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|  |  | **Tactical Combat Casualty Care for Medical Personnel 03 June 2016**  **Tactical Field Care #1** | Next we’ll be moving into the Tactical Field Care phase of TCCC |
|  |  | **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** airway control techniques and devices appropriate to the Tactical Field Care phase. | Read text |
|  |  | **OBJECTIVES**   * **DEMONSTRATE** the recommended procedure for surgical cricothyroidotomy. * **LIST** the criteria for the diagnosis of tension pneumothorax on the battlefield. * **DESCRIBE** the diagnosis and initial treatment of tension pneumothorax on the battlefield. | Read text |
|  |  | **OBJECTIVES**   * **DEMONSTRATE** the appropriate procedure for needle decompression of the chest. * **DESCRIBE** the progressive strategy for controlling hemorrhage in tactical field care. * **DEMONSTRATE** the correct application of a CoTCCC-recommended hemostatic dressing. * **DEMONSTRATE** the correct application of a CoTCCC-recommended junctional tourniquet. | Read text |
|  |  | **OBJECTIVES**   * **DEMONSTRATE** the appropriate procedure for initiating a rugged IV field setup. * **STATE** the rationale for obtaining intraosseous accessin combat casualties. * **DEMONSTRATE** the appropriate procedure for **i**nitiating an intraosseous infusion. | Read text |
|  |  | **OBJECTIVES**   * **STATE** the tactically relevant indicators of shock in combat settings. * **DESCRIBE** the pre-hospital fluid resuscitation strategy for hemorrhagic shock in combat casualties. * **DESCRIBE** the management of penetrating eye injuries in TCCC. * **DESCRIBE** how to prevent blood clotting problems from hypothermia. | Read text |
|  |  | **OBJECTIVES**   * **DESCRIBE** the appropriate use of pulse oximetry in pre-hospital combat casualty care * **STATE** the pitfalls associated with interpretation of pulse oximeter readings * **LIST** the recommended agents for pain relief in tactical settings along with their indications, dosages, and routes of administration * **DESCRIBE** the rationale for early antibiotic intervention on combat casualties. | Read text |
|  |  | **OBJECTIVES**   * **LIST** the factors involved in selecting antibiotic drugs for use on the battlefield. * **DISCUSS** the management of burns in TFC * **EXPLAIN** why cardiopulmonary resuscitation is not generally used for cardiac arrest in battlefield trauma care. * **DESCRIBE** the procedure for documenting TCCC care with the TCCC Casualty Card. | Read text |
|  |  | **OBJECTIVES**   * **DESCRIBE** the three ISAF categories for evacuation priority * **LIST** the nine items in a MEDEVAC request * **DISCUSS** the rules of thumb for calling for Tactical Evacuation and the importance of careful calculation of the risk/benefit ratio prior to initiating the call * **DESCRIBE** the appropriate procedures for providing trauma care for wounded hostile combatants. | Read text |
|  |  | **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 fire is ineffective.  Does not mean that the danger is over – could change to Care Under Fire again at any time. |
|  |  | **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. |
|  |  | **Battlefield Priorities in Tactical Field Care Phase**   * This section describes the recommended care to be provided in TFC. * **This sequence of priorities shown assumes that any obvious life-threatening bleeding has been addressed in the Care Under Fire phase.** * **If this is not the case – address the massive bleeding first.** * After that – care is provided in the sequence shown. This sequence is compatible with the MARCH algorithm found in the USSOCOM Tactical Trauma Protocols | You may have multiple casualties with multiple problems.  What problems do you address first?  Before we show you – we have to note one assumption. |
|  |  | **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. |
|  |  | **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 text |
|  |  | **Tactical Field Care Guidelines**  1. Casualties with an altered mental status should be disarmed immediately. | (Note: All of the slides entitled “Tactical Field Care Guidelines” - as this one is - should be read verbatim.)  Automatic weapons and shock (and/or narcotics) are a potentially lethal combination! |
|  |  | **Disarm Individuals with Altered Mental Status**   * Armed combatants with an altered mental status may use their weapons inappropriately. * Secure long gun, pistols, knives, grenades, explosives. * Possible causes of altered mental status are Traumatic Brain Injury (TBI), shock, hypoxia, and pain medications. * Explain to casualty: “Let me hold your weapon for you while the doc checks you out.” | Casualty may resist being disarmed.  The proposed comment in the last bullet may help him to better accept your taking his weapon. |
