Tactical Combat Casualty Care

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Introduction

• Soldiers continue to die on today’s battlefield just as they did during the Civil War. The standards of care applied to the battlefield have always been based on civilian care principals. These principals while appropriate for the civilian community often do not apply to care on the battlefield.
Introduction

Civilian medical trauma training is based on the following principles:

Emergency Medical Technicians (EMT-B,I,P)
Basic Trauma Life Support (BTLS)
Advanced Trauma Life Support (ATLS)
Introduction

- Tactical Combat Casualty Care has been approved by the American College of Surgeons and National Association of EMTs and is included in the Pre-hospital Trauma Life Support manual 5th edition.
Introduction

• Three goals of TCCC
  1. Treat the casualty
  2. Prevent additional casualties
  3. Complete the mission
Introduction

• This approach recognizes a particularly important principle –

• Performing the correct intervention at the correct time in the continuum of combat care. A medically correct intervention performed at the wrong time in combat may lead to further casualties
Introduction

• Pre-hospital care continues to be critically important
• Up to 90% of all combat deaths occur before a casualty reaches a Medical Treatment Facility (MTF)
• Penetrating vs. Blunt trauma
Factors influencing combat casualty care

- Enemy Fire
- Medical Equipment Limitations
- Widely Variable Evacuation Time
Factors influencing combat casualty care

• Tactical Considerations

• Casualty Transportation
STAGES OF CARE

• Care Under Fire

• Tactical Field Care

• Combat Casualty Evacuation Care
Care Under Fire

• “Care under fire” is the care rendered by the medic at the scene of the injury while he and the casualty are still under effective hostile fire. Available medical equipment is limited to that carried by the soldier or the medic in his aid bag.
Tactical Field Care

• “Tactical Field Care” is the care rendered by the medic once he and the casualty are no longer under effective hostile fire. It also applies to situations in which an injury has occurred, but there has been no hostile fire. Available medical equipment is still limited to that carried into the field by medical personnel. Time to evacuation to a MTF may vary considerably.
Combat Casualty Evacuation Care

• “Combat Casualty Evacuation Care” is the care rendered once the casualty has been picked up by an aircraft, vehicle or boat. Additional medical personnel and equipment may have been pre-staged and available at this stage of casualty management.
Care Under Fire
Care Under Fire

• Medical personnel’s firepower may be essential in obtaining tactical fire superiority. Attention to suppression of hostile fire may minimize the risk of injury to personnel and minimize additional injury to previously injured soldiers.
Care Under Fire

• Personnel may need to assist in returning fire instead of stopping to care for casualties

• Wounded soldiers should move as quickly as possible to any nearby cover
Care Under Fire

• Medical personnel are limited and if injured no other medical personnel may be available until the time of extraction during the CASEVAC phase.

• No immediate management of the airway is necessary at this time due to movement of the casualty to cover.
Care Under Fire

• Control of hemorrhage is important since injury to a major vessel can result in hypovolemic shock in a short time frame

• Over 2500 deaths occurred in Viet Nam secondary to hemorrhage from extremity wounds
Care Under Fire

• Use of temporary tourniquets to **stop the bleeding** is essential in these types of casualties
Tourniquet
Care Under Fire

The need for immediate access to a tourniquet in such situations makes it clear that all soldiers on combat missions have a suitable tourniquet readily available at a standard location on their battle gear and be trained in its use.
Combat Application Tourniquet

- Windlass
- Self Adhering Band
- Windlass Strap
Care Under Fire

- Penetrating neck injuries do not require C-spine immobilization. Other neck injuries, such as falls over 15 feet, fast-roping injuries, or MVAs may require C-spine control **unless** the danger of hostile fire constitutes a greater threat in the judgment of the medic.
Care Under Fire

• Conventional litters may not be available for movement of casualties. Consider alternate methods to move casualties such as a SKED® or Talon II® litter. Smoke, CS, and vehicles may act as screens to assist in casualty movement.
SKED Litter
Talon II Litter
Care Under Fire

• Do not attempt to salvage a casualty’s rucksack, unless it contains items critical to the mission

• Take the patient’s weapon and ammunition if possible to prevent the enemy from using it against you.
KEY POINTS

