Surgical Education and Assessment Modules (SEAM) - Trauma & Critical Care

Module Overview

<table>
<tr><td>Rationale</td><td colspan="3">This module has been designed to introduce you to trauma and critical care management protocols and the basic science on which these are based.
The topics presented in this module are applicable to the care of all of your general surgical patients.</td></tr>
<tr><td>Learning Objectives</td><td colspan="3">By the end of this module you should be able to:
1. Apply the principles of immediate trauma management
2. Apply the principles of definitive trauma care
3. Evaluate mechanisms of injury to predict likely injury patterns
4. Evaluate when patients should be transferred to another specialist centre
5. Apply an understanding of the pathophysiology of shock to the management of trauma patients
6. Apply an understanding of critical care in surgical patients, including common presentations and associated organ system dysfunction</td></tr>
<tr><td rowspan="6">Topics and keywords</td><td>Topic</td><td colspan="2">Keywords</td></tr>
<tr><td>Pathophysiology of trauma</td><td colspan="2">hypovolemic, obstructive, distributive, cardiogenic, fluid resuscitation</td></tr>
<tr><td>Resuscitation</td><td colspan="2">volume resuscitation, massive transfusion, damage control resuscitation, burns, head trauma, crush injury, fat embolism, imaging</td></tr>
<tr><td>Basic trauma management and resuscitation principles</td><td colspan="2">primary survey, airway control, breathing and ventilation, circulation, disability, exposure/environmental control, shock, secondary survey, abdomen and pelvis, trauma laparotomy, traumatic brain injury, spine, burns and thermal injury, tertiary survey, definitive care</td></tr>
<tr><td>Critical Care</td><td colspan="2">surgical disease in the ICU, sepsis, acute pancreatitis, intra-abdominal hypertension, traumatic brain injury, GI bleeding</td></tr>
<tr><td>Organ dysfunction in the ICU patient</td><td colspan="2">organ failure, respiratory failure, cardiovascular failure, acute kidney injury, gut and nutrition, metabolic dysfunction, liver failure, coagulation, neurological dysfunction</td></tr>
<tr><td rowspan="3">Recommended Further Reading</td><td colspan="3">Educational material provided within this module is not intended to be complete, and is not a textbook. Trainees are expected to undertake further reading in order to complete the module successfully.</td></tr>
<tr><td colspan="2">Recommended Reading</td><td>Learning Objective</td></tr>
<tr><td colspan="2">American College of Surgeons (2018). ATLS: Advanced Trauma Life Support (Student Course Manual), 10th edition. ISBN: 78-0-9968262-3-5.</td><td>1-5</td></tr>
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Recommended Further Reading	Recommended Reading	Learning Objective
	Australian Red Cross Blood Service (2011). *Massive transfusion* https://transfusion.com.au/disease_therapeutics/transfusion	1-5
	Bernal, W., & Wendon, J. (2013). Acute liver failure. *The New England Journal of Medicine, 369*(26), 2525-2534. doi:10.1056/NEJMra1208937	6
	Boffard, K.D. (2015). *Manual of Definitive Surgical Trauma Care*, 4th edition. CRC Press. ISBN 9781498714877.	2
	Buendgens, L., Koch, A., & Tacke, F. (2016). Prevention of stress-related ulcer bleeding at the intensive care unit: Risks and benefits of stress ulcer prophylaxis. *World Journal of Critical Care Medicine*, 5(1), 57–64. http://doi.org/10.5492/wjccm.v5.i1.57	6
	Cotton, B. A., et al. (2010). Multicenter validation of a simplified score to predict massive transfusion in trauma. *The Journal of Trauma: Injury, Infection, and Critical Care, 69*(1 Suppl), S33-S39. doi:10.1097/TA.0b013e3181e42411	1-5
	Duchesne, J. C., et al. (2010). Damage control resuscitation in combination with damage control laparotomy: A survival advantage. *The Journal of Trauma: Injury, Infection, and Critical Care, 69*(1), 46-52. doi:10.1097/TA.0b013e3181df91fa	1-5
	Duchesne, J. C., et al. (2010). Damage control resuscitation: The new face of damage control. *The Journal of Trauma: Injury, Infection, and Critical Care, 69*(4), 976-990. doi:10.1097/TA.0b013e3181f2abc9	1-5
	Feliciano, D. V., Mattox, K. L., & Moore, E. E. (2017). *Trauma* (8th ed.). New York, NY: McGraw Hill Medical.	1-5
	Helmy, A., Vizcaychipi, M, Gupta, A.K. (2007). Traumatic brain injury: intensive care management, *BJA: British Journal of Anaesthesia*, 99 (1), 32-42, https://academic.oup.com/bja/article/99/1/32/269636	6
	Hess, J. R., et al (2008). The coagulopathy of trauma: A review of mechanisms. *The Journal of Trauma, 65*(4), 748-754. doi:10.1097/TA.0b013e3181877a9c	1-5
	Hodgetts, T. J., Mahoney, P. F., Russell, M. Q., & Byers, M. (2006). ABC to <C>ABC: Redefining the military trauma paradigm. *Emergency Medicine Journal: EMJ*, *23*(10), 745-6. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2579588/	1-2
	Hodgmen, E.I. et al. (2012). Base deficit as a marker of survival after traumatic injury: Consistent across changing patient populations and resuscitation paradigms. *The Journal of Trauma and Acute Care Surgery, 72*(4), 844.	1-5
	Holcomb, J. B., et al. (2007). Damage control resuscitation: Directly addressing the early coagulopathy of trauma. *The Journal of Trauma: Injury, Infection, and Critical Care, 62*(2), 307-310. doi:10.1097/TA.0b013e3180324124	1-5
	Holcomb, J. B., et al. (2008). Increased plasma and platelet to red blood cell ratios improves outcome in 466 massively transfused civilian trauma patients. *Annals of Surgery, 248*(3), 447.	1-5
	Miller, P. R., Croce, M. A., Bee, T. K., Malhotra, A. K., & Fabian, T. C. (2002). Associated injuries in blunt solid organ trauma: Implications for missed injury in nonoperative management. *The Journal of Trauma: Injury, Infection, and Critical Care, 53*(2), 238-244.	1-5

