MODULE TITLE:	**TRAUMA**	**7-Nov-2016**
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REVIEWED BY:	**Alan Saunder (2010) Ian Campbell, Li Hsee, Michael Rodgers, Emma Secomb, Graham Stewart (2013). Priscilla Martin, Richard Turner (2016).**	

Module Rationale and Objectives

The general surgeon is an integral part of the Trauma Team. By their very nature, these patients require attention from a competent and confident practitioner. It is therefore imperative that during training all trainees have sufficient knowledge and experience to be able to fulfil this role.

The graduating trainee will be able to:

- understand the mechanisms of injury and the patterns of injury that may result from both blunt and penetrating trauma,
- describe common surgical pathologies that will result from trauma
- describe the pathophysiology of shock, acute brain injury, respiratory failure, sepsis, renal failure, multi organ failure, and burns
- identify appropriate treatment options, and their indications and contraindications
- participate in a trauma team including team leader role
- safely and effectively assess and resuscitate the injured patient
- implement the principles of EMST/ATLS, CCrISP, and DSTC
- effectively manage the care of patients with trauma, including multiple system trauma
- identify and manage risk in an environment of complexity and uncertainty
- appropriately adjust the way they communicate with patients to accommodate cultural and linguistic differences
- work in collaboration with members of an interdisciplinary team where appropriate
- recognise the need to refer patients to other professionals
- understand the need for early initiation of rehabilitation
- effectively use resources to balance patient care and systemic demands
- in acute circumstances, the consenting process may require conforming to state legislation
- communication and collaboration with other surgical specialties
- clear understanding of the potential disaster, humanitarian and military responsibilities of general surgeons
- disaster planning
- epidemiology and prevention
- trauma quality improvement, benchmarking and audit
- trauma systems and resources allocation

Anatomy, Physiology, Pathology

Trainees should have thorough knowledge of the normal embryology, anatomy, physiology, and pathology, of:

- head and neck
- spine
- limbs
- thorax
- abdomen
- pelvis

Suggested Reading

Trainees who are preparing to sit the Generic and Clinical Examinations need to refer to the recommended reading list on the RACS website at www.surgeons.org

For the Fellowship examination, the following texts are recommended:

(1) Trauma (ISBN 9780071717847), 7th edition, by D. Feliciano, K. Mattox, and E. Moore.

(2) Anatomic Exposures in Vascular Surgery (ISBN 9780781741019), 2nd edition, by R.J. Valentine and G.G. Wind.

Trainees are expected to keep abreast of the current literature, including textbooks, journal articles including the Journal of Trauma and Injury, consensus guidelines and other on-line resources.

Learning Opportunities and Methods

Trainees will have completed the requirements of the EMST program. Participation in the EMST Refresher course will be encouraged.

It is recommended that trainees participate in the Definitive Surgical Trauma Care (DSTC) Course, which is available in most regions and New Zealand. The course is available for Trainees in the last two (2) years of training.

If state-based and/or local hospital courses/meetings are available, trainees are strongly advised to avail themselves of these opportunities. This also includes practising procedures on simulation equipment where applicable.

Trainees are encouraged to present their research at national and/or accredited regional training days, in order to fulfil the research requirement.

How this module will be assessed

The Generic and Clinical Examinations; Fellowship examination (written and viva voce sections); Trainee evaluation forms and logbooks; SEAM (where applicable).

Assumed Knowledge

- Trainees should have a good understanding of relevant regional surgical anatomy
- Understand the basic patterns of various type of trauma
- Resource availability in multi-system injured patients

Definitions

Operative Management - Knows:	Trainees are required to be familiar with the indications, benefits and limitations of the procedure; trainees should be able to describe the relevant operative techniques involved in performing the procedure; trainees are encouraged to at least observe and preferably assist in these procedures.
Operative Management - Does:	In addition to the above, trainees must be competent at performing the procedure.