|  |  | **Tactical Field Care Guidelines**  2. Airway Management  a. Unconscious casualty without airway obstruction:  - Chin lift or jaw thrust maneuver  - Nasopharyngeal airway  - Place casualty in recovery position | Read text |
|  |  | **Tactical Field Care Guidelines**  2. Airway Management  b. Casualty with airway obstruction or impending airway obstruction:  - Chin lift or jaw thrust maneuver  - Nasopharyngeal airway  - Allow casualty to assume any position that best protects the airway, to include sitting up.  - Place unconscious casualty in recovery position. | Read text |
|  |  | **Tactical Field Care Guidelines**  2. Airway Management  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 intra-tracheal 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 intra-tracheal length (least desirable option)  - Use lidocaine if the casualty is conscious. | Read text |
|  |  | **Nasopharyngeal Airway**   * The “Nose Hose,” “Nasal Trumpet,” “NPA” * Excellent success in GWOT * 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 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 |
|  |  | **Nasopharyngeal Airway: (Note that the NPA is positioned at a 90° angle to the front plane of the face.)**  Description: NPA1 | Lubricate!  Gentle insertion with rotary or back and forth motion  Don’t start a big nosebleed  Some people have deviated nasal septums – try the other nostril if the NPA doesn’t go in the first side you try. |
|  |  | **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. |
|  |  | **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 alive to the ER was to let him sit up and lean forward.  May have to do a surgical airway with casualty in the sitting position. |
|  |  | **Airway Support**  Place unconscious casualties in the recovery position after the airway has been opened. | Recovery position helps to protect against vomiting and aspiration.  Again, note that C-spine stabilization is not required in penetrating head and neck trauma. |
|  |  | **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. |
|  |  | **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. |
|  |  | **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. |
|  |  | **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. |
|  |  | **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. |
|  |  | **Surgical Airway (Cricothyroidotomy)**  Description: TFC CT membrane 3 | 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. |
|  |  | **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. |
|  |  | **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. |
|  |  | **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. |
|  |  | **Cric-Key Technique**  1. Identify the cricothyroid membrane (CTM) between the thyroid cartilage and the cricoid cartilage. | Read text. |
|  |  | **Cric-Key Technique**  2. Grasp and hold the trachea, stabilizing the airway. | Read text. |
|  |  | **Cric-Key Technique**  3. Make a vertical skin incision down to the cricothyroid membrane using a #10 scalpel. | Read text. |
|  |  | **Cric-Key Technique**  4. Dissect the tissues to expose the membrane. | Read text. |
|  |  | **Cric-Key Technique**  5. Make a horizontal incision through the cricothyroid membrane. | Read text. |
|  |  | **Cric-Key Technique**  6. Insert the Cric-Key with the Melker airway. | Read text. |
|  |  | **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. |
|  |  | **Cric-Key Technique**  8. Remove the Cric-Key leaving the airway in place. | 8. Remove the Cric-Key leaving the airway in place. |
|  |  | **Cric-Key Technique**  9. Inflate the cuff with 10cc of air. | Read text. |
|  |  | **Cric-Key Technique**  10. Connect a bag and valve, and ventilate the casualty. Check for breath sounds bilaterally. Secure the airway. | Read text. |
|  |  | **Video: Surgical Airway Using the Cric-Key** | Let’s watch a video on how to do a surgical airway using the Cric-Key. |
|  |  | **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. |
|  |  | **Airway Practical**  Nasopharyngeal Airway  Surgical Airway | Nasopharyngeal airway skill sheet  Cric-Key skill sheet |
|  |  | **Tactical Field Care Guidelines**  3. 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 text |
|  |  | **Tactical Field Care Guidelines**  3. 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 text |
|  |  | **Tactical Field Care Guidelines**  3. Breathing  c. Casualties with moderate/severe TBI should be given supplemental oxygen when available to maintain an oxygen saturation > 90%. | In the presence of moderate or severe TBI, hypoxia is associated with worse outcomes, and should be prevented if possible. |
