A

Tactical Field Care

2. Breathing.

b. All open and/or sucking chest wounds should be treated by immediately applying an occlusive material to cover the defect and securing it in place. Monitor the casualty for the potential development of a subsequent tension pneumothorax.

Tactical Evacuation Care

2. Breathing.

d. Same as above for Tactical Field Care

Discussion

An open pneumothorax is an injury to the chest wall that may or may not include injuries to underlying lung, blood vessels, etc. Lilienthal in 1919 described a series of 18 open pneumothoraces during WWI as having a mortality of 34%, "a larger death rate than any other class of thoracic wounds." On the battlefield, these injuries are usually caused by penetrating objects such as bullets or shrapnel. When the chest wall opening is large enough, usually 2/3 or more of the diameter of the trachea, air will preferentially go into the chest cavity via the opening and may collapse the lung on that side and interfere with the distribution of air within the lung.

The immediate treatment for an open pneumothorax is to seal the opening. This could potentially lead to the development of a tension pneumothorax since there is typically underlying lung injury. This risk may be increased if the patient is receiving positive pressure ventilation. Traditionally, a dressing secured only on three sides has been used to prevent a tension pneumothorax from developing. (Emergency War Manual 2004, PHTLS Manual 2006, Hodgetts 1999) The theory is that a 3-sided dressing will allow the open side to act as a flutter valve and release any air pressure that may be building up in the chest cavity. There have been few case reports of this actually happening and no scientific studies of this in animals or humans. There have been a number of dressings designed to prevent this from occurring with a built-in valve, but there is no solid evidence that they either prevent or treat a tension pneumothorax. DeBakey mentioned that Tiegel devised a dressing with a valve in 1937 for this purpose. The Asherman chest seal is currently in use, but there have been anecdotal reports of it failing to adhere to a bloody/wet chest wall. Other valved types of chest dressing are also in use, but there is little clinical evidence to show that any of these or a 3-sided dressing are superior to a simple occlusive dressing placed over the wound to cover the defect.

Defects in the chest wall that result in a sucking chest wound should be closed immediately with an occlusive material. The occlusive material used may be any nonporous material such as Vaseline gauze, plastic wrap, foil, a burn dressing, EKG or defibrillator pads. The critical action is to seal the chest wound.

The next critical step is to observe the casualty for signs of a developing

tension pneumothorax. The potential for tension pneumothorax still exists - no matter what type of dressing is applied, although the one-way valve present in vented-type dressings may allow air to escape without additional venting.

When time, skills, and circumstances allow, a thoracostomy tube should be placed in the side of the chest with the open pneumothorax. This would typically be done in a medical treatment facility.

References

1. Allison, Porter, Mason; Use of the Asherman chest seal as a stabilization device for needle thoracostomy. Emer Med J 2002, 19:590-91.
2. Carter BN, DeBakey, ME; Current observations on war wounds of the chest, J. Thorac Surg, 1944, 13:2712.
3. DeBakey, ME: The management of chest wounds, Surg Gyn Obst 1942, 74:203237.
4. Haynes, BW: Dangers of emergency occlusive dressing in sucking chest wounds of the chest. JAMA , 1952, 150:1404.
5. Hodgetts TJ, Hanian CG, Newey: Battlefield First Aid: a simple, systematic approach for every soldier. J R Army Med Corps 1999;145:55-59
6. McSwain NE, Salome JP, eds: Prehospital Trauma Life Support Manual. Akron, Mosby, Sixth Edition; 2006: 280-281
7. NATO Emergency War Surgery Handbook. Washington, Department of Defense. Third United States Revision, 2004; Chapter 16: 16.4
8. Rathiman S, Stine S: Management of complicated post-operative air leak a new indication for the Asherman chest seal. Inetrac Cardivasc Thorac Surg, 2007; 6:691-694

Vote

The proposed change was approved by the committee.

24. Mr. Don Parsons – Proposed TCCC Guidelines Change - Management of Tension Pneumothorax

Mr. Parsons proposed that the TCCC guidelines regarding the management of tension pneumothorax be modified. The proposed change is outlined below.

Current Wording in the Guidelines

Care Under Fire

N/A

Tactical Field Care

3. Breathing

- a. Consider tension pneumothorax and decompress with needle thoracostomy if casualty has torso trauma and respiratory distress.

CASEVAC Care

3. Breathing

- a. Consider tension pneumothorax and decompress with needle thoracostomy if casualty has torso trauma and respiratory distress.
- b. Consider chest tube insertion if no improvement and/or long transport anticipated.

