Tactical Combat Casualty Care
Fluid Resuscitation for Hemorrhagic Shock in TCCC

2 June 2014

What is TCCC?

Committee for Tactical Combat Casualty Care

- Chair Frank Butler, MD CAPT USN (Ret)
- 49 members including 68W (combat medics), 18B (Special Forces Sergeant Medic), Air Force Pararescue specialists, Naval Corpsmen, Emergency Physicians, Trauma Surgeons.
- Half of all members must be non-physicians
- Civilian advisors Tactical Medical Officers for SWAT

What is TCCC?

Committee for Tactical Combat Casualty Care

- Reports to Secretary of Defense
- Part of Joint Theater Trauma System and Defense Health Board
- Develops Clinical Operation Guidelines for all United States forces
- Standard for all NATO forces
- Used by Russian and Chinese military as well

Why a change was needed

There have been a number of publications related to:

- Hypotensive resuscitation
- Dried plasma
- Adverse effects from resuscitation with both crystalloids and colloids
- Prehospital resuscitation with thawed and liquid plasma and RBCs
- Resuscitation from combined hemorrhagic shock and traumatic brain injury (TBI)

Why a change was needed

There have been a number of publications related to:

- Balanced blood component therapy in damage control resuscitation (DCR)
- The benefits of fresh whole blood (FWB) use
- Resuscitation from hemorrhagic shock in animal models where the hemorrhage is definitively controlled prior to resuscitation.

Why a change was needed

Recently published studies describe an increased use of blood products by coalition forces in Afghanistan during Tactical Evacuation (TACEVAC) Care and even in Tactical Field Care (TFC).

Resuscitation with RBCs and plasma has been associated with improved survival on the platforms that use them, even in the relatively short evacuation times seen in Afghanistan in recent years.

What this change does

- Provides an order of precedence for resuscitation fluids
- Documents the evidence for the order of precedence recommended
- Encourages the use of prehospital blood components when feasible, to include Tactical Field Care (TFC)
- Incorporates dried and liquid plasma into the resuscitation fluid options
- Makes the fluid resuscitation plan the same for both TFC and TACEVAC Care

What this change does

- Addresses recent studies documenting adverse effects from resuscitation with crystalloids and colloids
- Provides extra emphasis on the need for reassessment of hemorrhage control during resuscitation
- Adds emphasis on the need to ensure that external hemorrhage has been adequately controlled if shock recurs

TCCC Guideline for fluid resuscitation from hemorrhagic shock for Tactical Field Care (TFC) and Tactical Evacuation Care (TACEVAC)

The resuscitation fluids of choice in hemorrhagic shock, listed from most to least preferred are:

- whole blood
- plasma, RBCs and platelets in 1:1:1 ratio
- plasma and RBCs in 1:1 ratio
- plasma or RBCs alone
- Hextend; and crystalloid (Lactated Ringers or Plasma-Lyte A).

Fluid Resuscitation from Hemorrhagic Shock

Assess for hemorrhagic shock (altered mental status in the absence of brain injury and/or weak or absent radial pulse).

If not in shock:

- - No IV fluids are immediately necessary.
- - Fluids by mouth are permissible if the casualty is conscious and can swallow.

If in shock and blood products are available

- Resuscitate with whole blood, or, if not available;
- Plasma, RBCs and platelets in a 1:1:1 ratio, or, if not available;
- Plasma and RBCs in 1:1 ratio, or, if not available;
- Reconstituted dried plasma, liquid plasma or thawed plasma alone or RBCs alone;
- Reassess the casualty after each unit. Continue resuscitation a palpable radial pulse, improved mental status or systolic BP of 80-90 mmHg is present.

If in shock and blood product are not available

- Resuscitate with Hextend, or if not available;
- Lactated Ringers or Plasma-Lyte A;
- Reassess the casualty after each 500 mL IV bolus;
- Continue resuscitation until a palpable radial pulse, improved mental status, or systolic BP of 80-90 mmHg is present.
- Discontinue fluid administration when one or more of the above end points has been achieved.

Fluid Resuscitation from Hemorrhagic Shock

- Continue resuscitation until a palpable radial pulse, improved mental status, or systolic BP of 80-90 mmHg is present.
- Discontinue fluid administration when one or more of the above end points has been achieved.

Fluid Resuscitation from Hemorrhagic Shock with TBI

If a casualty with an altered mental status due to suspected TBI has a weak or absent peripheral pulse, resuscitate as necessary to restore and maintain a normal radial pulse. If BP monitoring is available, maintain a target systolic BP of at least 90 mmHg.

Fluid Resuscitation from Hemorrhagic Shock

Reassess the casualty frequently to check for recurrence of shock. If shock recurs, recheck all external hemorrhage control measures to ensure that they are still effective and repeat the fluid resuscitation as outlined above.

Why not use these fluids?

- Albumin
  - not recommended for casualties with TBI
- Voluven
  - More expensive than Hextend
  - Reported to cause kidney injury
- Normal saline
  - Causes a hyperchloremic acidosis

Why not use these fluids?

- Hypertonic saline
  - Volume expansion is larger than NS, but short-lived
  - Found to be not superior to NS in a large study
  - Most-studied concentration (7.5%) is not FDA-approve

"Heroes don't wear capes, they wear dog tags!"

Please address all questions and / or comments to:

james.vretis@txsg.state.tx.us