Emergency War Surgery Course (EWSC)
Course Objectives

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►Explain the concepts & elements of triage & teamwork within the battlefield trauma system

- Review injuries, levels of care and theater evacuation concepts specific to military care
- Explain the concepts and elements of triage and teamwork within the battlefield trauma system

►Describe the principles, indications, & procedures for damage control in the management of combat casualties

- Apply trauma principles to surgery in austere environments
- Describe the principles, indications and procedures for damage control in the management of combat casualties

►Demonstrate surgical techniques required to manage combat injuries to the head, face, eye, neck, torso, & extremities

- Demonstrate hands-on surgical techniques in the laboratory
- Demonstrate surgical techniques required to manage combat injuries to the head, face, eye, neck, torso and extremities

DAY 1

1.1 EWSC Introduction

►Discuss the course purpose and historical development
- Discuss the purpose and recommendations of the Combat Trauma Surgical Committee
- Discuss the course structure and participation expectations
- Introduce course participants

►Discuss the objectives of the Emergency War Surgery Course

1.2 War Wounds

►Define the spectrum of combat injuries
- Discuss epidemiology of injuries and fatalities due to war
- Define KIA and DOW
- Describe the general concept of time of death after wounding
- Etiology of war fatalities
- Define the spectrum of combat injuries
- List the common OEF/OIF mechanisms of injury
- List the percentages for anatomic sites of war injuries
- Compare the died of wound rates in OEF/OIF between coalition forces & host nation casualties
- Discuss goals of combat medicine
- Describe the pertinent surgical concepts of combat wounds

►Describe the injury mechanisms related to explosions
- Discuss the injury mechanisms related to explosions
- List the four basic mechanisms of injury and describe subsets of each
- Describe the four types of injuries sustained from explosive mechanisms
- Discuss surgical implications of battlefield injuries due to missiles, ballistics, blasts, mines, armored vehicles and UXOs
- Describe the common injuries sustained from the blast pressure wave
- Describe the distance from a homicide bomber and the resulting injuries
- List four types of injuries sustained in armored vehicles
- Discuss the management of a patient with an UXO
- Surgical implications of battlefield injuries due to missiles, ballistics, blasts, mines, armored vehicles and UXOs
- Discuss triage, decontamination and surgical concerns for injuries contaminated with radiological, chemical and biological agents

►Delineate the fundamental principles of combat wound management
- Triage, decontamination and surgical concerns for injured patients contaminated with CBRNE agents

1.3 Head Injuries

- Discuss the evaluation and management of the head injured patient
  - Identify the pathophysiology, injury types, evaluation and interventions necessary for treating head injuries
  - Describe types of head injuries, indications for treatment, relevant mechanisms of injuries and associated injuries
  - Describe the difference between primary injury and secondary brain injury and associated mechanisms of injury
  - Describe the Glasgow Coma Scale
  - Discuss assessment of single dilated, bilateral dilated and non reactive pupils
  - Describe initial assessment and medical management of head injuries

- Describe surgical management of intracranial hypertension in austere environments
  - Discuss field surgical management for head injuries including burr holes, ventriculostomies and craniotomies
  - Discuss the primary injury pathophysiology relating to head injuries including the relationship between ICP and CCP
  - Discuss indications for ICP monitoring
  - Discuss treatment management concepts of penetrating head injuries
  - Discuss important concepts when evacuating a head injured patient

1.4 Face and Neck Injuries

- Discuss the spectrum, evaluation and management of injuries to the **Face**
  - Delineate the various types of maxillofacial injuries.
  - Describe the initial & definitive treatment including management of complications
  - Describe the historical perspective of battlefield data of maxillofacial trauma
  - Describe the immediate treatment of maxillofacial trauma
  - Describe special considerations in establishing an airway in maxillofacial trauma patients
  - Discuss indications for immediate treatment
  - Discuss interventions and important considerations during treatment of facial lacerations and epistaxis
  - Discuss the goals in facial bone fractures
  - Discuss the important concepts with mandible fractures
  - List the reasons in which maxillofacial trauma can be life threatening
  - Describe the three types of LeFort fractures
  - Describe the basic anatomy of the facial nerve
  - Describe the basic repair of a facial nerve
  - Describe method of identifying and initial treatment of parotid duct injury

