

<b>MODULE TITLE:</b>	<b>SEPSIS &amp; THE CRITICALLY ILL OR COMPROMISED PATIENT</b>	<b>7-Nov-2016</b>
<b>DEVELOPED BY:</b>	<b>Adrian Anthony, Michael Cox, Richard Turner</b>	
<b>REVIEWED BY:</b>	<b>Alan Saunder (2010) Adrian Anthony, Wendy Brown, Sayed Hassen, Michael Cox, Tom Elliott, Greg Keogh, Noel Tait (2013). Richard Bryant, Satish Warriar (2016).</b>	
<b>Module Rationale and Objectives</b>	<p>Sepsis and other critical conditions require informed and decisive action on the part of the surgeon. This module identifies the key areas in which trainees are expected to have expertise in order to be able to minimise infection risks and consequences in critically ill or compromised patients and to respond promptly and appropriately as the need for assessment and management of sepsis in such patients arises. The graduating trainee will be able to:</p> <p>Pathology of sepsis:</p> <ul style="list-style-type: none"> <li>describe common surgical pathologies of sepsis in specific organs or regions</li> <li>describe infectious pathologies likely to be associated with surgically treated diseases</li> <li>describe infectious pathologies associated with medically complex, malnourished and immune suppressed patients</li> </ul> <p>Prophylaxis of sepsis:</p> <ul style="list-style-type: none"> <li>display well informed, evidence based team leadership in prophylaxis and management of sepsis in critically ill or compromised patients</li> <li>anticipate and aim to prevent the onset of sepsis and sepsis related complications in surgical patients</li> <li>describe mechanisms for limiting the development and spread of infectious diseases, especially multi-resistant organisms, among critically ill and compromised surgical patients</li> <li>describe evidence-based prophylaxis against development of peri-surgical sepsis</li> </ul> <p>Recognition and diagnosis of sepsis and sepsis syndromes:</p> <ul style="list-style-type: none"> <li>apply the CCRISP principles to identify and recognise the symptoms and signs of these conditions</li> <li>describe and select appropriate diagnostic testing</li> <li>select appropriate investigative tools and monitoring techniques</li> </ul> <p>Management planning and treatment:</p> <ul style="list-style-type: none"> <li>identify appropriate treatment options, and their indications and contraindications</li> <li>determine the appropriate priorities of care and level of care for patients affected by sepsis</li> <li>demonstrate awareness of the basic pharmacology and principles of antibiotic based therapeutics</li> <li>effectively manage septic complications of operative procedures and the underlying disease process</li> <li>identify the likely causative factor(s) of a patient's critical illness and implement management accordingly</li> <li>prioritise, initiate and coordinate the timely management of critically ill patients</li> <li>accurately identify the risks, benefits and mechanisms of action of various treatment modalities and interventions</li> </ul> <p>Ethics and Professional Communications:</p> <ul style="list-style-type: none"> <li>understand the importance of a multidisciplinary approach to the management of critically ill patients</li> <li>recognise the importance of effective communication with other professionals and recognise the need for timely referral and for timely response to requests for surgical review and surgical treatment</li> <li>communicate information to patients (and their family) about procedures, outcomes, and risks associated with surgery in ways that encourage their participation in informed decision making (consent)</li> </ul>	
<b>Anatomy, Physiology, Pathology</b>	<p>Trainees should have thorough knowledge of the, anatomy, microbiology, physiology, and pathology, of:</p> <ul style="list-style-type: none"> <li>organ-specific sepsis</li> <li>Systemic Inflammatory Response Syndrome (SIRS)/Multiple Organ Dysfunction Syndrome (MODS)</li> <li>system specific dysfunction (e.g. renal impairment)</li> <li>co-morbidities that may alter management and/or adversely affect outcome</li> </ul>	
