1.	Tactical Combat Casualty Care for Medical Personnel August 2017 (Based on TCCC-MP Guidelines 170131)  Tactical Field Care #1	**Tactical Combat Casualty Care for Medical Personnel** **August 2017** **(Based on TCCC-MP Guidelines 170131)** **Tactical Field Care #1**	Next we'll be moving into the Tactical Field Care phase of TCCC.
2.	 **OBJECTIVES** • **STATE** the common causes of altered states of consciousness on the battlefield. • **STATE** why a casualty with an altered state of consciousness should be disarmed. • **DESCRIBE** the progressive strategy for controlling hemorrhage in tactical field care. • **DEMONSTRATE** the correct application of a CoTCCC-recommended hemostatic dressing.	**OBJECTIVES** • **STATE** the common causes of altered states of consciousness on the battlefield. • **STATE** why a casualty with an altered state of consciousness should be disarmed. • **DESCRIBE** the progressive strategy for controlling hemorrhage in tactical field care**.** • **DEMONSTRATE** the correct application of a CoTCCC-recommended hemostatic dressing.	Read the text.
3.	 **OBJECTIVES** • **DEMONSTRATE** the correct application of a CoTCCC-recommended junctional tourniquet. • **DESCRIBE** airway control techniques and devices appropriate to the Tactical Field Care phase. • **DEMONSTRATE** the recommended procedure for surgical cricothyroidotomy.	**OBJECTIVES** • **DEMONSTRATE** the correct application of a CoTCCC-recommended junctional tourniquet. • **DESCRIBE** airway control techniques and devices appropriate to the Tactical Field Care phase. • **DEMONSTRATE** the recommended procedure for surgical cricothyroidotomy.	Read the text.

4.	**OBJECTIVES** • **LIST** the criteria for the diagnosis of tension pneumothorax on the battlefield. • **DESCRIBE** the diagnosis and initial treatment of tension pneumothorax on the battlefield. • **DEMONSTRATE** the appropriate procedure for needle decompression of the chest.	**OBJECTIVES** • **LIST** the criteria for the diagnosis of tension pneumothorax on the battlefield. • **DESCRIBE** the diagnosis and initial treatment of tension pneumothorax on the battlefield. • **DEMONSTRATE** the appropriate procedure for needle decompression of the chest.	Read the text.
5.	**OBJECTIVES** • **DESCRIBE** the appropriate use of pulse oximetry in pre-hospital combat casualty care • **STATE** the pitfalls associated with interpretation of pulse oximeter readings.	**OBJECTIVES** • **DESCRIBE** the appropriate use of pulse oximetry in pre-hospital combat casualty care. • **STATE** the pitfalls associated with interpretation of pulse oximeter readings.	Read the text.
6.	**Tactical Field Care** • Distinguished from Care Under Fire by: – A reduced level of hazard from hostile fire – More time available to provide care based on the tactical situation • Medical gear is still limited to that carried by the medic or corpsman or unit members (may include gear in tactical vehicles) 	**Tactical Field Care** • Distinguished from Care Under Fire by: – A reduced level of hazard from hostile fire – More time available to provide care based on the tactical situation • Medical gear is still limited to that carried by the medic or corpsman or unit members (may include gear in tactical vehicles)	Now the shooting has stopped – or the enemy's fire is ineffective. This doesn't mean that the danger is over – the situation could change to Care Under Fire again at any time.
7.	**Tactical Field Care** • May consist of rapid treatment of the most serious wounds with the expectation of a re-engagement with hostile forces at any moment, *or* • There may be ample time to render whatever care is possible in the field. • Time to evacuation may vary from minutes to several hours or longer.	**Tactical Field Care** • May consist of rapid treatment of the most serious wounds with the expectation of a re-engagement with hostile forces at any moment, ***or*** • There may be ample time to render whatever care is possible in the field. • Time to evacuation may vary from minutes to several hours or longer.	This phase of care may be very prolonged.

8.	 **Battlefield Priorities in the Tactical Field Care Phase** • This section describes the recommended care to be provided in TFC. • You must deal with your tactical situation and your casualties. • The sequence of care in TFC is compatible with the MARCH algorithm found in the USSOCOM Tactical Trauma Protocols.	**Battlefield Priorities in the Tactical Field Care Phase** • This section describes the recommended care to be provided in TFC. • You must deal with your tactical situation and your casualties. • The sequence of care in TFC is compatible with the MARCH algorithm found in the USSOCOM Tactical Trauma Protocols.	You may have multiple casualties with multiple problems, and you will deliver care in light of the tactical situation. You are on a battlefield. What problems do you address first?
9.	 **MARCH** • Massive hemorrhage – control life-threatening bleeding. • Airway – establish and maintain a patent airway. • Respiration – decompress suspected tension pneumothorax, seal open chest wounds, and support ventilation/oxygenation as required.	**MARCH** • **M**assive hemorrhage – control life-threatening bleeding. • **A**irway – establish and maintain a patent airway. • **R**espiration – decompress suspected tension pneumothorax, seal open chest wounds, and support ventilation/oxygenation as required.	The MARCH algorithm is a guide to the sequence of treatment priorities in caring for combat casualties.
10.	 **MARCH** • Circulation – establish IV/IO access and administer fluids as required to treat shock. • Head injury/Hypothermia – prevent/treat hypotension and hypoxia to prevent worsening of traumatic brain injury and prevent/treat hypothermia.	**MARCH** • **C**irculation – establish IV/IO access and administer fluids as required to treat shock. • **H**ead injury/**H**ypothermia – prevent/treat hypotension and hypoxia to prevent worsening of traumatic brain injury and prevent/treat hypothermia.	Read the text.

11.	**Tactical Field Care Guidelines**  1. Establish a security perimeter in accordance with unit tactical standard operating procedures and/or battle drills. Maintain tactical situational awareness.	**Tactical Field Care Guidelines** 1. Establish a security perimeter in accordance with unit tactical standard operating procedures and/or battle drills. Maintain tactical situational awareness.	Read the guideline. (Note: All of the slides entitled "Tactical Field Care Guidelines" - as this one is - should be read verbatim.) Security practices are prescribed in tactics, techniques, and procedures manuals. Know yours.
12.	**Tactical Field Care Guidelines** 2. Triage casualties as required. Casualties with an altered mental status should have weapons and communications equipment taken away immediately.	**Tactical Field Care Guidelines** 2. Triage casualties as required. Casualties with an altered mental status should have weapons and communications equipment taken away immediately.	Read the guideline. Weapons and radios do not mix well with shock or narcotics!
13.	**Manage Casualties with Altered Mental Status** • Combatants with an altered mental status may use their weapons or radios inappropriately. • Secure long gun, pistols, knives, grenades, explosives, and all communications gear. • Possible causes of altered mental status are Traumatic Brain Injury (TBI), shock, hypoxia, and pain medications. • Say to the casualty: "Let Smith hold your weapon for you while I check you out."	**Manage Casualties with Altered Mental Status** • Combatants with an altered mental status may use their weapons or radios inappropriately. • Secure long gun, pistols, knives, grenades, explosives, and all communications gear. • Possible causes of altered mental status are Traumatic Brain Injury (TBI), shock, hypoxia, and pain medications. • Say to the casualty: "Let Smith hold your weapon for you while I check you out.	You should take all weapons and radios away from any casualty who is not alert and fully oriented to the tactical situation. A confused or disoriented casualty may resist being disarmed. The proposed comment in the last bullet may help him to better accept your taking his weapon.

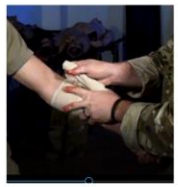
14.	**Tactical Field Care Guidelines** 3. Massive Hemorrhage a. Assess for unrecognized hemorrhage and control all sources of bleeding. If not already done, use a CoTCCC-recommended limb tourniquet to control life-threatening external hemorrhage that is anatomically amenable to tourniquet use or for any traumatic amputation. Apply directly to the skin 2-3 inches above the bleeding site. If bleeding is not controlled with the first tourniquet, apply a second tourniquet side-by-side with the first.	**Tactical Field Care Guidelines** 3. Massive Hemorrhage a. Assess for unrecognized hemorrhage and control all sources of bleeding. If not already done, use a CoTCCC-recommended limb tourniquet to control life-threatening external hemorrhage that is anatomically amenable to tourniquet use or for any traumatic amputation. Apply directly to the skin 2-3 inches above the bleeding site. If bleeding is not controlled with the first tourniquet, apply a second tourniquet side-by-side with the first.	Read the guideline.
15.	**Tourniquets: Points to Remember** • All unit members should have a CoTCCC-approved tourniquet at a standard location on their battle gear. – **It should be easily accessible if wounded – DO NOT bury it at the bottom of your pack** • Tourniquets should be left in their protective packaging until needed to treat casualties. – Harsh environments may contribute to tourniquet failure if not left in packaging	**Tourniquets: Points to Remember** • All unit members should have a CoTCCC-approved tourniquet at a standard location on their battle gear. –It should be easily accessible if wounded – **DO NOT** bury it at the bottom of your pack • Tourniquets should be left in their protective packaging until needed to treat casualties. –Harsh environments may contribute to tourniquet failure if not left in packaging	Each soldier having a tourniquet at the unit's standardized location is critical, and should be a pre-mission inspection item.
16.	**Tourniquets: Points to Remember** • **Training tourniquets should never be used as mission tourniquets!** • **Repetitive applications of a tourniquet may cause it to fail.**	**Tourniquets: Points to Remember** • Training tourniquets should never be used as mission tourniquets! • Repetitive applications of a tourniquet may cause it to fail.	Only tourniquets within their shelf life and still in their original packaging should be issued for mission use.