Proposed Change

Care Under Fire

N/A

Tactical Field Care

3. Breathing

- a. In a casualty with progressive respiratory distress and known or suspected torso trauma, consider a tension pneumothorax and decompress the chest on the side of the injury with a 14-gauge, 3.25 inch needle/catheter unit inserted in the second intercostal space at the midclavicular line. Ensure that the needle entry into the chest is not medial to the nipple line and is not directed towards the heart.

Tactical Evacuation Care

2. Breathing

- a. In a casualty with progressive respiratory distress and known or suspected torso trauma, consider a tension pneumothorax and decompress the chest on the side of the injury with a 14-gauge, 3.25 inch needle/catheter unit inserted in the second intercostal space at the mid-clavicular line. Ensure that the needle entry into the chest is not medial to the nipple line and is not directed towards the heart.
- b. Consider chest tube insertion if no improvement and/or long transport anticipated.

Discussion

Penetrating trauma is the predominant type of trauma encountered on the battlefield. Consider a presumptive diagnosis of tension pneumothorax when progressively worsening respiratory distress develops in a casualty with known or suspected penetrating chest trauma. Penetrating injuries in other locations, such as the shoulder or the abdomen, may also result in pulmonary injury and a tension pneumothorax. The battlefield diagnosis of tension pneumothorax should not rely on such typical signs as decreased breath sounds, tracheal deviation, jugular distension, or hyperresonance to percussion. These findings may not always be present and are exceedingly difficult to appreciate on the battlefield. Tension pneumothorax has been reported to be the cause of death in 3-4% of fatally wounded casualties reviewed from the Vietnam era. (McPherson 2006) Needle decompression for the initial management of tension pneumothorax has been reported to be safe and effective in the civilian prehospital setting. (Warner 2008)

It is imperative that a needle/catheter unit long enough to reach the thoracic cavity be used in this procedure. Recent studies have noted that the chest wall thickness in many individuals may exceed the length of the standard 2-inch (5 cm) 14 gauge needle catheter. Harcke and his colleagues found a mean chest wall thickness of 5.36 cm in 100 autopsy CT studies of military fatalities. Several of the cases in their autopsy series were noted to have had unsuccessful attempts at NT because the needle/catheter units used for the procedure were too short. (Harcke 2007) They recommended that an 8 cm (3.25 inch) needle/catheter be used in order to achieve a 99% assurance of reaching the pleural space. Other authors have voiced similar concerns. (Givens 2004, Zingerink 2008) A All Army Activities memorandum issued by the U.S. Army Surgeon General directed that Soldiers suspected of having a tension pneumothorax be decompressed with a 3.25 inch, 14-gauge needle/catheter unit inserted to the hub. (Kiley 2006)

A casualty with a penetrating wound to the chest will usually have some degree of pneumothorax as a result of their primary wound. The additional trauma caused by a needle thoracostomy would not be expected to worsen the condition significantly should the casualty actually not have a tension pneumothorax, further strengthening the case for the aggressive use of this procedure in the prehospital tactical setting.

The 14 gauge 3.25 inch needle catheter unit should be inserted over the top of the third rib at a 90 degree angle (to the frontal plane of the chest) into the second intercostal space at the midclavicular line. If unable to use the second intercostal space along the mid clavicular line, alternate sites for needle thoracostomy are the third, fourth, or fifth intercostal space but you must move laterally on the chest to the Anterior Axillary line (AAL) or the Mid-Axillary line (MAL). *The plug in the hub of the catheter must be removed prior to insertion or no indication of a pressure release (hiss of escaping air) will occur.* The needle catheter unit should be inserted all the way to the hub. The needle should then be removed and the catheter secured to the chest wall. There is no requirement to place a one-way valve, or three-way stopcock on the end of the catheter, as air will not enter the small diameter of the catheter into the chest cavity. Position the casualty in the sitting position if conscious or in the lateral recumbent position with the injured side down if unconscious.

Relief of the tension pneumothorax requires removal of the air under pressure within the chest cavity. Removal of blood from an accompanying hemothorax will not necessarily provide as much benefit.

