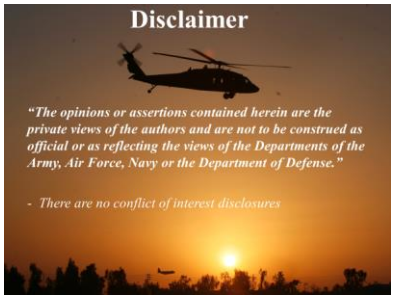
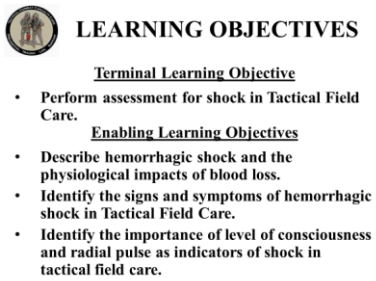
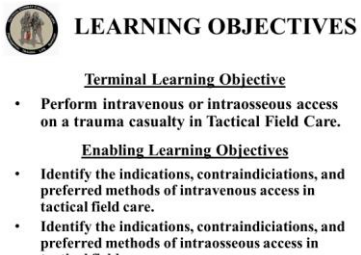
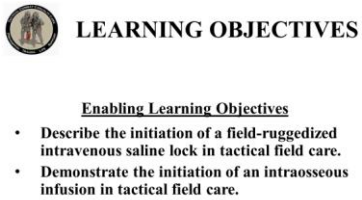
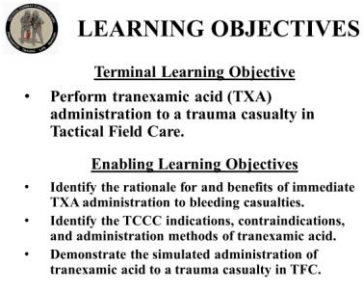
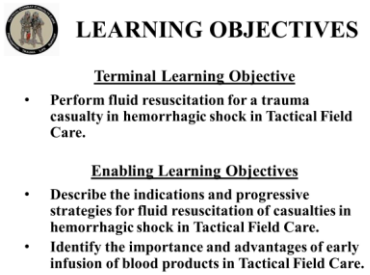
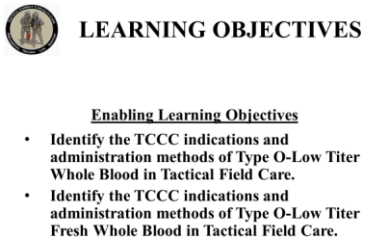
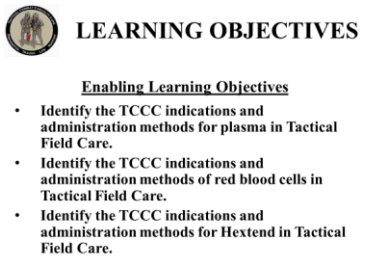
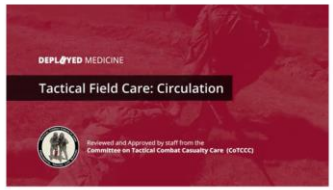
1.		**Tactical Combat Casualty Care for Medical Personnel** **August 2018** **(Based on TCCC-MP Guidelines 180801)** **Tactical Field Care 2B** **Circulation – Shock-IV/IO-TXA-Fluid Resuscitation**	Our next topics are Shock, IV/IO access, TXA administration, and Fluid Resuscitation.
2.		**Disclaimer** ***"The opinions or assertions contained herein are the private views of the authors and are not to be construed as official or as reflecting the views of the Departments of the Army, Air Force, Navy or the Department of Defense."*** - ***There are no conflict of interest disclosures***	Read the disclaimer.
3.		**LEARNING OBJECTIVES** Terminal Learning Objective • Perform assessment for shock in Tactical Field Care. Enabling Learning Objectives • Describe hemorrhagic shock and the physiological impacts of blood loss. • Identify the signs and symptoms of hemorrhagic shock in Tactical Field Care. • Identify the importance of level of consciousness and radial pulse as indicators of shock in tactical field care.	Read the text.