|  |  | **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. | 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. |
|  |  | **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 – does not help get oxygen to the body. |
|  |  | **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 into the air space outside the lung.  The air can’t be exhaled because it’s outside the lung – no way to escape - pressure builds up. |
|  |  | **Tension Pneumothorax**   * Both lung function and heart function are impaired with a tension pneumothorax, causing respiratory distress and shock. * Treatment is to let the trapped air under pressure escape * Done by inserting a needle into the chest * 14 gauge and 3.25 inches long is the recommended needle size | 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.  Study by Dr. Harcke in 2008:  Published in Military Medicine  Several casualties died from needles being too short to get through the chest wall  Old 2 inch needles were too short  3.25 inch needles will get through the chest wall in 99% of individuals |
|  |  | **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. |
|  |  | 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. |
|  |  | **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. |
|  |  | **Needle Decompression – Enter Over the Top of the Third Rib**   * This avoids the artery and vein on the bottom of the second rib. | Emphasize the needle should make a 90-degree angle to the chest wall, and it should slide in just over the top of the rib. |
|  |  | **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. |
|  |  | **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! |
|  |  | **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. |
|  |  | **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. |
|  |  | **Needle Decompression Practical** | Needle Decompression Skill Sheet |
|  |  | **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. |
|  |  | **Open Pneumothorax** | In this wound you can see into the chest cavity. |
|  |  | **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 text |
|  |  | **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. | Apply at the end of an exhalation.  At this point in the breathing cycle, there is relatively less air in the pleural space. |

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|  |  | **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 ox. |
|  |  | **Video: Sucking Chest Wound** | Click on video to play.  This is a video of a sucking chest wound.  Note the large open hole in the chest wall. |
|  |  | **Video: Sucking Chest Wound (Treated)** | Click on video to play.  Negative pressure during inhalation retracts the dressing over the wound.  The lung now has a better chance of re-inflating. |
|  |  | **Questions?** |  |
|  |  | **Tactical Field Care Guidelines**  4. Bleeding  a. Assess for unrecognized hemorrhage and control all sources of bleeding. If not already done, use a CoTCCC-recommended tourniquet to control life-threatening external hemorrhage that is anatomically amenable to tourniquet application or for any traumatic amputation. Apply directly to the skin 2-3 inches above wound.If bleeding is not controlled with the first tourniquet, apply a second tourniquet side-by-side with the first. | Read the guideline. |
|  |  | **Tactical Field Care Guidelines**  4. Bleeding  b. For compressible 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. |
|  |  | **Tactical Field Care Guidelines**  4. Bleeding  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.**  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. |
|  |  | **Tactical Field Care Guidelines**  4. Bleeding  c. Reassess prior tourniquet application. Expose the wound and determine if a tourniquet is needed. If it is, replace anylimb tourniquet placed over the uniform with one applied directly to the skin 2-3 inches above wound. Ensure that bleeding is stopped. When possible, a distal pulse should be checked. If bleeding persists **or** a distal pulse is still present, consider additional tightening of the tourniquet or the use of a second tourniquet side-by-side with the first to eliminate both bleeding and the distal pulse. | Read the guideline.  Although a tourniquet may stop the active bleeding, it also prevents venous blood from returning to the heart. If arterial blood continues to flow past the tourniquet, pressure can build up distally in the limb and create a compartment syndrome. This is why the tourniquet should be tightened until there is no longer a distal pulse – to minimize the chance of harm from a developing compartment syndrome. |