17.	**Tourniquets: Points to Remember** • **When a tourniquet has been applied, DO NOT loosen it intermittently to allow circulation to return to the limb.** – **Causes unacceptable additional blood loss** – **This HAS happened in the past, and was responsible for at least one near fatality.**	**Tourniquets: Points to Remember** • When a tourniquet has been applied, DO NOT loosen it intermittently to allow circulation to return to the limb. – Causes unacceptable additional blood loss – This HAS happened in the past, and was responsible for at least one near fatality.	Periodically loosening the tourniquet to allow intermittent flow to the limb is an unnecessary practice in the first place, and allows further blood loss in a casualty who cannot afford it.
18.	**Tactical Field Care Guidelines** 3. Massive Hemorrhage (continued) b. For compressible (external) hemorrhage not amenable to limb tourniquet use or as an adjunct to tourniquet removal, use Combat Gauze as the CoTCCC hemostatic dressing of choice. • Alternative hemostatic adjuncts: - Celox Gauze or - ChitoGauze or - XStat (Best for deep, narrow-tract junctional wounds)	**Tactical Field Care Guidelines** 3. Massive Hemorrhage (continued) b. For compressible (external) hemorrhage not amenable to limb tourniquet use or as an adjunct to tourniquet removal, use Combat Gauze as the CoTCCC hemostatic dressing of choice. ● Alternative hemostatic adjuncts: - Celox Gauze or - ChitoGauze or - XStat (Best for deep, narrow-tract junctional wounds)	Read the guideline.
19.	**Tactical Field Care Guidelines** 3. Massive Hemorrhage b. (continued) • Hemostatic dressings should be applied with at least 3 minutes of direct pressure (optional for XStat). Each dressing works differently, so if one fails to control bleeding, it may be removed and a fresh dressing of the same type or a different type applied. (Note: XStat is not to be removed in the field, but additional XStat, other hemostatic adjuncts, or trauma dressings may be applied over it.)	**Tactical Field Care Guidelines** 3. Massive Hemorrhage b. (continued) ● Hemostatic dressings should be applied with at least 3 minutes of direct pressure (optional for XStat). Each dressing works differently, so if one fails to control bleeding, it may be removed and a fresh dressing of the same type or a different type applied. (Note: XStat is not to be removed in the field, but additional XStat, other hemostatic adjuncts, or trauma dressings may be applied over it.)	Read the guideline.

20.	**Direct Pressure without a Hemostatic Dressing** • Can be used as a temporary measure. • It works most of the time for external bleeding. • It can stop even carotid and femoral bleeding. • Bleeding control requires very firm pressure. • **Don't let up pressure to check the wound until you are prepared to control bleeding with a hemostatic agent or a tourniquet!** • It is hard to use direct pressure alone to maintain control of big bleeders while moving the casualty.	**Direct Pressure** • Can be used as a temporary measure. • It works most of the time for external bleeding. • It can stop even carotid and femoral bleeding. • Bleeding control requires very firm pressure. • **Don't let up pressure to check the wound until you are prepared to control bleeding with a hemostatic agent or a tourniquet!** • It is hard to use direct pressure alone to maintain control of big bleeders while moving the casualty.	Even just a firmly applied thumb may work with big bleeders in small wound tracts. One combat medic has used a thumb successfully in two casualties. One had carotid bleeding – the other had femoral bleeding.
21.	**CoTCCC-recommended Hemostatic Agents** 	**CoTCCC-recommended Hemostatic Agents**	Hemostatic dressings can be used to control compressible hemorrhage from wounds in places where a tourniquet cannot be effectively applied, or to control bleeding when a tourniquet must be removed in a prehospital setting because evacuation will take longer than two hours. They can also be used on wounds amenable to the application of a junctional tourniquet when a junctional tourniquet is not available or while a junctional tourniquet is being readied for use.
22.	**CoTCCC-Recommended Hemostatic Agents**  Combat Gauze Celox Gauze ChitoGauze	**CoTCCC-Recommended Hemostatic Agents** Combat Gauze, Celox Gauze, and ChitoGauze	These are the three hemostatic dressings recommended in the TCCC guidelines.

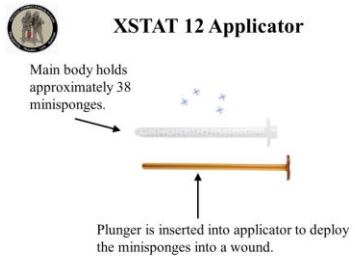
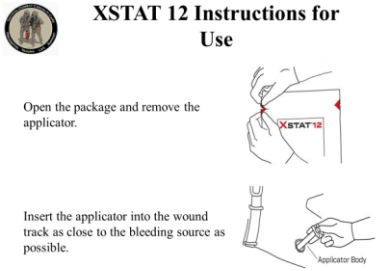
23.	**Combat Gauze** • Tested in the ISR safety model • Widely fielded in the DoD • Case series from the battlefield and the civilian sector: – CG is effective at stopping bleeding – No safety issues reported • Recommended by CoTCCC as first choice for hemostatic dressing 	**Combat Gauze** • Tested in the ISR safety model • Widely fielded in the DoD • Case series from the battlefield and the civilian sector: – CG is effective at stopping bleeding – No safety issues reported • Recommended by CoTCCC as first choice for hemostatic dressing	The CoTCCC recommends QuikClot Combat Gauze as the hemostatic dressing of choice.
24.	**Alternative Hemostatic Agents** • ChitoGauze & Celox Gauze – May be used if Combat Gauze is not available – Active ingredient is chitosan, a mucoadhesive • Function is independent of coagulation cascade • There are case series that report that chitosan dressings have stopped bleeding in surgical patients with life-threatening bleeding and severe coagulopathy • Does not cause reactions in persons allergic to shellfish – Are as effective as Combat Gauze at hemorrhage control in laboratory studies	**Alternative Hemostatic Agents** •Celox Gauze •ChitoGauze – May be used if Combat Gauze is not available – Active ingredient is chitosan, a mucoadhesive • Function is independent of coagulation cascade • There are case series that report that chitosan dressings have stopped bleeding in surgical patients with life-threatening bleeding and severe coagulopathy • Does not cause reactions in persons allergic to shellfish – Are as effective as Combat Gauze at hemorrhage control in laboratory studies	Read the text.
25.	**Alternative Hemostatic Agents** • Neither ChitoGauze nor Celox Gauze have been tested in the USAISR safety model, but • Chitosan-based hemostatic dressings have been used in combat since 2004 with no safety issues reported.	**Alternative Hemostatic Agents** • Neither ChitoGauze nor Celox Gauze have been tested in the USAISR safety model, but • Chitosan-based hemostatic dressings have been used in combat since 2004 with no safety issues reported.	Read the text.