4.		**LEARNING OBJECTIVES** Terminal Learning Objective • Perform intravenous or intraosseous access on a trauma casualty in Tactical Field Care. Enabling Learning Objectives • Identify the indications, contraindiciations, and preferred methods of intravenous access in tactical field care. • Identify the indications, contraindiciations, and preferred methods of intraosseous access in tactical field care.	Read the text.
5.		**LEARNING OBJECTIVES** Enabling Learning Objectives • Describe the initiation of a field-ruggedized intravenous saline lock in tactical field care. • Demonstrate the initiation of an intraosseous infusion in tactical field care.	Read the text.
6.		**LEARNING OBJECTIVES** Terminal Learning Objective • Perform tranexamic acid (TXA) administration to a trauma casualty in Tactical Field Care. Enabling Learning Objectives • Identify the rationale for and benefits of immediate TXA administration to bleeding casualties. • Identify the TCCC indications, contraindications, and administration methods of tranexamic acid. • Demonstrate the simulated administration of tranexamic acid to a trauma casualty in TFC.	Read the text.

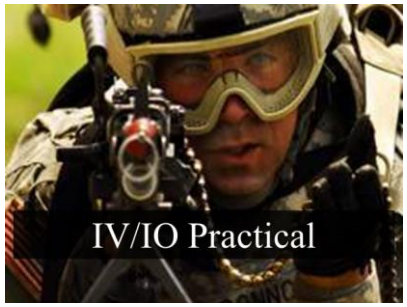
7.		**LEARNING OBJECTIVES** Terminal Learning Objective • Perform fluid resuscitation for a trauma casualty in hemorrhagic shock in Tactical Field Care. Enabling Learning Objectives • Describe the indications and progressive strategies for fluid resuscitation of casualties in hemorrhagic shock in Tactical Field Care. • Identify the importance and advantages of early infusion of blood products in Tactical Field Care.	Read the text.
8.		**LEARNING OBJECTIVES** Enabling Learning Objectives • Identify the TCCC indications and administration methods of Type O-Low Titer Whole Blood in Tactical Field Care. • Identify the TCCC indications and administration methods of Type O-Low Titer Fresh Whole Blood in Tactical Field Care.	Read the text.
9.		**LEARNING OBJECTIVES** Enabling Learning Objectives • Identify the TCCC indications and administration methods for plasma in Tactical Field Care. • Identify the TCCC indications and administration methods of red blood cells in Tactical Field Care. • Identify the TCCC indications and administration methods for Hextend in Tactical Field Care.	Read the text.

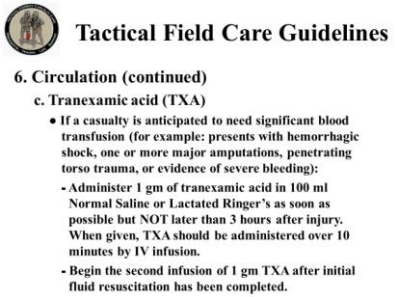
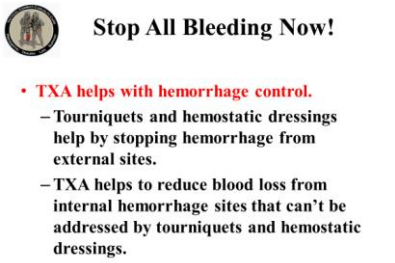
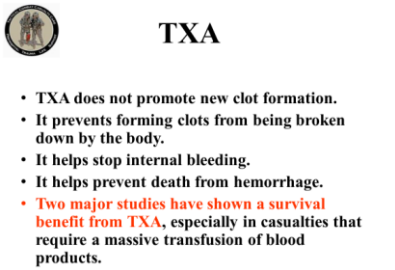
10.	 **LEARNING OBJECTIVES** **Enabling Learning Objectives** • **Identify the TCCC indications and administration methods for Lactated Ringer's in Tactical Field Care.** • **Identify the TCCC indications and administration methods for Plasma-Lyte A in Tactical Field Care.** • **Describe the rationale for allowing conscious casualties who may require surgery to take fluids by mouth during TCCC.**	**LEARNING OBJECTIVES** Enabling Learning Objectives • Identify the TCCC indications and administration methods for Lactated Ringer's in Tactical Field Care. • Identify the TCCC indications and administration methods for Plasma-Lyte A in Tactical Field Care. • Describe the rationale for allowing conscious casualties who may require surgery to take fluids by mouth during TCCC.	Read the text.
11.	 **LEARNING OBJECTIVES** **Enabling Learning Objectives** • **Identify the potential for untreated tension pneumothorax to be a potential cause of refractory shock.** • **Describe the treatment for suspected untreated tension pneumothorax resulting in refractory shock in Tactical Field Care.**	**LEARNING OBJECTIVES** Enabling Learning Objectives • Identify the potential for untreated tension pneumothorax to be a potential cause of refractory shock. • Describe the treatment for suspected untreated tension pneumothorax resulting in refractory shock in Tactical Field Care.	Read the text.
12.	 **Tactical Field Care Guidelines** 6. Circulation (continued) b. IV access • Intravenous (IV) or intraosseous (IO) access is indicated if the casualty is in hemorrhagic shock or at significant risk of shock (and may therefore need fluid resuscitation), or if the casualty needs medications, but cannot take them by mouth. - An 18-gauge IV or saline lock is preferred. - If vascular access is needed but not quickly obtainable via the IV route, use the IO route.	**Tactical Field Care Guidelines** 6. Circulation (continued) b. IV access • Intravenous (IV) or intraosseous (IO) access is indicated if the casualty is in hemorrhagic shock or at significant risk of shock (and may therefore need fluid resuscitation), or if the casualty needs medications, but cannot take them by mouth. - An 18-gauge IV or saline lock is preferred. - If vascular access is needed but not quickly obtainable via the IV route, use the IO route.	Read the guideline.