|  |  | **Tactical Field Care Guidelines**  4. Bleeding  d. Limb tourniquets and junctional tourniquets should be converted to hemostatic or pressure dressings as soon as possible if three criteria are met: the casualty is not in shock, it is possible to monitor the wound closely for bleeding, and the tourniquet is not controlling bleeding from an amputated extremity. Every effort should be made to convert tourniquets in less than 2 hours if bleeding can be controlled with other means. Do not remove a tourniquet that has been in place more than 6 hours unless close monitoring and lab capability are available. | Read text. |
|  |  | **Tactical Field Care Guidelines**  4. Bleeding  e. Expose and clearly mark all tourniquet sites with the time of tourniquet application. Use an indelible marker. | Read text |
|  |  | **Tourniquet Repositioning**   1. Expose the wound(s) and place a second tourniquet 2-3 inches above the most proximal bleeding site. 2. Loosen the “high-and-tight” tourniquet. | Tourniquets placed hastily over the uniform may be less effective than tourniquets applied directly to the skin. Furthermore, all “high-and-tight” tourniquets require repositioning or conversion at the EARLIEST opportunity (2 hours max). During reassessment, if a tourniquet needs to be repositioned, remove sufficient uniform materiel to place another tourniquet directly over the skin, place the second tourniquet 2-3 inches above the wound, and tighten it. Slowly loosen the first tourniquet while watching for continued bleeding control by the second tourniquet. Check also to make sure the distal pulses do not return. |
|  |  | **Tourniquet Repositioning**   1. If needed for hemorrhage control or to eliminate distal pulses, a “high-and-tight” tourniquet can be moved to a position side-by-side with the second tourniquet and tightened there. | Read text. |
|  |  | **Tourniquets: Points to Remember**   * Damage to the arm or leg is rare if the tourniquet is left on for less than two hours. * Tourniquets are often left in place for several hours during surgical procedures. * In the face of massive extremity hemorrhage, it is better to accept the small risk of damage to the limb than to have a casualty bleed to death. | Tourniquets have historically been frowned upon in civilian trauma settings.  **In combat settings, they are the biggest lifesaver on the battlefield!**  They are NOT A PROBLEM if not left in place for too long. |
|  |  | **Tourniquets: Points to Remember**   * Every effort should be made to convert tourniquets in less than 2 hours if bleeding can be controlled with other means. If bleeding remains controlled with Combat Gauze, leave the loosened tourniquet in place. If the bleeding is not controlled with Combat Gauze, re-tighten the tourniquet until bleeding stops. * Restoring blood flow to the limb by transitioning to Combat Gauze at the 2-hour mark will minimize the chance of ischemic damage due to the tourniquet. | Read text. |
|  |  | **Tourniquet Conversion**   1. Expose the wound(s) | Converting a tourniquet to a hemostatic dressing is a simple stepwise procedure. The first step is to expose the wound by cutting away the overlying uniform. The following sequence of slides shows the conversion of a tourniquet placed “high-and-tight” during Care Under Fire, but the procedure is the same for conversion of a tourniquet placed anywhere. |
|  |  | **Tourniquet Conversion**   1. Apply Combat Gauze and a pressure dressing | Read text. |
|  |  | **Tourniquet Conversion**   1. Loosen “high-and-tight” tourniquet and move it down to just above the pressure dressing. (Leave it loose here just in case it’s needed later.) 2. Monitor for re-bleeding. | Read text. |
|  |  | **Tourniquets: Points to Remember**   * If the transition to Combat Gauze at 2 hours failed, try again at 6 hours using the steps outlined in the previous slides. * Do not release the tourniquet after 6 hours of application unless close monitoring and lab support are available to evaluate for metabolic complications of prolonged tourniquet use. | Read text. |
|  |  | **Tourniquets: Points to Remember**  • All unit members should have a CoTCCC-approved tourniquet at a standard location on their battle gear.   –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. |
|  |  | **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. |
|  |  | **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. |
|  |  | **Tourniquets: Points to Remember**  Tightening the tourniquet enough to eliminate the distal pulse will help to ensure that all bleeding is stopped, and that there will be no damage to the extremity from blood entering the extremity but not being able to get out. | This condition is called Compartment Syndrome, as mentioned above.  It can cause unnecessary loss of the extremity. |