<b>Suggested Reading</b>	<p>Trainees who are preparing to sit the Generic and Clinical Examinations need to refer to the recommended reading list on the RACS website at <a href="http://www.surgeons.org">www.surgeons.org</a></p> <p>Suggested reading:</p> <p>(1) Care of the Critically Ill Surgical Patient (ISBN 9780340810484), 2<sup>nd</sup> edition, edited by I.D. Anderson.</p> <p>(2) Core Topics in General &amp; Emergency Surgery: A Companion to Specialist Surgical Practice (ISBN 9780702049644), 4<sup>th</sup> edition, by S. Paterson-Brown.</p> <p>For the Fellowship examination, there are no prescribed texts.</p> <p>Trainees are expected to keep abreast of the current literature, including textbooks, journal articles, consensus guidelines and other on-line resources.</p>	
<b>Learning Opportunities and Methods</b>	<p>Therapeutic Guidelines for surgical sepsis prophylaxis and for antibiotic therapy of surgical sepsis (available on internet or on most hospital intranets).</p> <p>Skills courses including RACS CCRISP, EMST courses.</p> <p>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.</p> <p>Trainees are encouraged to present their research at national and/or accredited regional training days, in order to fulfil the research requirement.</p>	
<b>How this module will be assessed</b>	<p>The Generic and Clinical Examinations; Fellowship examination (written and viva voce sections); Trainee evaluation forms and logbooks; SEAM (where applicable).</p>	
<b>Assumed Knowledge</b>	<ul style="list-style-type: none"> <li>Normal organ physiology</li> <li>Classification and characteristics of micro-organisms</li> <li>Local and systemic immune responses</li> <li>Physiological responses to pathogens</li> <li>Microbiology of organisms associated with major surgical sepsis including especially surgically relevant cocci, bacilli, clostridia, yeasts and fungi</li> </ul>	



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<b>Assumed Knowledge (continued)</b>	<ul style="list-style-type: none"> <li>▪ Laboratory investigation methods and indications for same</li> <li>▪ Pharmacology, prescribing and indications for appropriate prophylactic and therapeutic use of for use of antibiotics in the prophylaxis and therapy of surgical sepsis</li> <li>▪ Principles and practice of routines mitigating against spread of colonisation and invasive sepsis among surgical patients (e.g. 5 moments of hand hygiene)</li> <li>▪ Principles and practice of antibiotic stewardship in surgical practice</li> </ul>	
<b>Definitions</b>	<p><i>Operative Management - Knows:</i> 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.</p> <p><i>Operative Management - Does:</i> In addition to the above, trainees must be competent at performing the procedure.</p>	

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 -
<b>Critically ill surgical patient e.g.:</b> <ul style="list-style-type: none"> <li>▪ severe pancreatitis, anastomotic leak</li> <li>▪ strangulated small bowel / ischaemic colon / perforated small bowel / colon (see also Emergency Surgery Module)</li> <li>▪ massive haemorrhage (see also Emergency Surgery Module)</li> <li>▪ Severe cholangitis (See also Upper GI &amp; HPB - Hepatic, Pancreatic &amp; Biliary Module)</li> </ul>						
Early SET	<ul style="list-style-type: none"> <li>▪ Recognise the spectrum of pathologies responsible for critical illness</li> <li>▪ Explain the pathophysiology and consequences of: <ul style="list-style-type: none"> <li>- SIRS</li> <li>- MODS</li> <li>- Adult Respiratory Distress Syndrome</li> <li>- shock</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Identify the patient at risk of becoming critically ill</li> <li>▪ Recognise the clinical features of a critically ill patient and life threatening conditions</li> <li>▪ Identify and describe the clinical features of the different causes of shock</li> </ul>	<ul style="list-style-type: none"> <li>▪ Appropriately select and coordinate multimodal assessment as required</li> <li>▪ Review and interpret available data</li> <li>▪ Identify and describe scoring systems in relation to critically ill patients</li> </ul>	<ul style="list-style-type: none"> <li>▪ Organise multidisciplinary management</li> <li>▪ Identify the appropriate level of care for the patient</li> <li>▪ Organise resuscitation</li> <li>▪ Coordinate safe transfer of patient</li> <li>▪ Employ appropriate monitoring to assess response to resuscitation</li> <li>▪ Outline the role of pharmacological agents and their complications</li> </ul>	<ul style="list-style-type: none"> <li>▪ Cricothyroidotomy/tracheostomy</li> </ul>	<ul style="list-style-type: none"> <li>▪ Establish and maintain emergency airway</li> <li>▪ Needle thoracostomy / intercostal chest drain</li> <li>▪ Establish definitive emergency vascular access - central and peripheral</li> </ul>