SET LEVEL	MEDICAL EXPERTISE	JUDGEMENT / CLINICAL DECISION MAKING			TECHNICAL EXPERTISE	
	ANATOMY PHYSIOLOGY PATHOLOGY	CLINICAL ASSESSMENT	INVESTIGATIONS	PRINCIPLES OF MANAGEMENT	OPERATIVE MANAGEMENT - KNOWS -	OPERATIVE MANAGEMENT - DOES -
Initial trauma management: Resuscitative phase - ED						
Early SET	▪ Recognition/ anticipation of immediately and potentially life threatening situations based on injury mechanism, anatomical location and patient physiology	▪ Primary and Secondary survey according to EMST	▪ Define the role of imaging and laboratory investigations	▪ Implementation of EMST principles of initial management and stabilisation of major trauma patients ▪ Coordination of care with other specialties and disciplines ▪ Interaction with patients and family members: Communication/ Counselling	▪ Basic airway management techniques ▪ DPL principles ▪ FAST ▪ Principles of damage control laparotomy ▪ Laparostomy	▪ Vascular access ▪ Central venous access ▪ Intra osseous puncture and access ▪ Intercostal catheter ▪ Splinting of extremities ▪ Control of external haemorrhage ▪ Pelvic binding (stabilisation) ▪ Cricothyroidotomy ▪ Nasopharyngeal packing ▪ Clear cervical spine appropriately
Mid SET		▪ Triage in multiple casualties		▪ Leadership of trauma team ▪ Ability to triage trauma patients presenting simultaneously ▪ Decision on transport and definitive treatment priorities ▪ Indications and initiation of massive transfusion protocol ▪ Indications of angioembolisation ▪ Principle of damage control resuscitation and surgery	▪ Emergency thoracotomy	▪ FAST ▪ Damage control laparotomy ▪ Laparostomy
Late SET				▪ Triage training ▪ Disaster management ▪ Overwhelming injury policies	▪ Retroperitoneal exposure (great vessels)	▪ Emergency thoracotomy
Ongoing ICU management: Definitive care phase						
Early SET	▪ Definition and pathophysiology of traumatic shock, ischaemia reperfusion injury, post injury SIRS, sepsis and MOF, nutrition, compartment syndromes, burn care	▪ Perform Tertiary survey ▪ Ability to perform focused assessment of the organ systems based on clinical examination, vital parameters, laboratory data and the required level of organ support	▪ Interpretation of daily routine chest x-ray ▪ Ability to indicate and interpret focused imaging required based on clinical assessment ▪ Interpret compartment pressure measurements and know the indications for treatment	▪ Formulate a coordinated management plan based on clinical assessment ▪ Attention to prevention of common post injury complications		▪ Compartment pressure measurement

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Ongoing ICU management: Definitive care phase (continued)						
Mid SET				▪ Leadership role in multidisciplinary team of specialists and prioritise management based on the need of the trauma patient ▪ Understand management of SIRS and MOF ▪ Understanding the ICU principles of second day resuscitation – optimisation of haemodynamics, core rewarming, correction of coagulopathy	▪ Enteral feeding access	▪ Laparostomy (open abdomen) and its management ▪ Tracheo(s)tomy ▪ Limb fasciotomy
Late SET						▪ Staged abdominal closure
Daily ward management: Definitive care phase ward and rehabilitation						
Early SET		▪ Ability to perform daily focused assessment for the management of post injury/ postoperative patients ▪ Recognise the need for other specialty involvement ▪ Ability to perform comprehensive tertiary survey	▪ Daily examinations based on the patient condition	▪ Comprehensive discharge planning including rehabilitation and follow up ▪ Attention to prevention of common post-injury complications ▪ Recognition of minor injuries resulting in significant impairment if left untreated		▪ Principles of wound/drain care
Mid SET				▪ Coordinate multi-disciplinary treating team ▪ Nutritional management post-injury		▪ Tracheo(s)tomy care
Skin / Soft Tissues						
Early SET	▪ Wound healing ▪ Pathophysiology of necrosis/ischaemia ▪ Pathophysiology of burns	▪ Assessment and description of wounds ▪ Body cavity penetration ▪ Distal neuro-vascular assessment ▪ Viability assessment of soft tissues ▪ Burn assessment ▪ Fluid resuscitation in severe burn patients ▪ Inhalation injuries	▪ Relevant investigations for foreign bodies and body cavity penetration; **See also abdomen, chest** ▪ Investigation for injury to deeper neurovascular, aerodigestive, bone and joint structures	▪ Management priorities of acute traumatic wounds depending on mechanism, location and contamination ▪ Initial management principles of severe burns ▪ Anticipation and recognition of wound complications	▪ Surgical airway	▪ Wound exploration ▪ Wound debridement ▪ Foreign body removal (use of image intensifier) ▪ Wound closure or open management based on the nature of the soft tissue injury ▪ Split skin grafting ▪ VACC therapy applications and limitations