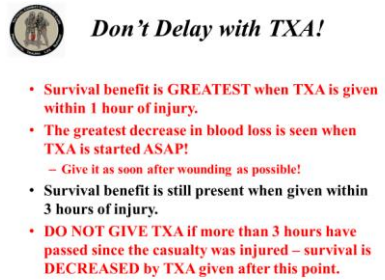
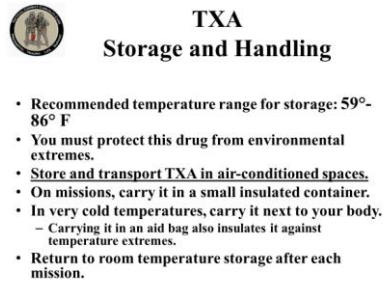
13.	**Circulation Overview** **Shock – IV/IO –TXA –** **Fluid Resuscitation** 	**Circulation Overview** **Shock – IV/IO –TXA – Fluid Resuscitation**	Click on the photo to play the video.
14.	**IV Access – Key Points** • Not every casualty needs an IV • Don't insert an IV distal to a significant wound! • A saline lock is recommended instead of an IV line unless fluids are needed immediately. – It's much easier to move a casualty without an IV line and bag attached. – There's less chance of traumatic disinsertion. – Provides rapid subsequent access if needed. – Conserves IV fluids. • Flush the saline lock with 5cc NS immediately and then every 1-2 hours to keep it open.	**IV Access – Key Point** • Not every casualty needs an IV • Don't insert an IV distal to a significant wound! • A saline lock is recommended instead of an IV line unless fluids are needed immediately. • It's much easier to move a casualty without an IV line and bag attached. • There's less chance of traumatic disinsertion. • Provides rapid subsequent access if needed. • Conserves IV fluids. • Flush the saline lock with 5cc NS immediately and then every 1-2 hours to keep it open.	Don't hang fluids unless the casualty really needs them.

15.	**Ruggedized Field IV**  *Courtesy Mr. Rob Miller*	**Ruggedized Field IV**	Click on the photo to play the video. Here's is an excellent way to ruggedize an IV that was developed by the Army Rangers. Don't forget to flush the saline lock! It will clot off if you don't. It must be flushed immediately (within 2-3 minutes), and then flushed every 2 hours if IV fluid is not running. The 2nd catheter for the IV line is inserted right through the Tegaderm. The Velcro strap helps prevent traumatic disinsertion of IV line. Even if the IV line is pulled out, the saline lock will remain in place. This ruggedized IV technique has worked very well on the battlefield.
16.	**FAST1® Insertion Video** 	**FAST1® Insertion Video**.	Click on the photo to play the video.

