

Tactical Combat Casualty Care Guideline Change 14-01:

Fluid Resuscitation for Hemorrhagic Shock in TCCC



2 June 2014



Fluid Resuscitation from Hemorrhagic Shock

Why a change was needed:

- The last update to the fluid resuscitation recommendations in the TCCC Guidelines was approved in November 2011
- In the interim, 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)
 - 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.



Fluid Resuscitation from Hemorrhagic Shock

Why a change was needed

- Additionally, 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.
- Prehospital blood products may have an increasingly important impact on survival if evacuation times lengthen as the drawdown in Afghanistan continues and if the U.S. military is called upon to conduct operations in less mature theaters of conflict.
- Future conflicts in other geographic combatant commands such as the U.S. Pacific Command (PACOM), the U.S. Southern Command (SOUTHCOM), and the U.S. Africa Command (AFRICOM) may have prolonged evacuation times and may include the need to consider pre-evacuation treatment aboard ships at sea.



Fluid Resuscitation from Hemorrhagic Shock

What this change does

- Provides an order of precedence for resuscitation fluids
- Documents the evidence for the order recommended



Fluid Resuscitation from Hemorrhagic Shock

What this change does

- Encourages the use of prehospital blood components when feasible, to include Tactical Field Care in some settings
- Incorporates dried and liquid plasma into the fluid options
- Makes the fluid resuscitation plan the same for both TFC and TACEVAC Care



Fluid Resuscitation from Hemorrhagic Shock

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 is adequately controlled if shock recurs



Fluid Resuscitation from Hemorrhagic Shock

**The newly approved TCCC Guideline
for fluid resuscitation from
hemorrhagic shock**

(Red text denotes new material)



Fluid Resuscitation from Hemorrhagic Shock

Tactical Field Care and TACEVAC Care

7. Fluid resuscitation

a. **The resuscitation fluids of choice for casualties 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

7. Fluid resuscitation

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

– 1. If not in shock:

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



Fluid Resuscitation from Hemorrhagic Shock

7. Fluid resuscitation

b2. If in shock and blood products are available under an **approved command or theater blood product administration protocol**:

- 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 until a palpable radial pulse, improved mental status or systolic BP of 80-90 mmHg is present.



Fluid Resuscitation from Hemorrhagic Shock

7. Fluid resuscitation

b3. If in shock and blood products are not available under an approved command or theater **blood product administration protocol due to tactical or logistical constraints:**

- **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

7. Fluid resuscitation

b4. 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

7. Fluid resuscitation

b5. 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.



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7. Fluid resuscitation

*** Neither whole blood nor apheresis platelets as these products are currently collected in theater are FDA-compliant. Consequently, whole blood and 1:1:1 resuscitation using apheresis platelets should be used only if all of the FDA-compliant blood products needed to support 1:1:1 resuscitation are not available, or if 1:1:1 resuscitation is not producing the desired clinical effect.**



Fluid Resuscitation from Hemorrhagic Shock

Why not use these fluids?

- Albumin – not recommended for casualties with TBI
- Voluven
 - More expensive than Hextend
 - Also reported to cause kidney injury
- Normal saline – causes a hyperchloremic acidosis
- 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-approved



Thank You!