The technique used in needle thoracostomy is important in avoiding some of the reported complications of NT, such as cardiac tamponade. (Butler 2003) Ensuring that the insertion site for the needle is at or lateral to the nipple line when a midclavicular line insertion site is used will help to avoid this complication. (Netto, in press) Additionally, care should be taken to direct the needle perpendicularly to the surface of the chest and not in the direction of the heart and great vessels. Some authors have suggested the fifth intercostal space in the anterior mid-axillary line as an alternate site for NT. (McPherson 2006, Zingerink 2008)

Any casualty who has undergone needle thoracostomy for relief of a tension pneumothorax must be frequently reassessed because catheters used for this purpose are subject to occlusion by clotting and or kinking. If a recurrence of the tension pneumothorax is suspected, a second needle catheter unit may need to be inserted next to the first one.

Caution must be exercised when considering needle thoracostomy in a casualty with non-penetrating torso trauma, since this procedure could result in a pneumothorax if not already present.

Needle thoracostomy with a 14-gauge needle catheter was found to relieve elevated intrapleural pressure rapidly in a swine model of traumatic tension pneumothorax. The therapeutic effect was sustained for 4 hours, and this procedure was found to be equivalent to tube thoracostomy with a 32 French chest tube for the observation period. (Holcomb, in press) The ease and speed of performance and the decreased likelihood of complications make needle thoracostomy the procedure of choice for relieving a tension pneumothorax on the battlefield.

Chest tubes are *not* recommended for routine use in the prehospital phase of battlefield trauma care for the following reasons:

1. Chest tubes are not usually needed to provide initial treatment for a tension pneumothorax.
2. Chest tubes are more difficult and time consuming for relatively inexperienced medical personnel.
3. Chest tube insertion is probably more likely to cause additional tissue damage and subsequent infection than needle thoracostomy.

4. The additional equipment and supplies required to perform tube thoracostomy would add significantly to the medic's loadout.
5. No documentation of benefit from battlefield tube thoracostomy by combat medical personnel is found in the literature. (Butler 1996)

Chest tubes are generally *not* part of the paramedic's scope of care in the civilian EMS settings, and no studies were found that address the use of this procedure by corpsmen and medics in combat settings. In the case of failure of needle decompression to relieve a tension pneumothorax, however, simple thoracostomy (creating an opening in the chest wall) or a chest tube may be effective and lifesaving. (Jones 2002)

References

1. Butler KL, Best IM, Weaver L, Bumpers HL: Pulmonary artery injury and cardiac tamponade after needle decompression of a suspected tension pneumothorax. *J Trauma* 2003;54:610-611
2. Butler FK, Hagmann J, and Butler EG. Tactical Combat Casualty Care in Special Operations. *Military Med* 161; Supplement; August 1996
3. Butler FK, Holcomb JB, Giebner SG, McSwain NE, Bagian J: Tactical Combat Casualty Care 2007: Evolving Concepts and Battlefield Experience. *Military Med* 2007; 172(S):1-19
4. Givens ML, Ayotte K, Manifold C: Needle thoracostomy: implications of computed tomography chest wall thickness. *Acad Emerg Med* 2004;11:211-213
5. Harcke HT, Pearse LA, Levy AD, Getz JM, Robinson SR: Chest wall thickness in military personnel: Implications for needle thoracostomy in tension pneumothorax. *Milit Med* 2007;172:1260-1263
6. Jones R, Hollingsworth J: Tension pneumothoraces not responding to needle thoracostomy. *Emerg Med J* 2002;19:176-177
7. Kiley KC: Management of Soldiers with Tension Pneumothorax. U.S. Army Surgeon General memorandum; 25 Aug 2006.
8. McPherson JJ, Feigin DS, Bellamy RF: Prevalence of tension pneumothorax in fatally wounded combat casualties. *J Trauma* 2006;60:573-578
9. Tien HC, Jung V, Rizoli SB, Acharya SB, MacDonald JC: An evaluation of tactical combat casualty care interventions in a combat environment. *J Am Coll Surg* 2008;207:174-178
10. Netto F, Shulman H, Rizoli S, et al: Are needle decompressions for tension pneumothoraces being performed appropriately for appropriate indications? *American J Emerg Med*, in press.
11. Warner KJ, Copass MK, Bulger EM: Paramedic use of needle thoracostomy in the prehospital environment. *Prehosp Emerg Care* 2008;12:162-168
12. Zengerink I, Brink PR, Laupland KB, et al: Needle thoracostomy in the treatment of tension pneumothorax in trauma patients: What size needle? *J Trauma* 2008;64:111-114
13. Holcomb JB, et al. Needle versus tube thoracostomy in a swine model of traumatic tension hemopneumothorax. Accepted for publication in *Prehospital Emergency Care*.

Vote

The proposed change was approved by the committee.