►Discuss the spectrum, evaluation and management of injuries to the **Neck**

- Describe trauma principles and techniques associated with exposing and controlling airway, esophageal and vascular structures of the neck
- Describe pertinent anatomy associated with treating neck injuries
- Describe the anatomical zones of the neck & implications for treating injuries
- List signs and symptoms of vascular and aero digestive injuries to the neck
- Describe the operative strategies for penetrating injuries to various neck zones
- Outline work-up and management of suspected vascular injury of the neck
- Describe the surgical approach for inominate, proximal subclavian and vertebral artery exposure
- Describe the work-up and management of laryngeal injury
- Describe the surgical considerations of tracheal injuries
- Describe the surgical considerations of esophageal injuries
- List the complications of non- vascular neck injuries

1.5 Ocular Injuries

►Discuss the spectrum, evaluation and management of injuries to the **Eyes**

- Identify assessment techniques, critical management priorities and interventions needed to manage traumatic eye injuries
- List the true ocular emergencies
- Describe the initial treatment for chemical injuries of the cornea
- Recognize acute retrobulbar hemorrhage
- Describe special considerations for medication in the field for occular injuries
- Describe the steps of lateral canthotomy
- Describe the initial management of an open globe

1.6 Damage Control Concepts and Principles

►Describe the principles and concepts of abdominal damage control operations

- Describe the philosophy of damage control in respect to trauma patients
- Describe the clinical findings in patients in whom damage control concepts should be utilized
- Discuss concepts involved in a planned re-operation for damage control surgery

►Discuss the evaluation and management of the abdominal compartment syndrome

- Describe the four main concepts in abdominal damage control surgery
- Describe the concept of temporary abdominal closure including towel clips, Bogata bag and V.A.C. therapy
- List various core re-warming techniques used in the hypothermic patient
- List the goals of continued damage control in the critical care setting
- Describe physiology & diagnostic techniques for abdominal compartment syndrome
- List the pitfalls of damage control surgery

1.7 Thoracic Injuries

▶Recognize and manage specific thoracic injuries on the battlefield

▶Describe the indications for and the technique of the resuscitative thoracotomy
- Recognize life-threatening the thoracic injuries
- Identify the indications for resuscitive thoracotomy

▶Describe common thoracic exposures appropriate for specific injuries
- Describe the various surgical thoracic approaches
- Describe techniques for vascular repairs
- Describe methods for repairing injuries to the heart
- Review specific surgical principles of lung, esophageal & tracheobroncheal injuries
- Discuss surgical techniques for repairing diaphragm injuries

1.8 Abdominal Injuries

▶Identify the indications for laparotomy
- Identify the indications for laparotomy in the trauma patient
- Indicate reasons that some laparotomies may be delayed
- Compare and contrast ultrasound, DPL and CT scan in regards to intra-abdominal injuries
- Discuss the underlying physics of basic ultrasound

▶Apply the FAST exam in the evaluation of the combat casualty
- Describe the four areas that are examined during a F.A.S.T. examination
- Recognize the advantages and limitations of the F.A.S.T. examination

▶Apply management strategies to injuries to the GI tract, GU tract, abdominal solid organs and abdominal vasculature
- Explain the advantages and limitations of diagnostic peritoneal tap
- Describe basic surgical concepts in management of stomach, duodenal and small bowel injuries
- Describe the surgical exposure and resection options for pancreatic injuries
- Describe the various procedures used to interrogate of the pancreatic duct
- Discuss damage control techniques for severe liver injuries
- Describe the techniques for hemorrhage control of the liver including balloon tamponade and omental packing
- Outline techniques for management of biliary tract injuries
- Discuss splenic injury management in the combat environment
- Discuss post splenectomy immunizations
- Explain the management of colon injuries in respect to primary repair or diversion
- Describe the diagnostic techniques for suspected rectal injuries
- List the standard therapy for rectal injuries and describe the importance of each
- Discuss the management of anal and perineal injuries
- Describe three zones on the retroperitoneum & whether exploration is warranted
- Describe the operative exposure technique for renal injuries