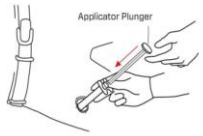
26.	**Combat Gauze** **NSN 6510-01-562-3325** • Combat Gauze is a 3-inch x 4-yard roll of sterile gauze impregnated with kaolin, a material that causes blood to clot. • Found in lab studies and actual use to be safe and effective in controlling bleeding that would otherwise be fatal. 	**Combat Gauze NSN 6510-01-562-3325** • Combat Gauze is a 3-inch x 4-yard roll of sterile gauze impregnated with kaolin, a material that causes blood to clot. • Found in lab studies and actual use to be safe and effective in controlling bleeding that would otherwise be fatal.	Combat Gauze is a z-folded gauze impregnated with kaolin that helps promote blood clotting.
27.	**Combat Gauze Directions (1)** **Expose Wound & Identify Bleeding** • Open clothing around the wound. • If possible, remove excess pooled blood from the wound while preserving any clots already formed in the wound. • Locate the source of the most active bleeding.  	**Combat Gauze Directions (1)** **Expose Wound & Identify Bleeding** • Open clothing around the wound. • If possible, remove excess pooled blood from the wound while preserving any clots already formed in the wound. • Locate the source of the most active bleeding.	Read the text.
28.	**Combat Gauze Directions (2)** **Pack Wound Completely** • Pack Combat Gauze tightly into the wound and directly onto the source of bleeding. • More than one gauze may be required to stem blood flow. • Combat Gauze may be re-packed or adjusted in the wound to ensure proper placement.  	**Combat Gauze Directions (2)** **Pack Wound Completely** • Pack Combat Gauze tightly into the wound and directly onto the source of bleeding. • More than one gauze may be required to stem blood flow. • Combat Gauze may be re-packed or adjusted in the wound to ensure proper placement.	Pack CG into the wound just like you would plain gauze. If more than one roll is needed, pack in more CG until the wound is full.
29.	**Combat Gauze Directions (3)** **Apply Direct Pressure** • Quickly apply pressure until bleeding stops. • **Hold continuous pressure for at least 3 minutes.** • Reassess to ensure bleeding is controlled. • Combat Gauze may be repacked or a second gauze used if initial application fails to provide hemostasis.  	**Combat Gauze Directions (3)** **Apply Direct Pressure** • Quickly apply pressure until bleeding stops. • **Hold continuous pressure for at least 3 minutes.** • Reassess to ensure bleeding is controlled. • Combat Gauze may be repacked or a second gauze used if initial application fails to provide hemostasis.	Although the Combat Gauze may become saturated during the initial application process, continue to hold firm pressure for at least three minutes. The kaolin will continue to leach into the wound area and help form a clot even though the bandage is soaked through.

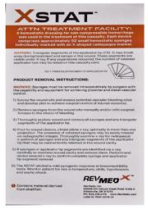
30.	**Combat Gauze Directions (4)** **Bandage over Combat Gauze** • Leave effective Combat Gauze in place. • Wrap pressure dressing to effectively secure the Combat Gauze on the bleeding site.  Although the Emergency Trauma Bandage is shown in this picture, the wound may be secured with any compression bandage, Ace wrap, roller gauze, or cravat.	**Combat Gauze Directions (4)** **Bandage over Combat Gauze** • Leave effective Combat Gauze in place. • Wrap pressure dressing to effectively secure the Combat Gauze on the bleeding site. Although the Emergency Trauma Bandage is shown in this picture, the wound may be secured with any compression bandage, Ace wrap, roller gauze, or cravat.	Carefully observe for blood continuing to flow from under the gauze to determine if bleeding has been controlled. Once you are sure the bleeding has stopped, apply a pressure bandage over the Combat Gauze.
31.	**Combat Gauze Directions (5)** **Transport & Monitor Casualty** • **Reassess frequently to monitor for recurrent bleeding.** • Evacuate casualty to next level of medical care as soon as possible. 	**Combat Gauze Directions (5)** **Transport & Monitor Casualty** • **Reassess frequently to monitor for recurrent bleeding.** • Evacuate casualty to next level of medical care as soon as possible.	Re-check the dressing frequently, especially while transporting the casualty to next level of care. Watch for re-bleeding.
32.	**Wound Packing with a Hemostatic Dressing**  	**Wound Packing with a Hemostatic Dressing**	Click on the photo to play the video.

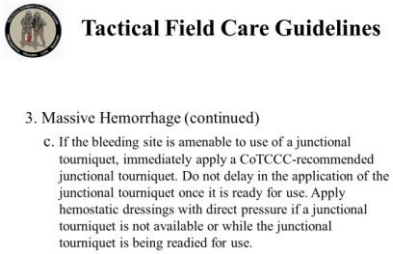
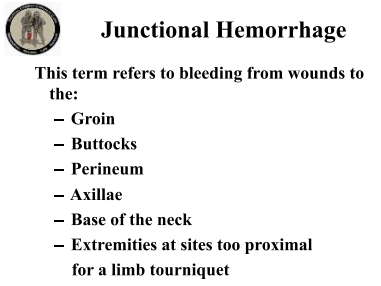
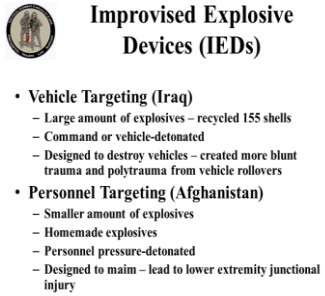
33.		**Questions?**	
34.	**Hemostatic Dressing Practical** 	**Hemostatic Dressing Practical**	Break into small groups for the practical. Use the Supplementary Module for the dressing you are training.
35.	**XSTAT 12** **NSN 6510-01-657-4737** • First expanding wound dressing FDA-cleared for life-threatening junctional bleeding. • Syringe-like applicator injects compressed minisponges into deep wounds. • Minisponges rapidly expand on contact with blood – compressing the wound to stop bleeding.  RevMedx, 25999 SW Canyon Creek Road, Suite C, Wilsonville, OR 97070 www.revmedx.com	**XSTAT 12** **NSN 6510-01-657-4737** • First expanding wound dressing FDA-cleared for life-threatening junctional bleeding. • Syringe-like applicator injects compressed minisponges into deep wounds. • Minisponges rapidly expand on contact with blood – compressing the wound to stop bleeding.	XSTAT 12 is a different kind of hemostatic dressing made by RevMedx.

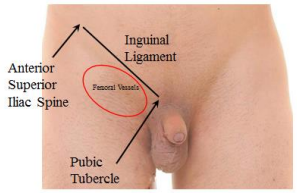
36.	**XSTAT 12 Indications For Use** XSTAT 12 is a hemostatic device for the control of severe, life-threatening bleeding from junctional wounds in the groin or axilla not amenable to tourniquet application in adults and adolescents. 	**XSTAT 12 Indications For Use** XSTAT 12 is a hemostatic device for the control of severe, life-threatening bleeding from junctional wounds in the groin or axilla not amenable to tourniquet application in adults and adolescents.	Read the text.
37.	**XSTAT 12 Indications For Use** XSTAT 12 is a temporary device for use up to **four** hours until surgical care is acquired. It should only be used for patients at high risk for immediate life-threatening bleeding from hemodynamically significant, non-compressible junctional wounds when definitive care at an emergency care facility cannot be achieved within minutes. XSTAT 12 is NOT indicated for use in: the thorax; the pleural cavity; the mediastinum; the abdomen; the retroperitoneal space; the sacral space; tissues above the inguinal ligament; or tissues above the clavicle.	**XSTAT 12 Indications For Use** XSTAT 12 is a temporary device for use up to **four** hours until surgical care is acquired. It should only be used for patients at high risk for immediate life-threatening bleeding from hemodynamically significant, non-compressible junctional wounds when definitive care at an emergency care facility cannot be achieved within minutes. XSTAT 12 is NOT indicated for use in: the thorax; the pleural cavity; the mediastinum; the abdomen; the retroperitoneal space; the sacral space; tissues above the inguinal ligament; or tissues above the clavicle.	XSTAT 12 is appropriate for wounds in the axilla, below the clavicles outside the rib cage, and in the groin distal to the inguinal ligaments when limb tourniquets, junctional tourniquets, and hemostatic dressings cannot be effectively applied.
38.	**XSTAT 12 Technical Characteristics** XSTAT 12 contains approximately 38 compressed minisponges. Upon contact with blood, the minisponges absorb blood and, expand to 10 - 12 times their compressed volume within approximately 20 seconds. A radiopaque marker is embedded into each of the minisponges to make them detectable by X-ray.	**XSTAT 12 Technical Characteristics** XSTAT 12 contains approximately 38 compressed minisponges. Upon contact with blood, the minisponges absorb blood and, expand to 10 - 12 times their compressed volume within approximately 20 seconds. A radiopaque marker is embedded into each of the minisponges to make them detectable by X-ray.	Read the text.

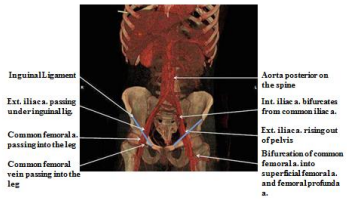
39.		**XSTAT 12 Applicator** Main body holds approximately 38 mini-sponges. Plunger is inserted into applicator to deploy the minisponges into a wound.	Read the text.
40.		**XSTAT 12 Packaging** XSTAT 12 is available as a three pack and single pack. Each applicator is individually sealed. Having three applicators available at the point of injury is recommended by the manufacturer.	It may take more than one applicator to effectively pack a larger wound, so carrying three is recommended.
41.		**XSTAT 12 Instructions for Use** Open the package and remove the applicator. Insert the applicator into the wound track as close to the bleeding source as possible.	Read the text.