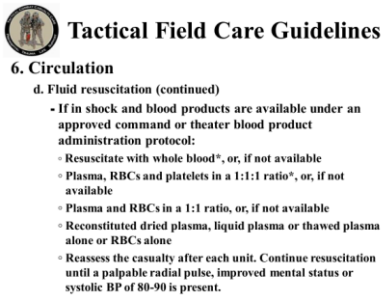
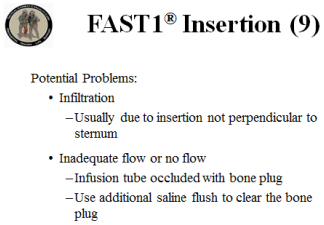
17.	**FAST1® Warnings** FAST1® NOT RECOMMENDED IF: - Patient is of small stature: - Weight of less than 50 kg (110 pounds) - Less than 12 years old - Fractured manubrium/sternum – flail chest - Significant tissue damage at site – trauma, infection - Severe osteoporosis - Previous sternotomy and/or scar • NOTE: FAST1® INFUSION TUBE SHOULD NOT BE LEFT IN PLACE FOR MORE THAN 24 HOURS	**FAST1® Warnings** FAST1® NOT RECOMMENDED IF: - Patient is of small stature: - Weight of less than 50 kg (110 pounds) - Less than 12 years old - Fractured manubrium/sternum – flail chest - Significant tissue damage at site – trauma, infection - Severe osteoporosis - Previous sternotomy and/or scar • NOTE: FAST1® infusion tube SHOULD NOT BE LEFT IN PLACE FOR MORE THAN 24 HOURS	A few things to be aware of about the FAST1®.
18.	**EZ-IO®** • After the FAST1 ®, the EZ-IO ® is the next most commonly used IO device in combat. • Overall experience with these devices has been favorable. • Multiple EZ-IO devices are available. It is absolutely essential to use the right device for the chosen anatomical location. 	**EZ-IO®** • After the FAST1 ®, the EZ-IO ® is the next most commonly used IO device in combat. • Overall experience with these devices has been favorable. • Multiple EZ-IO devices are available. It is absolutely essential to use the right device for the chosen anatomical location.	The device made for sternal insertion has a green plastic hub and 7.5mm-long needle. The EZ-IO device made for long bone insertion (humerus, tibia) has a blue hub and its needle is 25mm long. There are also pediatric and large patient devices. The packaging for these devices is markedly different. The long bone device package is marked “NOT FOR STERNAL USE.” Intraosseous needles designed for long bone insertion have the potential to perforate the sternum, a thinner and less dense bone. In this situation, IV fluids may be introduced into the mediastinum. MAKE SURE YOU USE THE CORRECT DEVICE FOR THE SITE CHOSEN!

19.	**EZ-IO ® Insertion (Humeral)** 	**EZ-IO ® Insertion (Humeral)**	Click on the photo to play the video.
20.	**IO Device Training Safety** • **DO NOT PRACTICE ON ONE ANOTHER!** – **In the past, a number of student volunteers have been taken to surgery to have IO needles removed.** – **There is a risk of osteomyelitis.** – **Train on intraosseous simulators, not classmates!**	**IO Device Training Safety** • DO NOT PRACTICE ON ONE ANOTHER! – In the past, a number of student volunteers have been taken to surgery to have IO needles removed. – There is a risk of osteomyelitis. – Train on intraosseous simulators, not classmates!	Read the text.
21.		**IV/IO Practical**	IV Skill Sheet IO Skill Sheet