- Describe the localization of ureteral injuries
- Explain the important points of damage control techniques for urteteral injuries
- Review the principles of diagnosis a& management of intra & extraperitoneal bladder injuries
- Discuss the diagnosis and management of urethral injuries
- Describe the management of penile and scrotal injuries
- Discuss the management of vulvar hematomas, uterine hemorrhage and post partum hemorrhage

1.10 Pelvic Fracture Management

►Describe the initial management and stabilization of pelvic fractures and associated injuries

- Discuss goals of treatment for pelvic fractures
- Discuss hemorrhage assessment and control in pelvic fractures
- Discuss the tenets of treatment and stabilization of pelvic injuries

1.11 Spine Injury Management

►Define the initial management of spine fractures and spinal cord injuries

- Discuss goals of treatment for spinal injuries
- Discuss spinal cord injury assessment and resuscitation
- Discuss the tenets of treatment and stabilization of spinal cord injuries

►Understand medical management of patients with SCI

- Discuss the hemodynamic monitoring of patients with spinal cord injury
- Discuss pharmacologic interventions for the spinal cord injury patient

►Understand principles of transportation of patients with SCI

- Discuss principles for transporting patients with cervical spine injury
- Discuss principles for transporting patients with thoracolumbar spine injury

1.12 Extremity Fracture Management

►Describe the initial evaluation and management of **upper** extremity fractures

- Discuss the classification of open fractures
- Discuss nerve injury evaluation
- Describe goals of humerus and forearm fracture stabilization management
- Discuss stabilization options

►Describe the initial evaluation and management of **lower** extremity fractures

- Describe goals of femur, and tibia fracture management
- Discuss stabilization options
- Discuss Hoffman II External Fixator field kits

►Describe the initial evaluation and management of **Periarticular** and **Intra-articular** fractures

- Discuss the tenets of treatment for peri-articular and intra-articular fractures
- Discuss diagnosis and surgical approaches for peri-articular and intra-articular fractures

►Describe the management of compartment syndrome

- Describe the non-surgical management available for suspected compartment syndrome
- Discuss the indications and goals of fasciotomies
- Describe the surgical techniques for distal forearm, hand, lower extremity, foot and thigh compartment releases

1.13 Amputations

►Describe appropriate techniques for battlefield amputation

- Discuss indications for and principles of amputation
- Describe the proper technique for battlefield amputation
- Describe three types of amputation techniques
- Discuss results of inadequate combat wound care

1.14 Peripheral Vascular Injuries

►Explain the mechanisms & consequences of vascular injury

- Describe the epidemiology of wartime vascular injuries
- Explain the mechanisms and consequences of vascular injuries
- Describe direct versus stretch vascular injury
- Describe the factors associated with ischemic tolerance

►Describe the evaluation & management of the patient with potential vascular injury

- Describe the evaluation and management of the patient with potential vascular injury
- Describe the technique of arteriography

►Illustrate techniques for peripheral vascular exposure & repair

- Describe the salient principles during vascular surgery
- Discuss hemostatic dressings
- Describe the vascular exposure for femoral, popliteal, tibial and brachial/radial veins and arteries
- Illustrate techniques for peripheral vascular exposure and repair
- Describe the indications for temporary vascular shunts
- Describe the basic surgical principles of vascular repair on the battlefield
- Discuss types of vascular repair
- Discuss the concepts of reverse saphenous vein graft versus PTFE for vascular repair
- Discuss management of vascular thrombosis
- Describe damage control options for vascular injuries

1.15 Pediatric Trauma

▶Discuss pediatric trauma in a wartime setting
- Review pediatric wartime historical trends
- Discuss pediatric wartime epidemiology

▶Highlight key differences in trauma care when related to children
- Relate the differences in ATLS principles for the pediatric patient
- Highlight system-specific management of the pediatric patient
- Describe differences in the management of the pediatric burn patient
- Discuss pediatric trauma resource utilization