42.	**XSTAT 12 Instructions for Use** Insert the plunger into the applicator and push the plunger firmly down to deploy the minisponges into the wound. DO NOT attempt to forcefully eject the minisponges from the applicator. If resistance is met, pull back slightly on the applicator to create additional packing space, then continue to depress the plunger. 	**XSTAT 12 Instructions for Use** Insert the plunger into the applicator and push the plunger firmly down to deploy the minisponges into the wound. DO NOT attempt to forcefully eject the minisponges from the applicator. If resistance is met, pull back slightly on the applicator to create additional packing space, then continue to depress the plunger.	Read the text.
43.	**XSTAT 12 Instructions for Use** Use additional applicators as necessary to completely pack the wound with mini-sponges. Pack XSTAT into the wound to the same density you would gauze. The higher the sponge density in the wound cavity, the higher the pressure exerted on the damaged vessel. 	**XSTAT 12 Instructions for Use** Use additional applicators as necessary to completely pack the wound with mini-sponges. Pack XSTAT into the wound to the same density you would gauze. The higher the sponge density in the wound cavity, the higher the pressure exerted on the damaged vessel.	Read the text.
44.	**XSTAT 12 Instructions for Use** Cover the wound with a pressure dressing. If bleeding persists, apply manual pressure until the bleeding is controlled. Never attempt to remove the minisponges from the wound. They must be removed by a surgeon after achieving proximal and distal vascular control. 	**XSTAT 12 Instructions for Use** • Cover the wound with a pressure dressing. • If bleeding persists, apply manual pressure until the bleeding is controlled. • Never attempt to remove the minisponges from the wound. They must be removed by a surgeon after achieving proximal and distal vascular control.	Read the text.

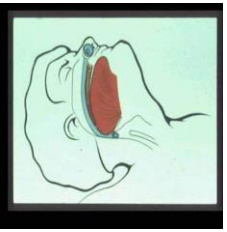
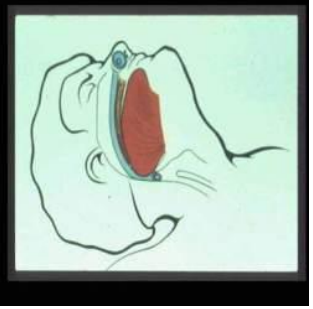
45.	**XSTAT Removal Instructions** • The manufacturer includes a casualty card inside the XSTAT package. • Instructions to the surgeon for removing the sponges from the wound are included on the back of the card. • Record the use of XSTAT on the DD 1380, and forward these instructions along with it to the Medical Treatment Facility. 	**XSTAT Removal Instructions** • The manufacturer includes a casualty card inside the XSTAT package. • Instructions to the surgeon for removing the sponges from the wound are included on the back of the card. • Record the use of XSTAT on the DD 1380, and forward these instructions along with it to the Medical Treatment Facility.	Read the text. NOTE: DD Form 1380 is the TCCC Casualty Card.
46.	**XSTAT 12 WARNINGS** **WARNINGS/CAUTIONS:** • XSTAT 12 has not been tested for use in extremity wounds that are amenable to tourniquet application. • XSTAT 12 use in conjunction with tourniquet application has not been assessed for use in extremity wounds that are amenable to tourniquet application. • Sterility not guaranteed if the package is damaged. • Larger wounds may require more than one applicator. Having at least three (3) XSTAT 12 devices available at all points of care is recommended. • Injuries with significant cavitation, such as those from a high-velocity gunshot wound, may require more than 3 applicators to appropriately pack the wound. **TRAINING WEBSITE: WWW.REVMEDX.COM**	**XSTAT 12 WARNINGS** **WARNINGS/CAUTIONS:** • XSTAT 12 has not been tested for use in extremity wounds that are amenable to tourniquet application. • XSTAT 12 use in conjunction with tourniquet application has not been assessed for use in extremity wounds that are amenable to tourniquet application. • Sterility not guaranteed if the package is damaged. • Larger wounds may require more than one applicator. Having at least three (3) XSTAT 12 devices available at all points of care is recommended. • Injuries with significant cavitation, such as those from a high-velocity gunshot wound, may require more than 3 applicators to appropriately pack the wound. **TRAINING WEBSITE: WWW.REVMEDX.COM**	Read the text.
47.	**Questions?** 	**Questions?**	

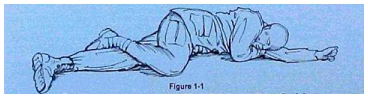
48.		**Tactical Field Care Guidelines** 3. Massive Hemorrhage (continued) c. If the bleeding site is amenable to use of a junctional tourniquet, immediately apply a CoTCCC-recommended junctional tourniquet. Do not delay in the application of the junctional tourniquet once it is ready for use. Apply hemostatic dressings with direct pressure if a junctional tourniquet is not available or while the junctional tourniquet is being readied for use.	Read the guideline.
49.		**Junctional Hemorrhage** This term refers to bleeding from wounds to the: – Groin – Buttocks – Perineum – Axillae – Base of the neck – Extremities at sites too proximal for a limb tourniquet	The areas where the neck and the limbs join the torso are “junctional” areas. Hemorrhage from wounds in these areas cannot be controlled by application of limb tourniquets like the C.A.T.
50.		**Improvised Explosive Devices (IEDs)** • **Vehicle Targeting (Iraq)** – Large amount of explosives – recycled 155 shells – Command or vehicle-detonated – Designed to destroy vehicles – created more blunt trauma and polytrauma from vehicle rollovers • **Personnel Targeting (Afghanistan)** – Smaller amount of explosives – Homemade explosives – Personnel pressure-detonated – Designed to maim – lead to lower extremity junctional injury	IEDs were configured and used differently in the two theaters. In Afghanistan, they were aimed at soldiers on dismounted patrol.

51.	**In 2010, there was a dramatic increase in lower extremity amputation rates in Afghanistan.** 	**In 2010, there was a dramatic increase in lower extremity amputation rates in Afghanistan.**	In the last months of 2010, US Forces in Afghanistan experienced an increase in limb amputations. This led to a new injury pattern described as Dismounted Complex Blast Injury (DCBI), and the emergence of junctional hemorrhage as a leading cause of mortality.
52.	**Dismounted Complex Blast Injury (DCBI)**  • DCBI causes junctional hemorrhage. • By 2011, junctional hemorrhage was the leading cause of death from external hemorrhage. • The proximal thigh and the groin were the most common sites of junctional hemorrhage	**Dismounted Complex Blast Injury (DCBI)** • DCBI causes junctional hemorrhage. • By 2011, junctional hemorrhage was the leading cause of death from external hemorrhage. • The proximal thigh and the groin were the most common sites of junctional hemorrhage	DCBI is characterized by a combination of high thigh amputations with genital injury associated with dismounted patrolling. DCBI may also include abdominal and upper extremity injuries and TBI. The junctional hemorrhage attending DCBI illuminated the need for junctional tourniquets.
53.	**Superficial Anatomy of the Groin** 	**Superficial Anatomy of the Groin**	A review of the anatomy of the groin helps to show where you should place a junctional tourniquet in this area.

54.	**Vascular Anatomy of the Abdomen and Groin**  	**Vascular Anatomy of the Abdomen and Groin**	For a piece of shrapnel, the high thigh and groin are target rich environments not covered by body armor. The aorta can be compressed near the umbilicus. The femoral arteries can be compressed in the groin.
55.	**TCCC Management of Junctional Hemorrhage** • **The three CoTCCC-recommended junctional tourniquets are:** – **The Combat Ready Clamp (CRoC)** – **The Junctional Emergency Treatment Tool (JETT)** – **The SAM Junctional Tourniquet (SJT)**	**TCCC Management of Junctional Hemorrhage** • The three CoTCCC-recommended junctional tourniquets are: – The Combat Ready Clamp (CRoC) – The Junctional Emergency Treatment Tool (JETT) – The SAM Junctional Tourniquet (SJT)	Read the text.
56.	**TCCC Management of Junctional Hemorrhage**  Combat Ready Clamp Junctional Emergency Treatment Tool SAM Junctional Tourniquet **Training materials for all 3 devices are contained in separate modules in the TCCC curriculum.**	**TCCC Management of Junctional Hemorrhage** • Combat Ready Clamp • Junctional Emergency Treatment Tool • SAM Junctional Tourniquet Training materials for all 3 devices are contained in separate modules in the TCCC curriculum.	Any of the three recommended devices can be taught in the Junctional Tourniquet Practical.