25. Dr. Frank Butler – Proposed TCCC Guidelines Change - TCCC Care Documentation

Dr. Butler proposed that the TCCC guidelines regarding documentation of TCCC care be modified. The proposed change is outlined below.

Current Wording in the Guidelines

Care Under Fire

N/A

Tactical Field Care

17. Documentation.

Document clinical assessments, treatments rendered, and changes in the casualty's status. Forward this information with the casualty to the next level of care.

CASEVAC Care

15. Documentation.

Same as for Tactical Field Care above

Proposed Change

Care Under Fire

N/A

Tactical Field Care

17. Documentation

Document clinical assessments, treatments rendered, and changes in the casualty's status *using the TCCC Casualty Card*. Forward this information with the casualty to the next level of care.

Tactical Evacuation Care

15. Documentation.

Same as for Tactical Field Care above

Discussion

The letter below was the result of a CoTCCC-sponsored First Responder Care Documentation conference held in 2007.

4 Sep 2007

DoD/HA Force Health Protection asked the Committee on Tactical Combat Casualty Care (CoTCCC) Sub-committee on First Responders to look into the lack of information related to care rendered at the point of injury in the current conflict. To this point, with over 30,000 WIA, less than 10% of records have any pre-hospital documentation; in only 1% of cases is the information available sufficient. 'Home-grown' formats were used in almost all cases of successful documentation. Decision support, from Level IIB clinicians through Health Affairs leadership, requires this information to provide current and future guidance related to battlefield health care. Furthermore, first responders are not medical personnel in most instances. Documentation of care provided by first responders must be in a format that they understand and can use.

CoTCCC is uniquely positioned to provide this feedback due to its charter, expertise, membership and system-wide implementation of Tactical Combat Casualty Care (TCCC) guidelines. A special meeting was convened on 30 Aug 2007 to address this issue, which included representation from the CoTCCC as well as medics and physicians from all service components, including active and reserve components. Sixty individuals attended this

conference and defined the environment of care under battlefield conditions. They also discussed, at length, the standard of care, realities of first responder documentation in the battle space and requirements for sufficient documentation of care provided. Currently, life saving interventions and other essential clinical data are not being captured for the longitudinal health care record. This does not meet the TCCC standard of care. Reasons cited included: the institutional documentation tools, the paper form 1380 and the electronic BMIS-T, do not sufficiently meet the needs of the pre-hospital providers in the tactical environment.

This consortium outlined several key requirements to meet the standard of care for improved pre-hospital documentation (see attachments). Furthermore, the consortium decided on the minimum essential data elements to capture, which will ensure adequate transfer of vital information.

Services are not meeting TCCC standard of care (adopted by all Services) because of the lack of information flow from POI to Level II. In order to meet that standard, certain critical elements of health care information must be communicated to insure optimal care; no current fielded solution exists. A new tool is needed to support TCCC at the point of injury. An immediate, cost-effective and easily fielded interim solution that meets the TCCC standard of care is included in the attachments. CoTCCC will publish this form in the next edition of the PHTLS manual and it will be posted on the TCCC website as an interim change.

Respectfully submitted on behalf of the First Responder Sub-committee, CoTCCC

Donald H Jenkins, Col USAF MC
Chair of Sub-committee

Stephen D Giebner, MD
Chair, CoTCCC

Vote

The proposed change was approved by the committee in an unscheduled vote.

26. Major Bob Mabry – First Responder Airway Issues

Major Mabry has been conducting a review of airway management during First Responder care on the battlefield. His review to date has indicated that the primary concern in this setting is opening the compromised airway in the setting of maxillofacial trauma. He believes that cricothyroidotomy remains the best option for the combat medic who has to manage the airway in this setting and favors a vertical incision for the procedure. Endotracheal intubation entails the possibility of intubating the esophagus or a false passage in the disrupted oropharyngeal anatomy and is not well tolerated by casualties who are not already dead.

He notes that the nasopharyngeal airway and positioning still have a place in the management of casualties who are unconscious but have no disruption of the airway anatomy. He is not at this point ready to recommend that the King airway be added to the combat medics' equipment list.

27. Next Meeting

The next regular meeting of the CoTCCC will be held in San Antonio on 3 and 4 February 2009. The TCCC First Responder Conference will be held in Tampa 9-11 September 2008.

Handwritten signature of Frank K. Butler in black ink.

Frank K. Butler, M.D.
CAPT MC USN (Ret)
Chairman
Committee on Tactical Combat Casualty Care