22.		**FAST1® Warnings** 6. Circulation (continued) c. Tranexamic acid (TXA) ● If a casualty is anticipated to need significant blood transfusion (for example: presents with hemorrhagic shock, one or more major amputations, penetrating torso trauma, or evidence of severe bleeding): - Administer 1 gm of tranexamic acid in 100 ml Normal Saline or Lactated Ringer's as soon as possible but NOT later than 3 hours after injury. When given, TXA should be administered over 10 minutes by IV infusion. - Begin the second infusion of 1 gm TXA after initial fluid resuscitation has been completed.	Read the guideline.
23.		**Stop All Bleeding Now!** • TXA helps with hemorrhage control. – Tourniquets and hemostatic dressings help by stopping hemorrhage from external sites. – TXA helps to reduce blood loss from internal hemorrhage sites that can't be addressed by tourniquets and hemostatic dressings.	Read the text.
24.		**TXA** • TXA does not promote new clot formation. • It prevents forming clots from being broken down by the body. • It helps stop internal bleeding. • It helps prevent death from hemorrhage. • Two major studies have shown a survival benefit from TXA, especially in casualties that require a massive transfusion of blood products.	CRASH-2: a very large (20,000 plus) patients in civilian trauma centers. MATTERS (Military Application of Tranexamic Acid in Traumatic Emergency and Resuscitative Surgery) – 896 casualties treated at the Bastion hospital in Afghanistan. Both studies showed a significant decrease in mortality with TXA use.

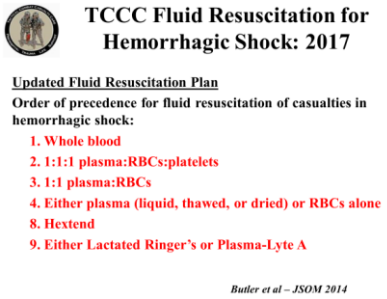
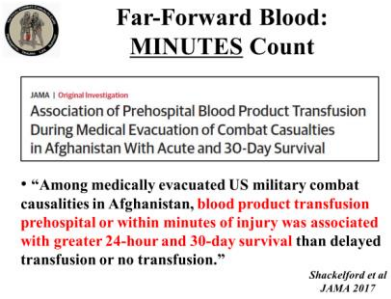
25.		***Don't Delay with TXA!*** • Survival benefit is GREATEST when TXA is given within 1 hour of injury. • The greatest decrease in blood loss is seen when TXA is started ASAP! – Give it as soon after wounding as possible! • Survival benefit is still present when given within 3 hours of injury. • DO NOT GIVE TXA if more than 3 hours have passed since the casualty was injured – survival is DECREASED by TXA given after this point.	It is just common sense if you are trying to stop bleeding to do that AS SOON AS POSSIBLE. We do not have a good reason why TXA should cause casualties to do worse after 3 hours, but that's what the data indicate. BLEEDING SHOULD BE STOPPED ASAP – SO GIVE TXA WTHOUT DELAY!
26.		**TXA Storage and Handling** • Recommended temperature range for storage: 59°-86° F • You must protect this drug from environmental extremes. • Store and transport TXA in air-conditioned spaces. • On missions, carry it in a small insulated container. • In very cold temperatures, carry it next to your body. – Carrying it in an aid bag also insulates it against temperature extremes. • Return to room temperature storage after each mission.	Review each point.
27.		**Questions?**	