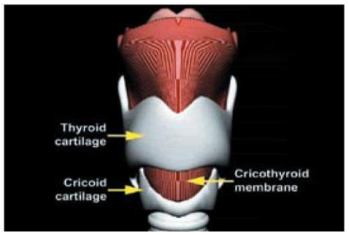
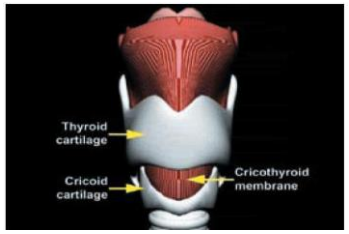
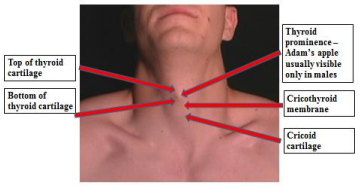
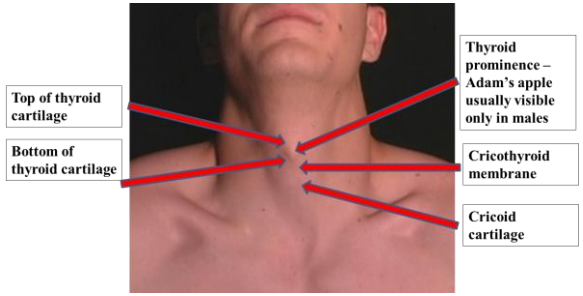
57.	**Continued Reassessment!** • Once applied, the junctional tourniquet, as well as the casualty's other hemorrhage control interventions, must be frequently reassessed to assure continued hemorrhage control. – **DO NOT EVER APPLY IT AND FORGET IT!**	**Continued Reassessment!** • Once applied, the junctional tourniquet, as well as the casualty's other hemorrhage control interventions, must be frequently reassessed to assure continued hemorrhage control. – DO NOT EVER APPLY IT AND FORGET IT!	Read the text.
58.	**Junctional Tourniquet Practical** 	**Junctional Tourniquet Practical**	Break into small groups for the practical. Use the Supplementary Module for the device being trained.
59.	**Tactical Field Care Guidelines** 4. Airway Management a. Unconscious casualty without airway obstruction: • Chin lift or jaw thrust maneuver • Nasopharyngeal airway • Place casualty in recovery position	**Tactical Field Care Guidelines** 4. Airway Management a. Unconscious casualty without airway obstruction: ● Chin lift or jaw thrust maneuver ● Nasopharyngeal airway ● Place casualty in recovery position	Read the guideline.

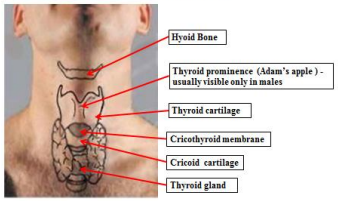
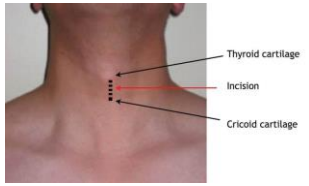
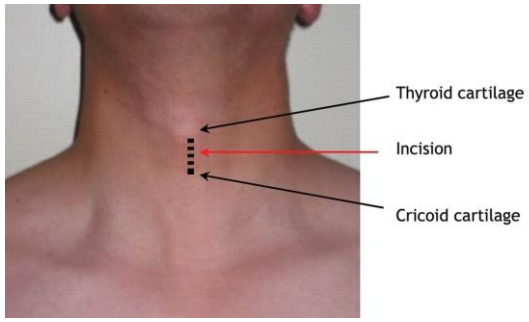
60.	**Nasopharyngeal Airway** • The "Nose Hose," "Nasal Trumpet," "NPA" • Excellent success in Afghanistan and Iraq • Well tolerated by the conscious patient • Lube before inserting • Insert at 90-degree angle to the face, NOT along the axis of the external nose • Tape it in • Don't use an oropharyngeal airway ('J' Tube) – Will cause conscious casualties to gag – Easily dislodged	**Nasopharyngeal Airway** • The "Nose Hose," "Nasal Trumpet," "NPA" • Excellent success in Afghanistan and Iraq • Well tolerated by the conscious patient • Lube before inserting • Insert at 90-degree angle to the face, NOT along the axis of the external nose • Tape it in • Don't use an oropharyngeal airway ('J' Tube) – Will cause conscious casualties to gag – Easily dislodged	The oropharyngeal airway is more easily dislodged and more likely to cause gagging in a conscious casualty. NPA is better tolerated by a conscious patient
61.	**Nasopharyngeal Airway:** **(Note that the NPA is positioned at a 90° angle to the front plane of the face.)** • Lubricate ! • Insert along floor of nasal cavity • If resistance met, use back-and forth motion • Don't Force – Use other nostril • If patient gags, withdraw slightly 	**Nasopharyngeal Airway:** **(Note that the NPA is positioned at a 90° angle to the front plane of the face.)** • Lubricate ! • Insert along floor of nasal cavity • If resistance met, use back-and forth motion • Don't Force – Use other nostril • If patient gags, withdraw slightly 	Lubricate! Gentle insertion with rotary or back and forth motion. Don't start a big nosebleed. Some people have a deviated nasal septum – try the other nostril if the NPA doesn't go in the first side you try.
62.	**Nasopharyngeal Airway**  What's wrong with this NPA insertion?	**Nasopharyngeal Airway** What's wrong with this NPA insertion?	This nasopharyngeal airway is being inserted towards the brain and may end up there if there are craniofacial or basilar skull fractures! The correct angle for insertion is 90 degrees to the frontal plane of the face. NOT along the long axis of the nose.

63.	**Nasopharyngeal Airway** 	**Nasopharyngeal Airway**	This is a more correct insertion angle for the NPA. It will track along the base of the nasal cavity, and will not track upward toward the brain.
64.	**Airway Support** Place unconscious casualties in the recovery position after the airway has been opened.  Figure 1-1	**Airway Support** Place unconscious casualties in the recovery position after the airway has been opened.	Recovery position helps to protect against vomiting and aspiration. Note here that C-spine stabilization is not required in penetrating head and neck trauma.
65.	**Tactical Field Care Guidelines** 4. Airway Management (continued) b. Casualty with airway obstruction or impending airway obstruction: • Chin lift or jaw thrust maneuver • Nasopharyngeal airway • Allow a conscious casualty to assume any position that best protects the airway, to include sitting up. • Place an unconscious casualty in the recovery position.	**Tactical Field Care Guidelines** 4. Airway Management (continued) b. Casualty with airway obstruction or impending airway obstruction: ● Chin lift or jaw thrust maneuver ● Nasopharyngeal airway ● Allow a conscious casualty to assume any position that best protects the airway, to include sitting up. ● Place an unconscious casualty in the recovery position.	Read the guideline.

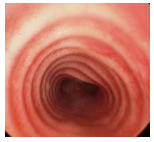
66.	**Maxillofacial Trauma**  • Casualties with severe facial injuries can often protect their own airway by sitting up and leaning forward. • Let them do it if they can!	**Maxillofacial Trauma** • Casualties with severe facial injuries can often protect their own airway by sitting up and leaning forward. • Let them do it if they can!	It would be almost impossible to intubate a casualty with this kind of injury, especially on the battlefield at night. If his larynx and trachea are intact, he may do well. This casualty was treated with an emergency surgical airway. The only way they got this casualty to the ER alive was to let him sit up and lean forward. With an injury like this, you may have to do a surgical airway with casualty in the sitting position.
67.	**Tactical Field Care Guidelines** 4. Airway Management (continued c. If the previous measures are unsuccessful, perform a surgical cricothyroidotomy using one of the following: • Cric-Key technique (preferred option) • Bougie-aided open surgical technique using a flanged and cuffed airway cannula of less than 10 mm outer diameter, 6-7 mm internal diameter, and 5-8 cm of intratracheal length • Standard open surgical technique using a flanged and cuffed airway cannula of less than 10mm outer diameter, 6-7 mm internal diameter, and 5-8 cm of intratracheal length (least desirable option) • Use lidocaine if the casualty is conscious. d. Spinal stabilization is not necessary for casualties with penetrating trauma.	**Tactical Field Care Guidelines** 4. Airway Management (continued c. If the previous measures are unsuccessful, perform a surgical cricothyroidotomy using one of the following: ● Cric-Key technique (preferred option) ● Bougie-aided open surgical technique using a flanged and cuffed airway cannula of less than 10 mm outer diameter, 6-7 mm internal diameter, and 5-8 cm of intratracheal length ● Standard open surgical technique using a flanged and cuffed airway cannula of less than 10mm outer diameter, 6-7 mm internal diameter, and 5-8 cm of intratracheal length (least desirable option) ● Use lidocaine if the casualty is conscious. d. Spinal stabilization is not necessary for casualties with penetrating trauma.	Read the guideline.
68.	**The Need for Cricothyroidotomy** • 4,596 battlefield fatalities in Operation Iraqi Freedom and Operation Enduring Freedom combat casualties from October 2001 to June 2011 – 87.3% of all injury mortality occurred in the prehospital environment (n = 4013) – Of the prehospital deaths, 24.3% were deemed potentially survivable. (n = 976) – The second most common cause (8%) of potentially preventable deaths was upper-airway obstruction due mostly to direct injury to the airway structures of the face and neck. (n = 78) Eastridge, et al. *Death on the battlefield (20012011): Implications for the future of combat casualty care.* J Trauma Acute Care Surg. 73; 6: Supplement 5	**The Need for Cricothyroidotomy** • 4,596 battlefield fatalities in Operation Iraqi Freedom and Operation Enduring Freedom combat casualties from October 2001 to June 2011 – 87.3% of all injury mortality occurred in the prehospital environment (n = 4013) – Of the prehospital deaths, 24.3% were deemed potentially survivable. (n = 976) – The second most common cause (8%) of potentially preventable deaths was upper-airway obstruction due mostly to direct injury to the airway structures of the face and neck. (n = 78)	Why should medics be able to do a surgical airway on the battlefield? Because upper airway obstruction is the second most common cause of potentially preventable deaths on the battlefield.