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Module Overview

Recommended Further Reading	Recommended Reading	Learning Objective
	Morrison, C. A., et al. (2011). Hypotensive resuscitation strategy reduces transfusion requirements and severe postoperative coagulopathy in trauma patients with hemorrhagic shock: Preliminary results of a randomized controlled trial. *The Journal of Trauma: Injury, Infection, and Critical Care, 70*(3), 652-663. doi:10.1097/TA.0b013e31820e77ea	1-5
	Nathens, A.B. *et al (2004)*. Management of the critically ill patient with severe acute pancreatitis. *Critical Care Medicine, 32*(12), 2524-36.	6
	National Blood Authority Australia (2011). *Patient Blood Management Guidelines: Module 1 Critical Bleeding/Massive Transfusion* https://www.blood.gov.au/pbm-module-1	1-5
	Neurosurgical Society of Australasia Inc. (2009). *The Management of Acute Neurotrauma in Rural and Remote Locations* 3rd edition. http://www.nsa.org.au/Documents/Information/Rural%20and%20Remote%20Trauma.pdf	1-5
	Nunez, T. C., Voskresensky, I. V., Dossett, L. A., Shinall, R., Dutton, W. D., & Cotton, B. A. (2009). Early prediction of massive transfusion in trauma: Simple as ABC (assessment of blood consumption)? *The Journal of Trauma: Injury, Infection, and Critical Care, 66*(2), 346-352. doi:10.1097/TA.0b013e3181961c35	1-5
	Rogers, W. K., & Garcia, L. (2018). Intraabdominal hypertension, abdominal compartment syndrome, and the open abdomen. *Chest, 153*(1), 238-250. doi:10.1016/j.chest.2017.07.023	6
	Royal College of Surgeons of England (2017). *Care of the Critically Ill Surgical Patient (Student Course Manual), 4th edition*. ISBN-10: 1904096328.	6
	Seamon, M. J., Feather, C., Smith, B. P., Kulp, H., Gaughan, J. P., & Goldberg, A. J. (2010). Just one drop: The significance of a single hypotensive blood pressure reading during trauma resuscitations. *The Journal of Trauma: Injury, Infection, and Critical Care, 68*(6), 1289-1295. doi:10.1097/TA.0b013e3181db05dc	1-5
	Shaikh, N. (2009). Emergency management of fat embolism syndrome. *Journal of Emergencies, Trauma, and Shock, 2*(1), 29-33. doi:10.4103/0974-2700.44680	1-5
	Singer, M., et al. (2016). The third international consensus definitions for sepsis and septic shock (sepsis-3). *JAMA, 315*(8), 801.	6
	Stocchetti, N., & Maas, A. I. R. (2014). Traumatic intracranial hypertension. *The New England Journal of Medicine, 370*(22), 2121-2130. doi:10.1056/NEJMra1208708	6
	Tertiary Trauma Survey http://www.trauma.org/archive/nurse/tertiarysurvey.html	1-5
	Tien, H. C., Spencer, F., Tremblay, L. N., Rizoli, S. B., & Brenneman, F. D. (2007). Preventable deaths from hemorrhage at a level I Canadian trauma center. *The Journal of Trauma: Injury, Infection, and Critical Care, 62*(1), 142-146. doi:10.1097/01.ta.0000251558.38388.47	1-5

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Module Overview

Prerequisites	This module is relevant to early years in surgical training, and it is strongly recommended that you successfully complete **CCrISP** and **EMST** before embarking on this module. The RACS CCrISP and EMST Courses are mandatory requirements of the Surgical Education & Training (SET) Program in General Surgery.
How this module will be assessed	The e-learning module comprises learning activities and opportunities for Formative Assessment, with feedback. The Summative Assessment comprises twenty (20) Type A, Type X, and Type R multiple choice questions.