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Skin / Soft Tissues (continued)						
Mid SET				▪ Advanced soft tissue management decisions: identifying the need for specialist involvement ▪ Wound management in specific areas	▪ Wound management in specific areas	▪ Escharotomy ▪ Local flap coverage
Blast injuries						
Early SET	▪ Understanding the unique patterns of blast trauma ▪ Pathophysiology of blast injury	▪ Assessment and description of wounds ▪ Identify life threatening injuries ▪ Initiate initial resuscitation ▪ Assess tetanus immunization status ▪ Identify possible exposures to toxins, chemicals or radiological	▪ Relevant investigations for barotrauma, penetrating, blunt and burn injuries			▪ Lavage and debride contaminated wounds ▪ Intercostal catheters
Mid SET		▪ Mass casualty triaging ▪ Resource allocations ▪ Co-ordinate multidisciplinary team efforts		▪ As per initial resuscitation phase and identify life threatening injuries ▪ Management of contaminated wounds ▪ Management of severe burns ▪ Air embolism	▪ Attend to life threatening injuries	▪ Surgical airway ▪ Thoracotomy ▪ Emergency laparotomy ▪ Haemorrhage control ▪ Escharotomy in burns
Head / Brain						
Early SET	▪ The relevant anatomy and physiology of the CNS ▪ The pathophysiology of increased intracranial pressure	▪ Detailed neurological assessment and documentation of trauma patients ▪ The recognition of typical presentations ▪ Recognition of concussion syndrome	▪ Basic Indications and interpretation of neurotrauma imaging ▪ Cognitive function assessment for management of head injury	▪ The initial management of potential head injured patient ▪ The recognition of raised ICP and monitoring of this ▪ Priorities and timeframes of intervention ▪ Recognition the need of specialist involvement	▪ Extra dural drainage	▪ Control of severe bleeding from scalp lacerations ▪ Nasal packing
Mid SET				▪ Decision making about priorities of head injury in polytrauma scenario ▪ Ongoing management principles of brain injury	▪ Control of severe maxilla-facial bleeding	▪ Definitive wound management of head/face/orbit wounds
Late SET					▪ For rural practice: craniotomy and craniectomy	

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Face / Neck						
Early SET	▪ Anatomy regions of the neck ▪ Describe Zones I, II and III of the neck	▪ Clinical assessment of the face ▪ Recognition of signs of vascular, airway, nerve, pharyngeal/ oesophageal injury	▪ Indication and interpretation of x-ray, CT, angiography, endoscopy, contrast studies depending the zone of injury and patient condition	▪ The indications for surgical exploration ▪ Involvement of other subspecialty surgeons ▪ Blunt cerebrovascular injury	▪ Surgical airway	
Mid SET				▪ Selective management strategy based on the zone of injury ▪ Principles of angioembolisation - Level I - Level II ▪ Principles of: - tracheoscopy - pharyngoscopy - oesophagoscopy - bronchoscopy	▪ Access and vascular control in Zone I and III ▪ Repair of carotid injury ▪ Repair of oesophageal injury ▪ Surgical exploration of Zone II	▪ Surgical airway
Spine						
Early SET	▪ Anatomy and physiology of spine and spinal cord ▪ Pathophysiology of primary and secondary cord injury ▪ Common spine injury patterns	▪ Ability to perform safe log-roll and immobilization ▪ Maintenance of spinal precautions ▪ Detailed peripheral neurological exam, level determination and documentation	▪ The need and priorities for imaging depending on the patient condition ▪ The advantages and limitations of imaging tests ▪ Recognition of “unstable” spinal fracture	▪ The ability to ‘clear the spine’ safely in straightforward scenarios		▪ Application of spine immobilisation devices
Mid SET				▪ Decision on transfer and the management priorities of spine injuries in polytrauma scenario	▪ Application of tongs	
Chest						
Early SET	▪ Anatomy and Physiology of thoracic wall and thoracic organs ▪ The pathophysiology of immediately and potentially life threatening conditions in the chest	▪ Focused clinical examination of the chest/torso for a blunt and penetrating trauma patient	▪ Interpretation of chest x-ray (recognition of life threatening conditions) ▪ Indication for further imaging ▪ Clear understanding of penetrating chest trauma workup	▪ Recognising the need for urgent lifesaving interventions (decompression, chest tube insertion), indicating the need for thoracotomy ▪ Involving cardiothoracic surgery as required	▪ ED resuscitative thoracotomy	▪ Chest tube insertion