69.	**Battlefield Cricothyroidotomy** • "Military medics have a 33% failure rate when performing this procedure."* • This is the most technically difficult procedure we ask medics, Corpsmen, and PJs to do. * Mabry RL, Frankfurt A. *An Analysis of Battlefield Cricothyrotomy in Iraq and Afghanistan* J Spec Oper Med. 2012 Spring;12(1):17-23.	**Battlefield Cricothyroidotomy** • Military medics have a 33% failure rate when performing this procedure. • This is the most technically difficult procedure we ask medics, Corpsmen, and PJs to do.	The problem with cricothyroidotomy is that it is hard to do. Historically, combat medics have often failed to get it right on the battlefield.
70.	**Video: An Actual Cricothyroidotomy Using Standard Open Surgical Technique**  Courtesy Dr. Peter Rhee, Univ. of Arizona	**Video: An Actual Cricothyroidotomy Using Standard Open Surgical Technique**	This is video of a cricothyroidotomy performed in an actual emergency situation after an attempt to intubate failed. Even in the Emergency Department cricothyroidotomy is a very difficult, time-consuming procedure. Click on the photo to play the video.
71.	**Preferred Surgical Airway Technique** • Cric-Key evaluation – Fifteen military medics with minimal training performed one Cric-Key technique and one open surgical technique on cadavers. • Medics were able to insert the Cric-Key in significantly less time (34 sec vs 65 sec.) • Though not statistically significant, there were three failures with the open surgical technique, and none with the Cric-Key. Mabry, et al. *A Comparison of Two Open Surgical Cricothyroidotomy Techniques by Military Medics Using a Cadaver Model*. Ann Emerg Med. 2014 Jan;63(1):1-5.	**Preferred Surgical Airway Technique** • Cric-Key evaluation – Fifteen military medics with minimal training performed one Cric-Key technique and one open surgical technique on cadavers. • Medics were able to insert the Cric-Key in significantly less time (34 sec vs 65 sec.) • Though not statistically significant, there were three failures with the open surgical technique, and none with the Cric-Key.	Under test conditions, medics were faster and more successful using the Cric-Key technique compared to the open surgical technique.

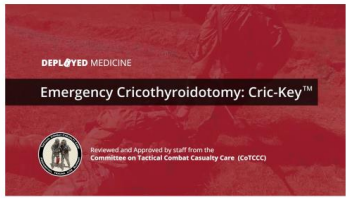
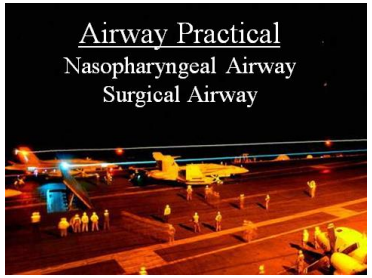
72.	**Cric-Key**  • The Cric-Key introducer is curvilinear, with an overall length of 19 cm, and an anteriorly directed distal tip. • Designed to guide insertion of a 5.0 cuffed Melker cricothyroidotomy airway cannula. • Combines the functions of a tracheal hook, stylet, dilator, and bougie when incorporated with the Melker airway.	**Cric-Key** • The Cric-Key introducer is curvilinear, with an overall length of 19 cm, and an anteriorly directed distal tip. • Designed to guide insertion of a 5.0 cuffed Melker cricothyroidotomy airway cannula. • Combines the functions of a tracheal hook, stylet, dilator, and bougie when incorporated with the Melker airway.	As tested, the Cric-Key technique requires a scalpel, a Cric-Key introducer, a Melker airway, and a 10-cc syringe.
73.	**Cricothyroid Membrane** 	**Cricothyroid Membrane** 	Through the cricothyroid membrane is the correct path for a cricothyroidotomy. You want to make the skin incision right over this membrane. The most anterior prominence of the thyroid cartilage is the "Adam's Apple" in men.
74.	**Surface Landmarks for Cricothyrotomy** 	**Surface Landmarks for Cricothyrotomy** 	Combat medic students should be able to demonstrate to an instructor the surface landmarks used to locate the cricothyroid membrane. These landmarks should be identified on a buddy.

75.	**Beneath the Surface Landmarks** 	**Beneath the Surface Landmarks** • Hyoid Bone • Thyroid prominence (Adam's apple) - usually visible only in males • Thyroid cartilage • Cricothyroid membrane • Cricoid cartilage • Thyroid gland	Here are the critical structures underlying the key surface landmarks.
76.	**Locating the Cric Skin Incision with a Dotted Line**  Macdonald JC , Tien HC. *Emergency Battlefield Cricothyrotomy.* CMAJ 2008;178:1133-1135 Bennett BL, Cailteux-Zevallos B, Kotora J. *Cricothyroidotomy bottom-up training review: battlefield lessons learned.* Mil Med. 2011 Nov;176(11):1311-9.	**Locating the Cric Skin Incision with a Dotted Line** 	In the practical, once the combat medic student has identified the pertinent landmarks, s/he should be required to draw a dashed vertical (mid-sagittal) line on his/her buddy's neck over the cricothyroid membrane where the incision should be made.
77.	**Cric-Key Technique** 1. Identify the cricothyroid membrane (CTM) between the thyroid cartilage and the cricoid cartilage. 	**Cric-Key Technique** 1. Identify the cricothyroid membrane (CTM) between the thyroid cartilage and the cricoid cartilage.	Read the text.

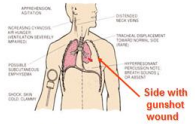
78.	**Cric-Key Technique** 2. Grasp and hold the trachea, stabilizing the airway. 	**Cric-Key Technique** 2. Grasp and hold the trachea, stabilizing the airway.	Read the text..
79.	**Cric-Key Technique** 3. Make a vertical skin incision down to the cricothyroid membrane using a #10 scalpel. 	**Cric-Key Technique** 3. Make a vertical skin incision down to the cricothyroid membrane using a #10 scalpel.	Read the text.
80.	**Cric-Key Technique** 4. Dissect the tissues to expose the membrane. 	**Cric-Key Technique** 4. Dissect the tissues to expose the membrane.	Read the text.

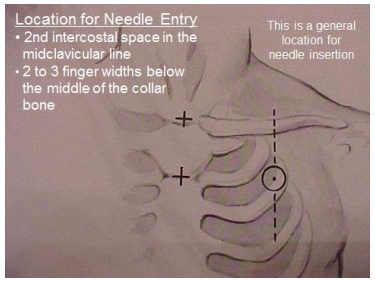
81.	**Cric-Key Technique**  5. Make a horizontal incision through the cricothyroid membrane.	**Cric-Key Technique** 5. Make a horizontal incision through the cricothyroid membrane.	Read the text.
82.	**Cric-Key Technique**  6. Insert the Cric-Key with the Melker airway.	**Cric-Key Technique** 6. Insert the Cric-Key with the Melker airway.	Read the text.
83.	**Cric-Key Technique**   7. Confirm placement by feeling the tracheal rings and looking for skin tenting.	**Cric-Key Technique** 7. Confirm placement by feeling the tracheal rings and looking for skin tenting.	The rounded, anterior-facing tip of the Cric-Key allows you to feel the tracheal rings as it slides over them – if the tip is inside the trachea. The photo on the right is a bronchoscopic view looking down the trachea, with the Cric-Key curving away distally. If the Cric-Key is inserted under the skin overlying the trachea, the tip will produce visible tenting of the skin in front of the neck.

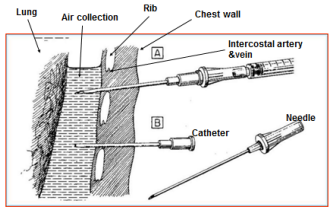
84.	**Cric-Key Technique**  8. Remove the Cric-Key leaving the airway in place.	**Cric-Key Technique** 8. Remove the Cric-Key leaving the airway in place.	8. Read the text.
85.	**Cric-Key Technique**  9. Inflate the cuff with 10cc of air.	**Cric-Key Technique** 9. Inflate the cuff with 10cc of air.	Read the text.
86.	**Cric-Key Technique**  10. Connect a bag and valve, and ventilate the casualty. Check for breath sounds bilaterally. Secure the airway.	**Cric-Key Technique** 10. Connect a bag and valve, and ventilate the casualty. Check for breath sounds bilaterally. Secure the airway.	Read the text.