• Return fire as directed or required
• The casualty(s) should also return fire if able
• Try to keep yourself from being shot
• Try to keep the casualty from sustaining any additional wounds
• Airway management is generally best deferred until the Tactical Field Care phase
• Stop any life threatening hemorrhage with a tourniquet
• Reassure the casualty
Tactical Field Care
Tactical Field Care

- The Tactical Field Care phase is distinguished from the Care Under Fire phase by having more time available to provide care and a reduced level of hazard from hostile fire. The times available to render care may be quite variable.
Tactical Field Care

• In some cases, tactical field care may consist of rapid treatment of wounds with the expectation of a re-engagement of hostile fire at any moment. In some circumstances there may be ample time to render whatever care is available in the field. The time to evacuation may be quite variable from 30 minutes to several hours.
Tactical Field Care

• If a victim of a blast or penetrating injury is found without a pulse, respirations, or other signs of life,

• **Do Not** attempt CPR

• Casualties with altered mental status should be disarmed immediately, both weapons and grenades
Tactical Field Care

Initial assessment consists of:

- Airway
- Breathing
- Circulation
Tactical Field Care - Airway

- Open the airway with a jaw thrust maneuver, if unconscious insert a nasopharyngeal airway or Combitube, and place the casualty in the recovery position.
Nasopharyngeal Airway
Tactical Field Care

• Airway

• If the casualty is unconscious with an obstructed airway, perform a surgical cricothyroidotomy
Tactical Field Care

• Airway

• Oxygen is usually not available in this phase of care
Tactical Field Care

• Breathing

• Traumatic chest wall defects should be closed with an occlusive dressing without regard to venting one side of the dressing or use an “Asherman Chest Seal®”. Place the casualty in the sitting position if possible.
"Asherman Chest Seal"
Tactical Field Care - Breathing

- Progressive respiratory distress secondary to a unilateral penetrating chest trauma should be considered a tension pneumothorax and decompressed with a 14 gauge needle.
- Tension pneumothorax is the 2\textsuperscript{nd} leading cause of preventable death on the battlefield.
Tension Pneumothorax

Air pushes over heart and collapses lung

Air outside lung from wound

Heart compressed not able to pump well
Needle Chest Decompression
Tactical Field Care

• Bleeding

• Any bleeding site not previously controlled should now be addressed. Only the absolute minimum of clothing should be removed.
Tactical Field Care

• Bleeding cont’d
• Significant bleeding should be controlled using a tourniquet as described previously.
• Once the tactical situation permits, consideration should be given to loosening the tourniquet and using direct pressure or hemostatic bandages (HemCon®) or hemostatic powder (QuikClot®) to control any additional hemorrhage
Tourniquet Removal

• When? Based on the Tactical Situation
• More time in a safer setting.
• More help available
• Tourniquet has been on for less than 6 hours
• Can you see what you are doing?
• Does the casualty need fluid resuscitation?
• If so, do it before the tourniquet is removed
Tourniquet Removal

• **DO NOT** periodically loosen the tourniquet to get blood to the limb.
• Can be rapidly fatal.
• Tourniquets are very painful
• If the tourniquet has been on for > 6hrs, leave it on.
• If unable to control bleeding with other methods-retighten the tourniquet
Hemostatic Agents

- Hemcon® Chitosan Bandage
- QuikClot® Hemostatic Powder
Chitosan Hemostatic Dressing

- Hold the foil over-pouch so that instructions can be read. Identify unsealed edges at the top of the over-pouch
Chitosan Hemostatic Dressing

- Peel open over-pouch by pulling the unsealed edges apart
Chitosan Hemostatic Dressing

- Trap dressing between bottom foil and non-absorbable green/black polyester backing with your hand and thumb
Chitosan Hemostatic Dressing

- Hold dressing by the non-absorbable polyester backing and discard the foil over-pouch. Hands must be dry to prevent dressing from sticking to hands.
Chitosan Hemostatic Dressing
Chitosan Hemostatic Dressing

• Place the light colored sponge portion of the dressing directly to the wound area with the most severe bleeding. Apply pressure for 2 minutes or until the dressing adheres and bleeding stops. Once applied and in contact with the blood and other fluids, the dressing cannot be repositioned.