|  |  | **Tourniquets: Points to Remember**  ***Do not convert the tourniquet if:***   * + The casualty is in shock.   + You cannot closely monitor the wound for re-bleeding.   + The extremity distal to the tourniquet has been traumatically amputated.   + The tourniquet has been on for more than 6 hours.   + The casualty will arrive at a medical treatment facility within 2 hours after time of application.   + Tactical or medical considerations make transition to other hemorrhage control methods inadvisable. | Pay very close attention to these rules about tourniquet conversion. |
|  |  | **Tourniquets: Points to Remember**   * Only medics, physician assistants, or physicians should re-position or convert tourniquets. | Read text. |
|  |  | **Questions?** |  |
|  |  | **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. |
|  |  | **CoTCCC-Recommended Hemostatic Agents**  Combat Gauze, Celox Gauze, and ChitoGauze | These are the three hemostatic dressings recommended in the TCCC guidelines. |
|  |  | **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. |
|  |  | **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 | Read text. |
|  |  | **Alternative Hemostatic Agents**   * Celox Gauze and ChitoGauze are as effective as Combat Gauze at hemorrhage control in laboratory studies:   + Rall JM, Cox JM, Songer AG, et al. Comparison of novel hemostatic gauzes to QuikClot Combat Gauze in a standardized swine model of uncontrolled hemorrhage. J Trauma Acute Care Surg. 2013; 75(2 Suppl 2):S150-6.   + Satterly S, Nelson D, Zwintscher N, et al. Hemostasis in a noncompressible hemorrhage model: An end-user evaluation of hemostatic agents in a proximal arterial injury. J Surg Educ. 2013;70(2):206-11.   + Watters JM, Van PY, Hamilton GJ, et al. Advanced hemostatic dressings are not superior to gauze for care under fire scenarios. J Trauma 2011;70:1413-18.   + Schwartz RB, Reynolds BZ, Shiver SA, et al. Comparison of two packable hemostatic Gauze dressings in a porcine hemorrhage model. Prehosp Emerg Care 2011;15:477-482 | Read first bullet. |
|  |  | **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 text. |
|  |  | **CoTCCC-Recommended Hemostatic Agents**   * For more information:   + Combat Gauze     - http://www.z-medica.com/military/Home.aspx   + Celox Gauze     - http://www.celoxmedical.com/usa/products/celox-gauze/   + ChitoGauze     - http://www.hemcon.com/Products/ChitoGauzeHemostaticGauzeOverview.aspx | Further information on these products is available on the manufacturers’ websites. |
|  |  | **Combat Gauze NSN 6510-01-562-3325**   * Combat Gauzeis 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. |
|  |  | **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 Text |
|  |  | **Combat Gauze Directions (2) Pack Wound Completely**   * Pack Combat Gauze tightly into 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 wound just like you would plain gauze.  If more than one roll is needed, pack in more CG until the wound is full. |
|  |  | **Combat Gauze Directions (3) Apply Direct Pressure**   * Quickly apply pressure until bleeding stops. * Hold continuous pressure for 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. |
|  |  | **Combat Gauze Directions (4) Bandage over Combat Gauze**  • Leave Combat Gauze in place.  • Wrap to effectively secure the dressing in the wound.  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. |
|  |  | **Combat Gauze Directions (5) Transport & Monitor Casualty**   * Do not remove the bandage or Combat Gauze. * Transport 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. |
|  |  | **Combat Gauze Video** | Click on the photo to play the video. |
|  |  | **Questions?** |  |
|  |  | **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!** * **Use for 3 full minutes after applying a hemostatic dressing.** * 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. |
|  |  | **Hemostatic Dressing Practical** | Break into small groups for practical.  Hemostatic Dressing Skill Sheet. |
|  |  | **XSTAT 30**   * First-in-kind expanding wound dressing approved for internal use. * Syringe-like applicator applies compressed mini-sponges into deep wounds. * Mini-sponges rapidly expand on contact with blood – compressing the wound to stop bleeding.   RevMedx, 25999 SW Canyon Creek Road, Suite C, Wilsonville, OR 97070 wwww.revmedx.com | XSTAT 30 is made by RevMedx. |
|  |  | **XSTAT 30 Indications For Use**  XSTAT 30 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. |
|  |  | **XSTAT 30 Indications For Use**  XSTAT 30 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 30 is NOT indicated for use in: the thorax; the pleural cavity; the mediastinum; the abdomen; the retroperitoneal space; the sacral space above the inguinal ligament; or tissues above the clavicle. | XSTAT 30 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. |