1.16 Soft Tissue Injuries

▶Delineate options for wound management and coverage across populations encountered in deployment
- Understand the challenges in providing care to coalition and host nation casualties including EPW's and non-combatants
- Describe the goal of managing war wounds
- Discuss the basic principles of war wound management
- Discuss extremity wound assessment, resuscitation, and management
- List the common causes of wound infection

▶Discuss the principles and techniques of debridement in the management of soft tissue injuries
- Articulate the role of debridement in the initial management of soft tissue injuries
- Discuss evaluation of the wound and associated injuries
- Describe the 4 C's of soft tissue assessment
- Contrast normal from devitalized tissue
- Discuss procedures for battlefield wound debridement
- Discuss debridement adjuncts
- Describe common wound irrigation fluids and methods for irrigation
- Discuss important concepts in wound coverage and closures
- Define delayed primary closure
- Describe uses for the vacuum assisted devices (V.A.C.)

DAY 2

2.1 Military Trauma Systems

►Describe the Military Trauma System
- Understand the historical need for a military trauma system
- Discuss the components of a military trauma system

►Describe the Joint Theater Trauma System (JTTS) as the model for the Military Trauma System
- Know the organizational laydown of the JTTS
- Understand the movement of patients in theater

►Describe the Joint Theater Trauma Registry (JTTR)
- Discuss the relationship between the JTTS and JTTR
- Know the purpose and content of the JTTR

►Describe the PI Process and importance of CPGs
- Discuss the PI Process and its role in the JTTS
- Learn each individual's role in the PI Process

2.2 Enroute Care

►Define the levels of care on the battlefield
- Describe levels of care in the military setting
- Match the combat wound management with the level of care

►Describe the evacuation system of care
- Describe the composition of service specific forward surgical teams: FST, FRSS, MFST
- Describe the concept of continuous care en route

►Describe the preparation of the critically injured patient for evacuation
- Know the components of a Critical Care Air Transport Team (CCATT)
- Discuss patient preparation for CCATT movement

2.3 Hemorrhage Control, Shock and Resuscitation

►Describe the assessment and classification of hemorrhagic shock
- Describe tactical combat casualty care including care under fire, field care and evacuation care
- Describe various tourniquets used in the combat setting & pitfalls of use
- List the various types of haemostatic agents and describe their mechanism of action, advantages and disadvantages

►Discuss principles and options for resuscitation
- Describe the concept of controlled resuscitation
- Describe the 4 classes of hemorrhagic shock including amount of blood loss, changes in vital signs and physiologic changes

- Describe the various products used in volume resuscitation
- Describe the three typical responses seen with volume resuscitation

►Define availability and indications for blood product usage on the battlefield
- Describe the types of blood products available for resuscitation and availability in the theater
- List the adverse consequences of the transfusion of banked blood
- Define massive blood transfusion
- Describe the concept of the walking blood bank including advantages and disadvantages
- List the ideal characteristics of a blood substitute
- Describe the FDA approved indications for recombinant Factor VIIa and current indications for use in the trauma setting
- List the various end points of resuscitation
- Describe the utility of the abnormal thromboelastogram (TEG) tracings with regards to treatment

2.4 Field Critical Care

►Apply principles of critical care throughout the battlefield trauma system
- Describe the steps in rapid sequence intubations (RSI)
- List the significant logistic requirements that damage control places on the field ICU
- Describe the two phases of shock resuscitation
- Describe the basic goals in treating central nervous system injury
- List the two anesthesia apparatuses currently fielded in the forward surgical environment
- Describe the important concepts in the mechanical ventilation in ARDS
- Describe the initial management and goals of rhabdomyolysis
- Discuss antibiotic discipline in the field setting
- Describe the concepts of preparation for evacuation of the critically injured

2.5 Mass Casualty & Triage

►Discuss the implications for treatment in the setting of a Mass Casualty
- Discuss personnel roles during a Mass Casualty
- Discuss facility preparation for a Mass Casualty

►Review triage principles in the context of wartime patient care
- Review the four triage categories of immediate, delayed, minimal, and expectant as they apply in the military setting
- Review patient care in the setting of limited resources and overwhelming demand