Mid SET				<ul style="list-style-type: none"> <li>▪ Discuss the procedural details of definitive surgical management where indicated</li> <li>▪ Explain the role and indications for advanced organ and system support: <ul style="list-style-type: none"> <li>- cardiovascular</li> <li>- respiratory</li> <li>- renal</li> </ul> </li> </ul>		
Late SET					<ul style="list-style-type: none"> <li>▪ Understand surgical strategies in the critically ill patient</li> </ul>	
<b>Gangrene/necrotising fasciitis</b> <i>See Skin &amp; Soft Tissue Module</i>						
<b>Tetanus</b>						
Early SET	<ul style="list-style-type: none"> <li>▪ Discuss the incidence and describe pathogenesis including microbiology</li> </ul>	<ul style="list-style-type: none"> <li>▪ Identify the clinical manifestations</li> <li>▪ Classify the spectrum of presentation</li> </ul>	<ul style="list-style-type: none"> <li>▪ Select and interpret blood tests, microbiology and imaging investigations</li> </ul>	<ul style="list-style-type: none"> <li>▪ Establish the principles of immunisation</li> <li>▪ Recognise early signs and describe the management</li> </ul>	<ul style="list-style-type: none"> <li>▪ Wound debridement</li> </ul>	
Mid SET				<ul style="list-style-type: none"> <li>▪ Coordinate multidisciplinary care</li> </ul>		

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<b>Subphrenic/pelvic/ intra-abdominal abscess</b>						
Early SET	<ul style="list-style-type: none"> <li>Describe the anatomy of abdominal and pelvic cavity</li> <li>Describe the various forms of abscess</li> </ul>	<ul style="list-style-type: none"> <li>Classify the spectrum of presentation, including the clinical signs of sepsis and clinical presentations pertaining to abscesses in various sites in the abdomen</li> </ul>	<ul style="list-style-type: none"> <li>Select and interpret blood tests, microbiology and imaging investigations</li> </ul>	<ul style="list-style-type: none"> <li>Review open/ percutaneous drainage procedures</li> <li>Discuss therapeutic and prophylactic role of antibiotics, including dosage of common antibiotics</li> </ul>		
Mid SET				<ul style="list-style-type: none"> <li>Identify and describe the role for laparotomy/laparostomy, minimally invasive techniques</li> <li>Discuss the procedural details of treatment, including possible complications and how to deal with them</li> </ul>		<ul style="list-style-type: none"> <li>Transrectal drainage</li> <li>Laparotomy/ laparostomy/minimally invasive techniques for drainage of complex abscesses</li> </ul>
<b>Psoas abscess</b>						
Early SET	<ul style="list-style-type: none"> <li>Describe pathogenesis, causative organisms, and related disease</li> </ul>	<ul style="list-style-type: none"> <li>Take an appropriate history and perform a focused examination</li> </ul>	<ul style="list-style-type: none"> <li>Select and/or interpret diagnostic/ interventional imaging</li> <li>Interpret results of microbiological specimens</li> </ul>	<ul style="list-style-type: none"> <li>Review open/ percutaneous drainage procedures</li> <li>Discuss the role of antibiotic therapy</li> </ul>		
Mid SET				<ul style="list-style-type: none"> <li>Discuss the procedural details of open drainage</li> </ul>	<ul style="list-style-type: none"> <li>Trans/ Retroperitoneal drainage</li> </ul>	
<b>Intra-abdominal sepsis/peritonitis</b>						
<i>See also Abdominal Wall Module</i>						
<i>See also above: Subphrenic/pelvic/ intra-abdominal abscess</i>						