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Chest (continued)						
Mid SET				▪ Prioritisation of chest injuries in polytrauma scenario ▪ Decision on advanced imaging, timing of aortic tear management ▪ Selective management of penetrating chest trauma ▪ Management of blunt thoracic aortic rupture ▪ Tracheobronchial injury ▪ Pulmonary contusion ▪ Management of retained haemothorax	▪ Diaphragmatic repair from the abdomen ▪ Pericardial window (extra-peritoneal vs. intra-peritoneal) ▪ Diaphragmatic repair from chest	
Late SET					▪ Vascular control in the chest ▪ Periclavicular approaches for the thoracic outlet ▪ Repair simple cardiac wounds ▪ Thoracoscopy, thoracotomy ▪ VATS	▪ Diaphragmatic repair from the abdomen
Abdomen						
Early SET	▪ Up to date knowledge of penetrating and blunt abdominal trauma mechanism, injury probabilities ▪ Relevant trauma surgical anatomy of abdominal organs ▪ Physiology and pathophysiology of abdominal organs ▪ Abdominal organ injury scaling (AAST)	▪ Abdominal/torso assessment in blunt and penetrating trauma ▪ Interpretation of clinical signs in the context of abdominal trauma and other injuries (urgency, importance)	▪ Indication and interpretation of FAST, plain abdominal x-ray and CT scan ▪ Contrast and endoscopic studies ▪ Up to date knowledge of each tests sensitivity specificity and operator dependency	▪ Indications and timing of trauma laparotomy ▪ Decision making in isolated blunt and penetrating abdominal trauma ▪ Indications and limitations of local wound exploration and laparoscopy in penetrating trauma		▪ Local wound exploration

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Abdomen (continued)						
Mid SET				▪ Indications for selective and non-operative management ▪ Priorities of abdominal injuries in polytrauma patients “Damage control” principles ▪ Sound knowledge of which organs can be resected and in what extent, which arteries and veins can be ligated at what level without and with (specifically what) consequences ▪ Role of embolisation	▪ Exploration of the retroperitoneum – left and right medial visceral rotation manoeuvers ▪ Control of major vessels	▪ Damage control laparotomy ▪ Temporary abdominal closure ▪ Trauma laparoscopy ▪ Control of the environment, preparation and execution ▪ Systematic approach ▪ Haemorrhage and contamination control ▪ Anatomical liver packing ▪ Pringle manoeuvre ▪ Splenectomy ▪ Repair resection hollow viscus injury
Late SET					▪ Major abdominal vascular repair ▪ Vascular isolation of the liver ▪ Splenic and kidney salvage techniques ▪ Exploration of the retroperitoneum – left and right medial visceral rotation manoeuvers	
Pelvis						
Early SET	▪ Knowledge of relevant pelvic musculo-skeletal and visceral anatomy and physiology ▪ Basic classification of pelvic fractures	▪ Pelvic examination, leg length, springing, deformity, perineal examination, rectal examination ▪ Neuro-vascular assessment	▪ Pelvic x-ray interpretation ▪ Pelvic CT interpretation (injury to the posterior and anterior ring, contrast blush, pelvic organ injuries) ▪ Indications and interpretation of urethrogram, cystogram and pelvic angiography	▪ Recognition and initiation of the management of haemodynamically unstable pelvic fracture patients ▪ The role of abdominal clearance, pelvic binding, packing, external and internal fixation and angiography		▪ Application of pelvic binder
Mid SET				▪ Decision making on the need and priorities of techniques at the basic column (left) ▪ Priorities in associated abdominal injuries and polytrauma ▪ Open pelvic fracture management ▪ Role of temporary pelvic fixation		▪ Trauma laparotomy
Late SET				▪ Urethrogram	▪ Pre-peritoneal packing for pelvic traumas	▪ Pelvic packing

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Extremities						
Early SET	▪ Relevant anatomy of extremities ▪ The pathophysiology of limb threatening injuries ▪ Grading of open fractures	▪ Basic trauma focused musculo-skeletal assessment including the neurovascular status ▪ Recognition of hard and soft signs of vascular injuries ▪ Ankle-brachial Index	▪ The indication, timing and interpretation of skeletal radiology	▪ Initiation of the management of limb threatening injuries ▪ Tetanus and antibiotic prophylaxis ▪ Early involvement other specialties		▪ Realignment ▪ Splinting ▪ Washout and debridement of open wounds ▪ Compartment pressure measurement
Mid SET				▪ Decision making of viability of limbs in conjunction with other relevant specialties ▪ The priorities of damage control or definitive management of extremity injuries in polytrauma scenarios ▪ Tourniquet	▪ Vascular exploration and control on extremities	▪ Amputations ▪ Fasciotomy