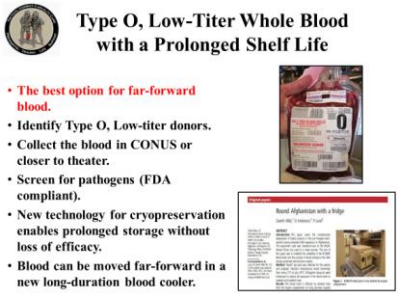
28.	**TXA Injection Practical** 	**TXA Injection Practical**	Use the TXA Injection Skill Sheet for this practical.
29.	**Tactical Field Care Guidelines** **6. Circulation (continued)** **d. Fluid resuscitation** ● **Assess for hemorrhagic shock (altered mental status in the absence of brain injury and/or weak or absent radial pulse).** ● **The resuscitation fluids of choice for casualties in hemorrhagic shock, listed from most to least preferred, are: whole blood*; plasma, red blood cells (RBCs) and platelets in a 1:1:1 ratio*; plasma and RBCs in a 1:1 ratio; plasma or RBCs alone; Hextend; and crystalloid (Lactated Ringer's or Plasma-Lyte A). (NOTE: Hypothermia prevention measures [Section 7] should be initiated while fluid resuscitation is being accomplished.)**	**Tactical Field Care Guidelines** 6. Circulation (continued) d. Fluid resuscitation ● Assess for hemorrhagic shock (altered mental status in the absence of brain injury and/or weak or absent radial pulse). ● The resuscitation fluids of choice for casualties in hemorrhagic shock, listed from most to least preferred, are: whole blood*; plasma, red blood cells (RBCs) and platelets in a 1:1:1 ratio*; plasma and RBCs in a 1:1 ratio; plasma or RBCs alone; Hextend; and crystalloid (Lactated Ringer's or Plasma-Lyte A). (NOTE: Hypothermia prevention measures [Section 7] should be initiated while fluid resuscitation is being accomplished.)	Read the guideline. (NOTE: The footnote attached to these asterisks appears in slide #84.)
30.	**Tactical Field Care Guidelines** **6. Circulation** **d. Fluid resuscitation (continued)** **- If not in shock:** ◦ **No IV fluids are immediately necessary.** ◦ **Fluids by mouth are permissible if the casualty is conscious and can swallow.**	**Tactical Field Care Guidelines** 6. Circulation d. Fluid resuscitation (continued) - If not in shock: ◦ No IV fluids are immediately necessary. ◦ Fluids by mouth are permissible if the casualty is conscious and can swallow.	Read the guideline.

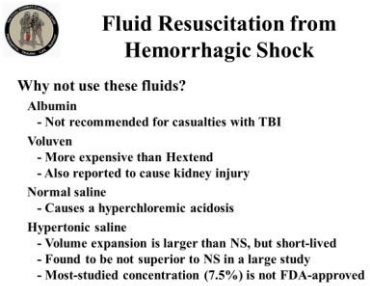
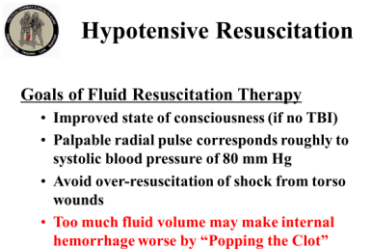
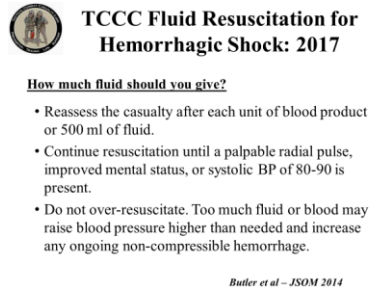
31.		**Tactical Field Care Guidelines** 6. Circulation d. Fluid resuscitation (continued) - If in shock and blood products are available under an approved command or theater blood product administration protocol: ◦ Resuscitate with whole blood*, or, if not available ◦ Plasma, RBCs and platelets in a 1:1:1 ratio*, or, if not available ◦ Plasma and RBCs in a 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 is present.	Read the guideline.
32.		**Tactical Field Care Guidelines** 6. Circulation d. Fluid resuscitation (continued) - 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 Ringer's 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.	Read the guideline.

33.	 **Tactical Field Care Guidelines** **6. Circulation** **d. Fluid resuscitation (continued)** **• If a casualty with an altered mental status due to suspected TBI has a weak or absent radial 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.**	**Tactical Field Care Guidelines** 6. Circulation d. Fluid resuscitation (continued) ● If a casualty with an altered mental status due to suspected TBI has a weak or absent radial 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.	Read the guideline.
34.	 **Tactical Field Care Guidelines** **6. Circulation** **d. Fluid resuscitation (continued)** **• Reassess the casualty frequently to check for recurrence of shock. If shock recurs, re-check all external hemorrhage control measures to ensure that they are still effective and repeat the fluid resuscitation as outlined above.**	**Tactical Field Care Guidelines** 6. Circulation d. Fluid resuscitation (continued) ● Reassess the casualty frequently to check for recurrence of shock. If shock recurs, re-check all external hemorrhage control measures to ensure that they are still effective and repeat the fluid resuscitation as outlined above.	Read the guideline.
35.	 **Tactical Field Care Guidelines** **6. Circulation** **d. Fluid resuscitation (footnote)** *** Currently, neither whole blood nor apheresis platelets collected in theater are FDA-compliant because of the way they are collected. 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.**	**Tactical Field Care Guidelines** 6. Circulation d. Fluid resuscitation (footnote) * Currently, neither whole blood nor apheresis platelets collected in theater are FDA-compliant because of the way they are collected. 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.	Read the guideline.