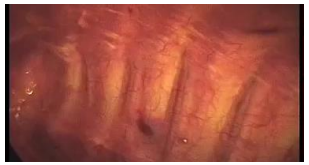
87.	**Video: Surgical Airway Using the Cric-Key**  NOTE: Cric-Key is the preferred technique.	**Video: Surgical Airway Using the Cric-Key** NOTE: Cric-Key is the preferred technique**.**	Let's watch a video on how to do a surgical airway using the Cric-Key. Click on the photo to play the video.
88.	**Repetition and Realism in Cric Training**  To prepare for scenarios like this one, combat medics should perform cricothyrotomy at least five times during training on an anatomically realistic model.	**Repetition and Realism in Cric Training** To prepare for scenarios like this one, combat medics should perform cricothyrotomy at least five times during training on an anatomically realistic model.	Cricothyrotomy is a difficult procedure even under the best of circumstances. Under stress, the combat medic will fall back on his training. Repetition and realism (both clinical and tactical) during training enhances skill development and knowledge retention in combat trauma care. Cricothyrotomy is a critical skill that should be practiced repeatedly on a realistic model.
89.		**Airway Practical** Nasopharyngeal Airway Surgical Airway	Nasopharyngeal airway skill sheet Cric-Key skill sheet

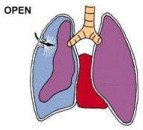
90.	**Tactical Field Care Guidelines** 5. Respiration/Breathing a. In a casualty with progressive respiratory distress and known or suspected torso trauma, consider a tension pneumothorax and decompress the chest on the side of the injury with a 14-gauge, 3.25-inch needle/catheter unit inserted in the 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. An acceptable alternate site is the 4th or 5th intercostal space at the anterior axillary line (AAL).	**Tactical Field Care Guidelines** 5. Respiration/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. An acceptable alternate site is the 4th or 5th intercostal space at the anterior axillary line (AAL).	Read the guideline.
91.	**Tactical Field Care Guidelines** 5. Respiration/Breathing b. All open and/or sucking chest wounds should be treated by immediately applying a vented chest seal to cover the defect. If a vented chest seal is not available, use a non-vented chest seal. Monitor the casualty for the potential development of a subsequent tension pneumothorax. If the casualty develops increasing hypoxia, respiratory distress, or hypotension and a tension pneumothorax is suspected, treat by burping or removing the dressing or by needle decompression.	**Tactical Field Care Guidelines** 5. Respiration/Breathing b. All open and/or sucking chest wounds should be treated by immediately applying a vented chest seal to cover the defect. If a vented chest seal is not available, use a non-vented chest seal. Monitor the casualty for the potential development of a subsequent tension pneumothorax. If the casualty develops increasing hypoxia, respiratory distress, or hypotension and a tension pneumothorax is suspected, treat by burping or removing the dressing or by needle decompression.	Read the guideline.
92.	**Tension Pneumothorax** • **Tension pneumothorax is another common cause of preventable death encountered on the battlefield.** • **Easy to treat.** • Tension pneumo may occur with entry wounds in abdomen, shoulder, or neck. • Blunt (motor vehicle accident) or penetrating trauma (GSW) may also cause it.	**Tension Pneumothorax** • **Tension pneumothorax is another common cause of preventable death encountered on the battlefield.** • **Easy to treat** • Tension pneumo may occur with entry wounds in the abdomen, shoulder, or neck. • Blunt (motor vehicle accident) or penetrating trauma (GSW) may also cause it.	Two things about a tension pneumothorax: - It is a very common cause of preventable death on the battlefield. - It can be effectively treated by combat medics, corpsmen, and PJs.

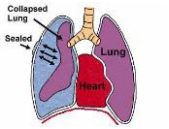
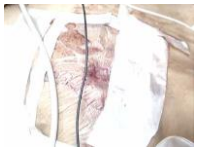
93.	**Pneumothorax**  A pneumothorax is a collection of air between the lung and chest wall due to an injury to the chest and/or lung. The lung then collapses as shown.	**Pneumothorax** A pneumothorax is a collection of air between the lungs and chest wall due to an injury to the chest and/or lung. The lung then collapses as shown.	Normally the lung fills up the entire chest cavity. With injury, air may get between the chest wall and the lung and cause the lung to collapse. Air is supposed to be INSIDE the lung. Here the air is inside the chest but OUTSIDE the lung – this does not help get oxygen to the body.
94.	**Tension Pneumothorax**  **A tension pneumothorax is worse. Injured lung tissue acts as a one-way valve, trapping more and more air between the lung and the chest wall. Pressure builds up and compresses both lungs and the heart.**	**Tension Pneumothorax** A tension pneumothorax is worse. Injured lung tissue acts as a one-way valve, trapping more and more air between the lung and the chest wall. Pressure builds up and compresses both lungs and the heart.	Every breath adds more air to the air space outside the lung. The air can't be exhaled because it's outside the lung – there's no way for it to escape, so pressure builds up.
95.	**Tension Pneumothorax** • **Both lung function and heart function are impaired with a tension pneumothorax, causing respiratory distress and shock.** • The treatment is to let the trapped air under pressure escape. • This is done by inserting a needle into the chest. • The recommended needle size is 14-gauge x 3.25 inches.	**Tension Pneumothorax** • Both lung function and heart function are impaired with a tension pneumothorax, causing respiratory distress and shock. • The treatment is to let the trapped air under pressure escape. • This is done by inserting a needle into the chest. • The recommended needle size is 14-gauge x 3.25 inches.	One collapsed lung should not kill you, but the elevated air pressure OUTSIDE the collapsed lung in a tension pneumothorax can impair the function of the good lung and the heart by preventing them from expanding normally. This CAN kill you. In a study by Dr. Harcke published in Military Medicine in 2008, several casualties died from needles being too short to get through the chest wall. The old 2-inch needles were too short. 3.25-inch needles will get through the chest wall in 99% of individuals.

96.	**Tension Pneumothorax** • Question: "What if the casualty does not have a tension pneumothorax when you do your needle decompression?" • Answer: – If he has penetrating trauma to that side of the chest, there is already a collapsed lung and blood in the chest cavity. – The needle won't make it worse if there is no tension pneumothorax. – If he DOES have a tension pneumothorax, you will save his life.	**Tension Pneumothorax** • Question: "What if the casualty does not have a tension pneumothorax when you do your needle decompression?" • Answer: ▪ If he has penetrating trauma to that side of the chest, there is already a collapsed lung and blood in the chest cavity. ▪ The needle won't make it worse if there is no tension pneumothorax. ▪ If he DOES have a tension pneumothorax, you will save his life.	Let's ask a question here.
97.		Location for Needle Entry • 2nd intercostal space in the midclavicular line • 2 to 3 finger widths below the middle of the collar bone	WHERE exactly does the needle go? First – it goes on the SAME SIDE OF THE CHEST AS THE INJURY.
98.	**Warning!**  • The heart and great vessels are nearby • Do not insert needle medial to the nipple line or point it towards the heart.	**Warning!** • The heart and great vessels are nearby. • Do not insert needle medial to the nipple line or point it towards the heart.	This is an outline of the location of the heart drawn on the surface of the chest.

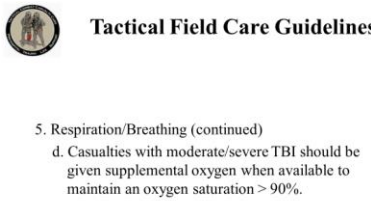
99.	**Needle Decompression – Enter Over the Top of the Third Rib**  • This avoids the artery and vein on the bottom of the second rib.	**Needle Decompression – Enter Over the Top of the Third Rib** • This avoids the artery and vein on the bottom of the second rib.	The needle should make a 90-degree angle to the chest wall, and it should slide in just over the top of the rib. An intercostal artery and vein run along the bottom edge of each rib.
100.	**Alternate Site for Needle Decompression** • An acceptable alternate site is the 4th or 5th intercostal space at the anterior axillary line. • The 5th intercostal space is located at the level of the nipple in young, fit males. • The AAL is located at approximately the lateral aspect of the pectoralis major muscle. 	**Alternate Site for Needle Decompression** • An acceptable alternate site is the 4th or 5th intercostal space at the anterior axillary line. • The 5th intercostal space is located at the level of the nipple in young, fit males. • The AAL is located at approximately the lateral aspect of the pectoralis major muscle.	The 5th intercostal space at the anterior axillary line is more remote from the heart and great vessels, and using this site may reduce the risk of complications from needle decompression. In a tactical situation, the lateral approach may be faster and safer given body armor configuration and ability to reassess. The procedure is the same as used at the 2nd intercostal space at the mid-clavicular line.
101.	**Remember!!!** • Tension pneumothorax is a common but easily treatable cause of preventable death on the battlefield. • Diagnose and treat aggressively! 	**Remember!!!** • Tension pneumothorax is a common but easily treatable cause of preventable death on the battlefield. • Diagnose and treat aggressively!	DO NOT MISS THIS INJURY!