|  |  | **XSTAT 30’s Technical Characteristics**  XSTAT 30 is composed of compressed mini-sponges coated with chitosan –a compound designed to stop bleeding.  Upon contact with blood, the mini-sponges absorb blood and, expand to 10 - 12 times their compressed volume within approximately 20 seconds.  A radiopaque marker is embedded into each of the mini-sponges to make them detectable by X-ray. | Read the text. |
|  |  | **XSTAT 30 Applicator**  Main body holds approximately 92 mini-sponges.  Telescoping Handle  Bifurcated silicone tip allows sponges to exit. | The XSTAT 30 applicator is six inches long (10.5 inches with the handle extended) and 30 mm in diameter. |
|  |  | **XSTAT 30 Packaging**  XSTAT 30 is available in single and triple packs. 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. |
|  |  | **XSTAT 30 Instructions for Use**  Open the package and remove the applicator.  Pull the handle out and away from the barrel until it stops and locks. | Read the text. |
|  |  | **XSTAT 30 Instructions for Use**  Place the tip of the applicator into the wound track as close to the bleeding source as possible.  Firmly depress the handle to deploy the mini-sponges. The sponges should flow freely into the wound. | Read the text. |
|  |  | **XSTAT 30 Instructions for Use**   * DO NOT attempt to forcefully eject the material from the applicator. If resistance is met, pull the applicator back slightly to create additional packing space, then continue to depress the handle. * 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. |
|  |  | **XSTAT 30 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 mini-sponges from the wound. They must be removed by a surgeon after achieving proximal and distal vascular control. | Read the text. |
|  |  | **XSTAT 30** | Click on the photo to play the video. |
|  |  | **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. |
|  |  | **Warnings/Cautions**   * XSTAT contains material derived from shellfish.   + A mild pyrogenic response has been elicited in biocompatibility tests.   + Monitor the casualty for fever, chills, hypotension, and shock. | Read the text. |
|  |  | **Warnings/Cautions**   * Segments of the applicator tip may break away during application and be left in the wound.   + After injecting the mini-sponges, check the applicator tip for missing segments.   + Do not attempt to retrieve missing segments from the wound.   + Record the number of lost segments on the TCCC Casualty Card. | If a segment of the applicator’s tip should separate and get lost in the packed wound, do not explore the wound in an attempt to retrieve it. It is radiopaque and can be removed by the surgeon who removes the mini-sponges. |
|  |  | **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 standard tourniquets like the C.A.T. |
|  |  | **Junctional Tourniquets**  The recent conflicts in Afghanistan and Iraq went on for 13 years.  So why did it take until 2011 to add a junctional tourniquet to TCCC? | Read text. |
|  |  | **Dr. John Holcomb’s Brief to Defense Health Board 2011**  Increasing Amputation Rates in the period Sep-Dec 2010 | In the last months of 2010, US Forces in Afghanistan experienced an increase in limb amputations. |
|  |  | **IEDS: Iraq vs Afghanistan**   * Iraq   + Large amount of explosives – recycled 155 shells   + Command or vehicle-detonated   + Designed to destroy vehicles * Afghanistan   + Smaller amount of explosives   + Homemade explosives   + Personnel pressure-detonated   + Designed to maim | IEDs were configured and used differently in the two theaters. In Afghanistan, they were aimed at soldiers on dismounted patrol. These tactics led to high rates of Dismounted Complex Blast Injury (DCBI). |
|  |  | **Dismounted Complex Blast Injury (DCBI)**   * DCBI causes junctional hemorrhage. * By 2011, junctional hemorrhage was the leading of death from external hemorrhage. * The proximal thigh and the groin are the most common site 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. |
|  |  | **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. |
|  |  | **Anatomy of the Inguinal Region** | Effective application of a junctional hemorrhage control device depends upon accurate location. Note that the external iliac artery becomes the femoral artery as it passes under the inguinal ligament. |
|  |  | **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. |
|  |  | **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 text. |
|  |  | **TCCC Management of Junctional Hemorrhage**  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. |
|  |  | **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 text. |
|  |  | **Junctional Tourniquet Practical** | Break into small groups for the practical.  Use the module and the skill sheet for the device being trained. |
|  |  | **Questions?** |  |