36.	**Fluid Resuscitation Strategy** **If the casualty is not in shock:** – No IV fluids are necessary – SAVE IV FLUIDS FOR CASUALTIES WHO REALLY NEED THEM. – PO fluids are permissible if the casualty can swallow. • Helps treat or prevent dehydration. • Oral fluids are OK even if the casualty is wounded in the abdomen – Aspiration is extremely rare; low risk in light of the benefit. – Dehydration increases mortality. 	**Fluid Resuscitation Strategy** **If the casualty is not in shock:** – **No IV fluids are necessary – SAVE IV FLUIDS FOR CASUALTIES WHO REALLY NEED THEM.** – PO fluids are permissible if the casualty can swallow. • Helps treat or prevent dehydration. • Oral fluids are OK, even if the casualty is wounded in the abdomen. – Aspiration is extremely rare; low risk in light of benefit – Dehydration increases mortality	Don't ever use your IV fluids unless the casualty needs them. The next person to get shot may die if he or she doesn't get fluids. CONSERVE precious medical supplies on the battlefield.
37.	**Fluids for the Treatment of Hemorrhagic Shock** There is an increasing awareness that fluid resuscitation for casualties in hemorrhagic shock is best accomplished with fluid that is identical to that lost by the casualty - whole blood. Large volumes of crystalloids and colloids may worsen coagulopathy and increase bleeding. "The historic role of crystalloid and colloid solutions in trauma resuscitation represents the triumph of hope and wishful thinking over physiology and experience." *COL Andre Cap* *J Trauma, 2015*	**Fluids for the Treatment of Hemorrhagic Shock** There is an increasing awareness that fluid resuscitation for casualties in hemorrhagic shock is best accomplished with fluid that is identical to that lost by the casualty - whole blood. Large volumes of crystalloids and colloids may worsen coagulopathy and increase bleeding. "The historic role of crystalloid and colloid solutions in trauma resuscitation represents the triumph of hope and wishful thinking over physiology and experience." ***COL Andre Cap*** ***J Trauma, 2015***	Read the text. COL Andre Cap was Chief of Coagulation and Blood Research at the U.S. Army Institute of Surgical Research when he published this assessment.

38.		**TCCC Fluid Resuscitation for Hemorrhagic Shock: 2017** <u>Updated Fluid Resuscitation Plan</u> Order of precedence for fluid resuscitation of casualties in hemorrhagic shock: 1. Whole blood 2. 1:1:1 plasma:RBCs:platelets 3. 1:1 plasma:RBCs 4. Either plasma (liquid, thawed, or dried) or RBCs alone 8. Hextend 9. Either Lactated Ringer's or Plasma-Lyte A	When resuscitating a casualty in hemorrhagic shock, whole blood is best, followed by blood products, Hextend, and then colloids.
39.		**Far-Forward Blood: <u>MINUTES</u> Count** JAMA | Original Investigation Association of Prehospital Blood Product Transfusion During Medical Evacuation of Combat Casualties in Afghanistan With Acute and 30-Day Survival "Among medically evacuated US military combat causalities in Afghanistan, blood product transfusion prehospital or within minutes of injury was associated with greater 24-hour and 30-day survival than delayed transfusion or no transfusion." ***Shackelford et al JAMA 2017***	This is a study that was published in JAMA in 2017 that shows the importance of EARLY blood transfusion.