102.	**Needle Decompression Works**  Video courtesy Dr. Oleksandr Linchevskyy Medical Director, Patriot Defence Ukraine	**Needle Decompression Works** Video courtesy Dr. Oleksandr Linchevskyy Medical Director, Patriot Defence Ukraine	This video presents a pleuroscopic view of a needle decompression performed on a trauma victim with tension pneumothorax and a collapsed lung. The re-expansion of the collapsed lung is dramatic. The catheter may inflict a little trauma on the lung before it gets bent over, but this is acceptable given the benefit accrued from the removal of air from the pleural space and the returned function of the re-inflated lung. Click on the photo to play the video.
103.	**Needle Decompression** • After decompression of a tension pneumothorax with a 14-gauge, 3.25" needle/ catheter unit: – Remove the needle – Secure the catheter in place	**Needle Decompression** • After decompression of a tension pneumothorax with a 14-gauge, 3.25" needle/catheter unit: – Remove the needle – Secure the catheter in place	After you decompress a tension pneumothorax, the needle should be removed, and the catheter should be secured in place. Although kinking or clotting may eventually close the lumen of the catheter, it will hopefully remain patent for some time. As long as it does, it will provide some insurance against the recurrence of tension pneumothorax. The inside diameter of the catheter is small compared to the diameter of the trachea and bronchi, so air will preferentially enter the lungs during inhalation, and the lung on the decompressed side of the chest will not deflate as it would with an open chest wound. When securing the catheter in place, take care not to occlude it externally.
104.	 **Needle Decompression Practical**	**Needle Decompression Practical**	Needle Decompression Skill Sheet

105.	**Sucking Chest Wound (Open Pneumothorax)**  Takes a hole in the chest the size of a nickle or bigger for this to occur.	**Sucking Chest Wound (Open Pneumothorax)** Takes a hole in the chest the size of a nickel or bigger for this to occur.	In a sucking chest wound, air enters the pleural space through a wound in the chest wall. The elastic lung deflates and pulls away from the chest wall. On inspiration, the air now enters the chest THROUGH THE HOLE instead of INTO THE LUNGS. The affected lung cannot be fully re-inflated by inhalation.
106.	**Open Pneumothorax** 	**Open Pneumothorax**	In this wound you can see into the chest cavity.
107.	**Management of Open Pneumothorax** • Input from the USCENTCOM/JTS assessment of prehospital trauma care in Afghanistan questioned the use of unvented chest seals in the treatment of open pneumothorax. • New animal research from both USAISR and Naval Medical Center Portsmouth has shown that vented chest seals work reliably to prevent a tension pneumothorax in the presence of an open pneumothorax and an ongoing air leak from the lung, but non-vented chest seals do not.	**Management of Open Pneumothorax** • Input from the USCENTCOM/JTS assessment of prehospital trauma care in Afghanistan questioned the use of unvented chest seals in the treatment of open pneumothorax. • New animal research from both USAISR and Naval Medical Center Portsmouth has shown that vented chest seals work reliably to prevent a tension pneumothorax in the presence of an open pneumothorax and an ongoing air leak from the lung, but non-vented chest seals do not.	Read the text.
108.	**Sucking Chest Wound** • May result from large defects in the chest wall and may interfere with ventilation • **Treat by applying a vented occlusive dressing completely over the defect at the end of one of the casualty's exhalations.** • Monitor for possible development of subsequent tension pneumothorax. • Allow the casualty to adopt the sitting position if breathing is more comfortable.	**Sucking Chest Wound** • May result from large defects in the chest wall and may interfere with ventilation • **Treat it by applying a vented occlusive dressing completely over the defect at the end of one of the casualty's exhalations.** • Monitor for possible development of subsequent tension pneumothorax. • Allow the casualty to adopt the sitting position if breathing is more comfortable.	Apply a vented chest seal at the end of an exhalation. At this point in the breathing cycle, there is relatively less air in the pleural space.

109.	**Sucking Chest Wound (Treated)**  Key Point: If signs of a tension pneumothorax develop – lift one edge of the seal and allow the tension pneumothorax to decompress ("burping" the seal). Alternatively, remove the seal for a few seconds to accomplish the decompression, then re-apply.	**Sucking Chest Wound (Treated)** **Key Point: If signs of a tension pneumothorax develop – lift one edge of the seal and allow the tension pneumothorax to decompress ("burping" the seal). Alternatively, remove the seal for a few seconds to accomplish the decompression, then re-apply.**	Once the wound has been occluded with a dressing, air can no longer enter (or exit) the pleural space through the wound in the chest wall. The injured lung will remain partially collapsed, but the mechanics of respiration will be better. You have to be alert for the possible development of tension pneumothorax because air can still leak into the pleural space from the injured lung. Monitor these patients with observation and a pulse oximeter.
110.	**Video: Sucking Chest Wound** 	**Video: Sucking Chest Wound**	This is a video of a sucking chest wound. Note the large open hole in the chest wall. Click on the photo to play the video.
111.	**Video: Sucking Chest Wound (Treated)** 	**Video: Sucking Chest Wound (Treated)**	This video shows a sucking chest wound after the defect in the chest wall has been sealed. Negative pressure during inhalation retracts the dressing over the wound. The lung now has a better chance of re-inflating. Click on the photo to play the video.
112.	**Tactical Field Care Guidelines** 5. Respiration/Breathing (continued) c. Initiate pulse oximetry. All individuals with moderate/severe TBI should be monitored with pulse oximetry. Readings may be misleading in the settings of shock or marked hypothermia.	**Tactical Field Care Guidelines** 5. Respiration/Breathing (continued) c. Initiate pulse oximetry. All individuals with moderate/severe TBI should be monitored with pulse oximetry. Readings may be misleading in the settings of shock or marked hypothermia.	Read the guideline.

113.	**Pulse Oximetry Monitoring** • Pulse oximetry tells you how much oxygen is present in the blood. • Shows the heart rate and the percent of oxygenated blood ("O2 sat") in the numbers displayed. • 98% or higher is normal O2 sat at sea level. • 86% is normal at 12,000 feet due to lower oxygen pressure at that altitude. 	**Pulse Oximetry Monitoring** • Pulse oximetry tells you how much oxygen is present in the blood. • Shows the heart rate and the percent of oxygenated blood ("O2 sat") in the numbers displayed. • 98% or higher is normal O2 sat at sea level. • 86% is normal at 12,000 feet due to lower oxygen pressure at that altitude.	Here is what a pulse oximeter looks like and what it tells you. What it actually tells you is the percentage of oxygenated hemoglobin in the blood.
114.	**Pulse Oximetry Monitoring** Consider using a pulse ox for these types of casualties: • TBI – good O2 sat is very important for a good outcome • Unconscious • Penetrating chest trauma • Chest contusion • Severe blast trauma 	**Pulse Oximetry Monitoring** Consider using a pulse ox for these types of casualties: • TBI – good O2 sat is very important for a good outcome • Unconscious • Penetrating chest trauma • Chest contusion • Severe blast trauma	Hypoxia is associated with worse clinical outcomes in casualties with moderate/severe TBI. Monitoring the O2 saturation in these casualties with a pulse oximeter will help identify hypoxia so that it can be prevented or treated. Unconscious casualties may experience an airway obstruction. Chest trauma and blast trauma casualties may not exchange oxygen well in their lungs.
115.	**Pulse Oximetry Monitoring** Oxygen saturation values may be inaccurate in the presence of: • Hypothermia • Shock • Carbon monoxide poisoning • Very high ambient light levels 	**Pulse Oximetry Monitoring** Oxygen saturation values may be inaccurate in the presence of: • Hypothermia • Shock • Carbon monoxide poisoning • Very high ambient light levels	Even after significant blood loss, the blood remaining in the intravascular compartment may be normally oxygenated. Readings on a cold limb may be artificially low. The pulse ox can mistake carbon monoxide for oxygen in burn patients and give a falsely high reading. To repeat – a decrease in O2 sat is normal at altitude. This drop in O2 sat is REAL.

116.		**Tactical Field Care Guidelines** 5. Respiration/Breathing (continued) d. Casualties with moderate/severe TBI should be given supplemental oxygen when available to maintain an oxygen saturation > 90%.	Read the guideline. Hypoxia is associated with worse clinical outcomes in casualties with moderate/severe TBI. Oxygen may be available in some instances in TFC, and when it is, it should be administered to these casualties. Monitoring O2 saturation with a pulse oximeter will help identify hypoxia and track its correction.
117.		**Questions?**	