Early SET	<ul style="list-style-type: none"> <li>Discuss pathogenesis, causative organisms, and related disease</li> </ul>	<ul style="list-style-type: none"> <li>Perform a focused clinical examination</li> <li>Recognise the clinical signs of peritonitis</li> <li>Understand the clinical scenarios that may mask the signs or peritonitis</li> </ul>	<ul style="list-style-type: none"> <li>Select and/or interpret diagnostic/ interventional imaging</li> <li>Interpret microbiological results</li> </ul>	<ul style="list-style-type: none"> <li>Discuss the indications for non-surgical and surgical management</li> <li>Discuss indications for laparostomy and delayed closure</li> <li>Describe the principles of open/ percutaneous and minimally invasive drainage procedures where appropriate</li> </ul>		
Mid SET					<ul style="list-style-type: none"> <li>Laparostomy</li> </ul>	<ul style="list-style-type: none"> <li>Laparotomy for sepsis control</li> </ul>

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	ANATOMY PHYSIOLOGY PATHOLOGY	CLINICAL ASSESSMENT	INVESTIGATIONS	PRINCIPLES OF MANAGEMENT	OPERATIVE MANAGEMENT - KNOWS -	OPERATIVE MANAGEMENT - DOES -
<b>The immuno- suppressed patient</b> <i>See Transplantation Module</i>						
Early SET	<ul style="list-style-type: none"> <li>Discuss the basis of humoral and cellular immunity and the factors that modify immunity</li> </ul>	<ul style="list-style-type: none"> <li>Identify the symptoms and signs suggesting sepsis and/or impending decompensation in an immuno-suppressed patient</li> </ul>	<ul style="list-style-type: none"> <li>Select appropriate pathology and imaging investigations to identify sepsis in an immuno-suppressed surgical patient</li> </ul>	<ul style="list-style-type: none"> <li>Enlist appropriate multi-disciplinary input to assist with management</li> </ul>		
Mid SET				<ul style="list-style-type: none"> <li>Discuss the nature and role of operative or non-operative management, where indicated</li> </ul>		
Late SET					<ul style="list-style-type: none"> <li>Understand surgical strategies in the critically ill patient</li> </ul>	
<b>HIV/AIDS and other atypical infections including TB</b> <i>See also above: The immuno-suppressed patient</i>						
Early SET	<ul style="list-style-type: none"> <li>Describe the pathophysiology of immune suppression as it relates to HIV/AIDS</li> <li>Explain the progression of disease</li> </ul>	<ul style="list-style-type: none"> <li>Recognise the spectrum of clinical presentation</li> </ul>	<ul style="list-style-type: none"> <li>Interpret relevant haematological and microbiological tests, such as helper/suppressor cell ratios and viral load</li> <li>Indicate the role for medical imaging where indicated</li> </ul>	<ul style="list-style-type: none"> <li>Describe and explain the role of universal precautions</li> <li>Seek multi-disciplinary input from Microbiology and Infectious Disease specialists regarding operative vs. non-operative management</li> </ul>		
Mid SET						<ul style="list-style-type: none"> <li>Insertion of central venous access with management</li> </ul>
<b>The splenectomised patient</b> <i>See also above: The immuno-suppressed patient</i>						
Early SET	<ul style="list-style-type: none"> <li>Discuss the anatomy and physiological role of the spleen</li> <li>Outline the role of the spleen in certain haematological disorders such as hereditary spherocytosis and idiopathic thrombocytopenic purpura</li> <li>Outline the role of the spleen in certain infectious conditions such as infectious mononucleosis and malaria</li> </ul>	<ul style="list-style-type: none"> <li>Perform an abdominal examination to identify splenomegaly</li> </ul>		<ul style="list-style-type: none"> <li>Prescribe appropriate preventive management for overwhelming post-splenectomy infection (OPSI) following splenectomy including antibiotics and immunisation</li> </ul>		
Mid SET	<ul style="list-style-type: none"> <li>Discuss the pathophysiological and clinical consequences of splenectomy</li> </ul>		<ul style="list-style-type: none"> <li>Select appropriate pathology and imaging investigations prior to elective splenectomy</li> </ul>	<ul style="list-style-type: none"> <li>Discuss the indications for elective splenectomy</li> </ul>	<ul style="list-style-type: none"> <li>Laparoscopic elective splenectomy</li> </ul>	<ul style="list-style-type: none"> <li>Open elective splenectomy <b>See also Upper GI/HPB Module</b></li> </ul>

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<b>Post transplantation patients</b> <i>See Transplantation Module</i>						
<b>Nutritional support</b>						