40.		**Type O, Low-Titer Whole Blood with a Prolonged Shelf Life** • The best option for far-forward blood. • Identify Type O, Low-titer donors. • Collect the blood in CONUS or closer to theater. • Screen for pathogens (FDA compliant). • New technology for cryopreservation enables prolonged storage without loss of efficacy. • Blood can be moved far-forward in a new long-duration blood cooler.	This is the latest development in providing FDA-compliant whole blood far forward in theater. Donated blood is preserved in electrically powered blood coolers and moved far forward in a new non-powered, 50-hour container.
41.		**Tactical Damage Control Resuscitation Fisher et al 2015** REVIEW ARTICLES MILITARY MEDICINE, 180, 8:869, 2015 Tactical Damage Control Resuscitation MAJ Andrew D. Fisher, SP USA*; MAJ Ethan A. Miles, MC USA*; LTC Andrew P. Cap, MC USA†; CDR Geir Strandenes, MC‡; COL Shawn F. Kane, MC USA§ • Fresh whole blood is another option for far-forward whole blood. • 75th Ranger Regiment "ROLO" program: – Type O, Low-Titer Anti-A, Anti-B antibodies – Donors pre-screened for type, titers, and infectious diseases – The donor pool is used to transfuse casualties in shock.	The 75th Rangers have provided whole blood transfusion far forward by identifying type O, low-titer donors ahead of time, and collecting blood from then when needed on the battlefield.

42.		**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	Albumin is a colloid derived from human plasma that has been used to resuscitate individuals in hemorrhagic and other types of shock, but patients resuscitated with albumin have a higher mortality rate than those resuscitated with saline. Voluven is a synthetic colloid.
43.		**Hypotensive Resuscitation** **Goals of Fluid Resuscitation Therapy** • Improved state of consciousness (if no TBI) • Palpable radial pulse corresponds roughly to systolic blood pressure of 80 mm Hg • Avoid over-resuscitation of shock from torso wounds • Too much fluid volume may make internal hemorrhage worse by "Popping the Clot"	DO NOT try to restore a normal blood pressure. As you infuse fluids, the blood pressure goes up. If it goes up too much, this may interfere with your body's attempt to clot off an internal bleeding site both by diluting clotting factors and by increasing the pressure to the point where the clot is disrupted by the hydrostatic force exerted by the IV fluid. Bickell study in New England Journal of Medicine 1994: Patients with shock from uncontrolled hemorrhage did WORSE with aggressive prehospital fluids
44.		**TCCC Fluid Resuscitation for Hemorrhagic Shock: 2017** **How much fluid should you give?** • Reassess the casualty after each unit of blood product or 500 ml of fluid. • Continue resuscitation until a palpable radial pulse, improved mental status, or systolic BP of 80-90 is present. • Do not over-resuscitate. Too much fluid or blood may raise blood pressure higher than needed and increase any ongoing non-compressible hemorrhage.	Read the text.

45.	**Tactical Field Care Guidelines** **6. Circulation** e. If a casualty in shock is not responding to fluid resuscitation, consider untreated tension pneumothorax as a possible cause of refractory shock. Thoracic trauma, persistent respiratory distress, absent breath sounds, and hemoglobin oxygen saturation < 90% support this diagnosis. Treat as indicated with repeated NDC or finger thoracostomy/chest tube insertion at the 5th ICS in the AAL, according to the skills, experience, and authorizations of the treating medical provider. Note that if finger thoracostomy is used, it may not remain patent and finger decompression through the incision may have to be repeated. Consider decompressing the opposite side of the chest if indicated based on the mechanism of injury and physical findings. ** New material in red text*	**Tactical Field Care Guidelines** **6. Circulation** e. If a casualty in shock is not responding to fluid resuscitation, consider untreated tension pneumothorax as a possible cause of refractory shock. Thoracic trauma, persistent respiratory distress, absent breath sounds, and hemoglobin oxygen saturation < 90% support this diagnosis. Treat as indicated with repeated NDC or finger thoracostomy/chest tube insertion at the 5th ICS in the AAL, according to the skills, experience, and authorizations of the treating medical provider. Note that if finger thoracostomy is used, it may not remain patent and finger decompression through the incision may have to be repeated. Consider decompressing the opposite side of the chest if indicated based on the mechanism of injury and physical findings. **** New material in red text***	Read the guideline. For casualties in shock who have not responded to fluid resuscitation, the provider must reconsider the possibility of a tension pneumothorax. If the tension pneumothorax is severe enough to cause shock, more invasive measures such as a chest tube or finger thoracostomy should be considered if the provider has the skills and equipment to perform them.
46.	 **Questions?**	**Questions?**	