►Accomplish a mass casualty and triage tabletop exercise
- Review the scenario for the triage exercise
- Classify each patient in an appropriate triage category based on presenting evaluation and current resources

2.6 Burns

- Discuss the evaluation and management of the burn patient
  - Recognize and appropriately treat thermal injuries
  - Define burn triage categories
  - Describe the primary survey and initial treatment of thermal injuries
  - Identify the presence of inhalation injury
  - Recognize chest wall compartment syndrome due to circumferential thoracic burns and discuss treatment
  - Calculate the initial fluid requirements during the first 24 hours of a thermally injured patient
  - Describe the steps in the initial care of burn wounds
  - Discuss the advantages and disadvantages of the topical burn agents, silver sulfadiazine, mafenide acetate and silver nitrate
  - Identify patients requiring referral to a burn center
  - Discuss the evaluation, treatment and monitoring of extremity burns
  - Describe the findings and treatment in extremity compartment syndrome
  - Discuss the special considerations for electrical burns
  - Discuss the special considerations for acid and alkali burns
  - Discuss the special considerations for white phosphorous burns

2.7 Surgical Skills Laboratory

- Introduction
  - Describe student skill performance expectations
  - Discuss skill lab procedures for use of fresh human cadaver models, simulated tissue models, and animal models
  - Discuss IACUC Protocols

- Skills Laboratory – Part 1 – Head & Neck Procedures (Human Cadaver Model)
  - Using a human cadaver model, demonstrate damage control emergency head and neck surgical procedures (Lateral Canthotomy/Cantholysis, Intracranial Pressure Monitor/Ventriculostomy Placement).

Lateral Canthotomy/Cantholysis

- ELO - Using a human cadaver model, perform damage control emergency lateral canthotomy/cantholysis.
- Procedures Demonstrated:
  1. Focused eye exam with emphasis on trauma to eye
  2. Indications for and technique of placement of FOX eye shield
  3. Eyelid laceration with occult globe laceration
  4. Lateral canthotomy for retrobulbar hemorrhage with central retinal artery occlusion

Ventriculostomy Placement

- ELO: Using a cadaver model, perform damage control emergency ventriculostomy placement.
- Procedures demonstrated:
  1. Intracranial pressure monitor placement.
  2. Ventriculostomy placement.

▶ Skills Laboratory – Part 2 – Extremity Stabilization (Human Cadaver Model)
Using a simulated tissue model, correctly perform damage control emergency external fixation (Pelvis and Extremities).

External Fixation (Pelvis)

- Using a simulated tissue model, perform external fixation of pelvis.
- Procedures demonstrated
  1. Placement of expedient pelvic external fixation device for pelvic stabilization
  2. demonstration of other simpler stabilization methods (sheet wrap, bean bag, mast, pelvic clamp)

External Fixation (Extremities)

- Using a cadaver, perform specific external fixations of extremities.
- Procedures demonstrated:
  1. External fixation of simulated tib-fib fractures
  2. External fixation of simulated femur fractures

▶ Skills Laboratory – Part 3 – Damage Control Surgery (Live Animal Model)

- Using a live animal model, correctly perform damage control emergency surgical procedures.
- Perform the following specific surgical procedures:
  1. Exploratory Laparotomy
  2. Median Sternotomy
  3. Small and large bowel (repair/resection)
  4. Liver (repair/resection/control hemorrhage)
  5. Kidney resection (complete/partial) or repair
  6. Cardiac repair
  7. IVC repair
  8. Ureter/bladder repair
  9. Diaphragm repair
  10. Pancreas/Duodenum injury management
  11. Stomach repair
  12. Vascular shunt placement

▶ Skills Laboratory – Part 4 – ASSET Course (Human Cadaver Model)
The American College of Surgeons (ACS) Advanced Surgical Skills for Exposure in Trauma (ASSET) course is inclusive to the Emergency War Surgery Course.
All surgeons attending EWSC are required to accomplish the ASSET course. The course is provided in accordance with the ACS guidelines.

2.8 Post Test/Test Review/Course Critiques

- TLO: Students will complete the post rest with review and course critique.