Early SET	<ul style="list-style-type: none"> <li>▪ Describe:               <ul style="list-style-type: none"> <li>- components of nutrition and their functions</li> <li>- normal fluid, electrolytic and other nutritional requirements</li> <li>- specific nutritional demands associated with different pathologies</li> <li>- complications associated with nutritional replacement</li> <li>- how nutrition influences outcome</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Identify the patient at risk of nutritional deficiencies</li> <li>▪ Recognise the symptoms and signs related to nutritional deficiencies</li> <li>▪ Identify patients who have specific nutritional requirements</li> </ul>	<ul style="list-style-type: none"> <li>▪ Select and interpret appropriate laboratory tests to assess nutrition</li> </ul>	<ul style="list-style-type: none"> <li>▪ Appraise the role of nutritional support in the management of surgical pathologies</li> <li>▪ Coordinate multidisciplinary approach to management</li> <li>▪ Differentiate the various routes for nutritional support</li> </ul>		
Mid SET			<ul style="list-style-type: none"> <li>▪ Select and interpret appropriate laboratory tests to formulate nutritional support</li> </ul>	<ul style="list-style-type: none"> <li>▪ Explain the indications for enteral and parenteral nutritional routes and the associated complications</li> <li>▪ Monitor response to nutritional support and adjust accordingly</li> <li>▪ Describe techniques to establish routes for administering nutrition</li> <li>▪ Understand pathophysiology of re-feeding syndrome</li> </ul>		<ul style="list-style-type: none"> <li>▪ Feeding gastrostomy/ jejunostomy (open, endoscopic, and laparoscopic)</li> <li>▪ Vascular access for nutrition (including surgical and radiological implantable and tunnelled devices)</li> </ul>
<b>Other medical system disease</b>						
Early SET	<ul style="list-style-type: none"> <li>▪ Recognise the impact on effective management of surgical patients of comorbidities</li> </ul>	<ul style="list-style-type: none"> <li>▪ Quantify and classify the risk factors of comorbidities</li> </ul>		<ul style="list-style-type: none"> <li>▪ Classify the patient according to ASA grading system and be able to accurately determine patient status</li> <li>▪ Coordinate (and lead) multidisciplinary teams</li> </ul>		

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<b>Acute pain control</b>						
Early SET	<ul style="list-style-type: none"> <li>▪ Describe:               <ul style="list-style-type: none"> <li>- pathophysiology of acute pain</li> <li>- the causes of pain in the surgical patient</li> <li>- the effect of pain on various physiological functions</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▪ Identify the patient likely to have pain</li> <li>▪ Recognise and assess pain using a scoring system</li> <li>▪ Recognise abnormal behaviour in response to pain</li> </ul>	<ul style="list-style-type: none"> <li>▪ Select and interpret investigations to determine the cause of pain</li> </ul>	<ul style="list-style-type: none"> <li>▪ Implement preventive measures</li> <li>▪ Discuss the role of pain control in patient outcome</li> <li>▪ Liaise with an acute pain service to assist management</li> <li>▪ Prescribe and monitor response to pharmacological agents and adjust accordingly</li> <li>▪ Implement multimodal therapy for pain control</li> <li>▪ Describe complications associated with analgesic therapy</li> <li>▪ Differentiate the preferred route(s) for administering analgesia</li> </ul>		
<b>Patients on specific medications: Anticoagulant, Immunomodulators, Oncological agents</b>						
Early SET	<ul style="list-style-type: none"> <li>▪ Recognise the impact of various pharmacological agents on different patients</li> <li>▪ Understand the management of anticoagulants</li> </ul>		<ul style="list-style-type: none"> <li>▪ Order and interpret appropriate investigations as required</li> </ul>	<ul style="list-style-type: none"> <li>▪ Select and adjust surgical practice according to risk</li> <li>▪ Coordinate multidisciplinary teams</li> <li>▪ Understand which patients on anticoagulation / antiplatelets require interim cover</li> <li>▪ Establish a perioperative plan to manage patients on anticoagulants</li> </ul>		