Surgical Education and Assessment Modules (SEAM) - Trauma & Critical Care

Learning Activities & Formative Assessment

Cognitive level	Learning Objective	Module Topic	Learning Activity	Formative Assessment
Apply	Apply an understanding of the pathophysiology of shock to the management of trauma patients	Pathophysiology of trauma	After reading about types and classifications of shock, base excess, and coagulopathy, learners will review a high speed collision case scenario, designed to evaluate knowledge of the pathophysiology of trauma. Free text responses will be compared to expert responses. Learners will be able to identify causes of shock, based on indicators learnt in the module.	Learners will evaluate statements regarding arterial blood gases and acid base status, based on indicators learnt in the module.
Apply	Apply the principles of immediate trauma management	Resuscitation Basic trauma management and resuscitation principles	After reading about volume resuscitation in trauma, haemostatic resuscitation, massive transfusion and Damage Control Resuscitation (DCR), learners will review a DCR case scenario, designed to evaluate knowledge of the principles of trauma management. Free text responses will be compared to expert responses. Learners will be able to identify appropriate measures for controlling haemorrhage from pelvic fractures, based on indicators learnt in the module.	Leaners will apply Glasgow Coma Scale scores for various clinical scenarios. Learners will review a patient case scenario and identify appropriate management, based on principles learnt in the module.
Apply	Apply the principles of definitive trauma care		Learners will read about primary and tertiary survey, airway and cervical spine, chest injury statistics, management of haemorrhagic shock, abdomen and pelvis, trauma laparotomy indications and principles, spinal column injury, musculoskeletal injury, and perioperative and ongoing care of the trauma patient. Learners will review patients in case scenarios related to airway and cervical spine, breathing and ventilation, abdomen and pelvis, traumatic brain injury, and trauma in special populations, designed to evaluate knowledge of the principles of definitive trauma care. Free text responses will be compared to expert responses. Learners will be able to identify appropriate scenarios for clearing a patient's cervical spine, based on indicators learnt in the module.	

Surgical Education and Assessment Modules (SEAM) - Trauma & Critical Care

Learning Activities & Formative Assessment

Cognitive level	Learning Objective	Module Topic	Learning Activity	Formative Assessment
Evaluate	Evaluate when patients should be transferred to another specialist centre		After reading burns transfer protocols, learners will review patients in case scenarios related to burns, thermal injury, and definitive care, designed to evaluate knowledge of when patients should be transferred to specialist centres. Free text responses will be compared to expert responses.	
Evaluate	Evaluate mechanisms of injury to predict likely injury patterns		Learners will read about specific injury patterns in relation to burns, head trauma with raised intracranial pressure, crush injury, fat embolism, and imaging in trauma. Learners will review patients in case scenarios related to burns, head trauma, and crush injury, designed to evaluate knowledge of mechanisms of injury. Free text responses will be compared to expert responses.	
Apply	Apply an understanding of critical care in surgical patients, including common presentations and associated organ system dysfunction	Critical Care	After reading about surgical disease in the ICU, sepsis, acute pancreatitis, abdominal compartment syndrome, traumatic brain injury, and GI bleeding, learners will take part in a progressive case scenario, designed to evaluate knowledge of critical care in surgical patients. Feedback is presented as the learner progresses through the scenario. Learners will recognise measures included in the quick Sequential Organ Failure Assessment, based on indicators learnt in the module.	Learners will recognise elements of sepsis, based on indicators learnt in the module.
		Organ dysfunction in the ICU patient	After reading about organ dysfunction in the ICU patient, respiratory failure, cardiovascular failure, acute kidney injury, GI tract dysfunction & malnutrition, liver failure, and other considerations, learners will take part in a progressive case scenario, designed to evaluate knowledge of organ system dysfunction. Feedback is presented as the learner progresses through the scenario. Learners will identify causes of hypoglycaemia in a critically ill Intensive Care patient, based on indicators learnt in the module. Learners will recognise elements of organ dysfunction in the ICU patient, based on indicators learnt in the module.	Learners will be able to identify appropriate nutritional support in the ICU patient, based on indicators learnt in the module.