• A new dressing should be applied to other exposed bleeding sites. Each new dressing must be in contact with tissue where bleeding is heaviest. Care must be taken to avoid contact with the patient’s eyes.
Chitosan Hemostatic Dressing

- If dressing is not effective in stopping bleeding after 4 minutes, remove original and apply a new dressing. Additional dressings cannot be applied over ineffective dressing.
- Apply a battle dressing/bandage to secure hemostatic dressing in place.
- Hemostatic dressings should only be removed by responsible persons after evacuation to the next level of care.
QuikClot™
Adsorbent Hemostatic Agent

Controls Moderate to Severe Blood Loss by Promoting Coagulation

For Emergency/External Use

as a Temporary Traumatic Wound Treatment To Stop Moderate-to-Severe Bleeding

SEE DIRECTIONS ON BACK

Z-MEDICA

441 Winton Ave, Winton, CT 06111 • www.z-medica.com
Tactical Field Care

- IV
- IV access must be gained next. The use of a single 18 gauge catheter is recommended, because of the ease of starting and also helps to conserve supplies.
- A Heparin or saline lock-type access tubing should be used unless the patient needs immediate resuscitation.
Saline Lock
Tactical Field Care

- IV
- Medics should insure the IV is not started distal to a significant wound.
- If unable to start an IV consideration should be given to starting a sternal I/O line to provide fluids.
Tactical Field Care

• Fluids

• 1000ml of Ringers Lactate (2.4lbs) will expand the intravascular volume by 250ml within 1 hour

• 500ml of 6% Hetastarch (trade name Hextend®, weighs 1.3lbs) will expand the intravascular volume by 800ml within 1 hour, and will sustain this expansion for 8 hours
Tactical Field Care

- Fluids
- Algorithm for fluid resuscitation
- BP verses palpable radial pulse and mentation
- Superficial wounds (>50% injured); no immediate IV fluids needed. Oral fluids should be encouraged.
Tactical Field Care

• Fluids

• Any significant extremity or truncal wound (neck, chest, abdomen, pelvis)

• 1. If the soldier is coherent and has a palpable radial pulse, start a saline lock, hold fluids and reevaluate as frequently as the situation permits
Tactical Field Care

• Fluids

• 2. Significant blood loss from any wound, and the soldier has no radial pulse or is not coherent—STOP THE BLEEDING—by whatever means available—tourniquet, direct pressure, hemostatic dressings, or hemostatic powder etc. Start 500ml of Hextend®. If mental status improves and radial pulse returns, maintain saline lock and hold fluids.
Tactical Field Care

• Fluids

• 3. If no response is seen give an additional 500ml of Hextend® and monitor vital signs. If no response is seen after 1000ml of Hextend®, consider triaging supplies and attention to more salvageable casualties
Tactical Field Care

• Fluids

• 4. Because of conservation of supplies, no casualty should receive more than 1000 ml of Hextend®. Remember this is the equivalent to six liters of Ringers Lactate.
Tactical Field Care

• Wounds
• Dress wounds to prevent further contamination and help hemostasis (Emergency Bandage®)
• Check for additional wounds (exit)
• Protect the patient from Hypothermia (Blizzard Survival Blanket)
Blizzard Survival Wrap
Prevention with Body Bags
Tactical Field Care

Pain Control

• Able to fight
  – Celebrex 200mg or Meloxicam (Mobic®) 15mg po initially
  – Acetaminophen 1000 mg po q6hr

• Unable to fight
  – Morphine 5 mg IV / IO
  – Phenergan® 25mg IV, IM
In the event of open combat wound, swallow all four pills with water.

TYLENOL 1000mg EXP 10/05
VIOXX 50mg EXP 04/04
GATIFLOXACIN 400mg EXP 12/03

Pain Management and Infection Control For Combat Casualties
"Just Got Easier To Swallow"
Tactical Field Care

- Pain Control
- Pain control should be achieved by intravenous morphine, if possible
- 1. 5mg IV morphine may be given every 10 minutes until adequate pain control is achieved. If a saline lock is used it should be flushed with 5ml of sterile solution (saline, LR etc.) after morphine administration.
Tactical Field Care

• Pain control

• 2. Insure some visible indication of time and amount of morphine given.

• 3. Soldiers who administer morphine should also be trained in its side effects and in the use of Naloxone.
Tactical Field Care

• Pain Control

• Soldiers should avoid aspirin and other nonsteroidal anti-inflammatory medicines while in a combat zone because of detrimental effects on hemostasis.
Future Pain Relief

Fentanyl Transmucosal Lozenge
Future Pain Relief

Intranasal Ketamine
Tactical Field Care

- Fractures

- Splint fractures as circumstances allow, insuring pulse, motor, and sensory checks before and after splinting
Tactical Field Care

• Antibiotics

• Antibiotics should be considered in any wound sustained on the battlefield.
Tactical Field Care

- Casualties who are awake and alert, Gatifloxacin 400 mg, one tablet Q day
- Casualties who are unconscious,
- Cefotetan-no longer manufactured
- Cefoxitin- 1-2 Gms TID May not be available
- Ertapenem 1 gm IV /IM QD
- IV requires 30 infusion time
- IM should be diluted with lidocaine
Ertapenem Invanz®

• Reconstitute the contents of a 1 g vial of INVANZ with 3.2 mL of 1.0% lidocaine HCl injection ** (without epinephrine). Shake vial thoroughly to form solution.

• Immediately withdraw the contents of the vial and administer by deep intramuscular injection into a large muscle mass (such as the gluteal muscles or lateral part of the thigh).

• The reconstituted IM solution should be used within 1 hour after preparation. **NOTE: THE RECONSTITUTED SOLUTION SHOULD NOT BE ADMINISTERED INTRAVENOUSLY.**
Antibiotics

• Patients with allergies to fluoroquinolones, penicillin's, cephalosporins, or other beta-lactam antibiotics may need alternate antibiotics which should be selected during the pre-deployment phase.
Casevac Care
Casevac Care

- At some point in the operation the casualty will be scheduled for evacuation. Time to evacuation may be quite variable from minutes to hours.
Casevac
Casevac Care

• There are only minor differences in care when progressing from the Tactical Field Care phase to the Casevac phase.

• 1. Additional medical personnel may accompany the evacuation asset and assist the medic on the ground. This may be important for the following reasons:
Casevac Care

• The medic may be among the casualties

• The medic may be dehydrated, hypothermic, or otherwise debilitated
Casevac Care

• The Evac asset’s medical equipment may need to be prepared prior to evacuation.

• There may be multiple casualties that exceed the capability of the medic to care for simultaneously.
Casevac Care

• 2. Additional medical equipment can be brought in with the EVAC asset to augment the equipment the medic already has.

• This equipment may include:
Casevac Care

- Electronic monitoring equipment capable of measuring a patient’s blood pressure, pulse, and pulse oximetry.

- Oxygen should be available during this phase.
Casevac Care

• Ringers Lactate at a rate of 250ml per hour for patients not in shock should help to reverse dehydration.

• Blood products may be available during this phase of care.
Summary

- How people die in ground combat:
  - 31% Penetrating Head Trauma
  - 25% Surgically Uncorrectable Torso Trauma
  - 10% Potentially Correctable Surgical Trauma
Summary

• 9% Exsanguination from Extremity Wounds 1st
• 7% Mutilating Blast Trauma
• 5% Tension Pneumothorax 2nd
• 1% Airway Problems 3rd
• <5% Died of Wounds (Mostly infections and complications of shock)
Summary

• Three categories of casualties on the battlefield
• Soldiers who will do well regardless of what we do for them
• Soldiers who are going to die regardless of what we do for them
• Soldiers who will die if we do not do something for them Now (7-15%)
Summary

• If during the next war you could do only two things, (1) put a tourniquet on and (2) relieve a tension pneumothorax then you can probably save between 70 and 90 percent of all the preventable deaths on the battlefield.  

COL Ron Bellamy 1993
Summary

• Medical care during combat differs significantly from the care provided in the civilian community. New concepts in hemorrhage control, fluid resuscitation, analgesia, and antibiotics are important steps in providing the best possible care to our combat soldiers.
Summary

• These timely interventions will be the mainstay in decreasing the number of combat fatalities on the battlefield.
National Stock Numbers

Combat Application Tourniquet® 6515-01-521-7976
• Hextend® Fluid  6505-01-498-8636
• FAST 1®  6515-01-453-0960
• Emergency Bandage® 6510-01-492-2275
• HemCon Chitosan Dressing®  6510-01-502-6938
• Sked Litter® 6530-01-260-1222
• Talon II Litter®  6530-01-452-1651
• Blizzard Rescue Wrap® 6532-01-524-6932
• Ready Heat Medical Blankets® 6532-01-525-4062
QUESTIONS ?