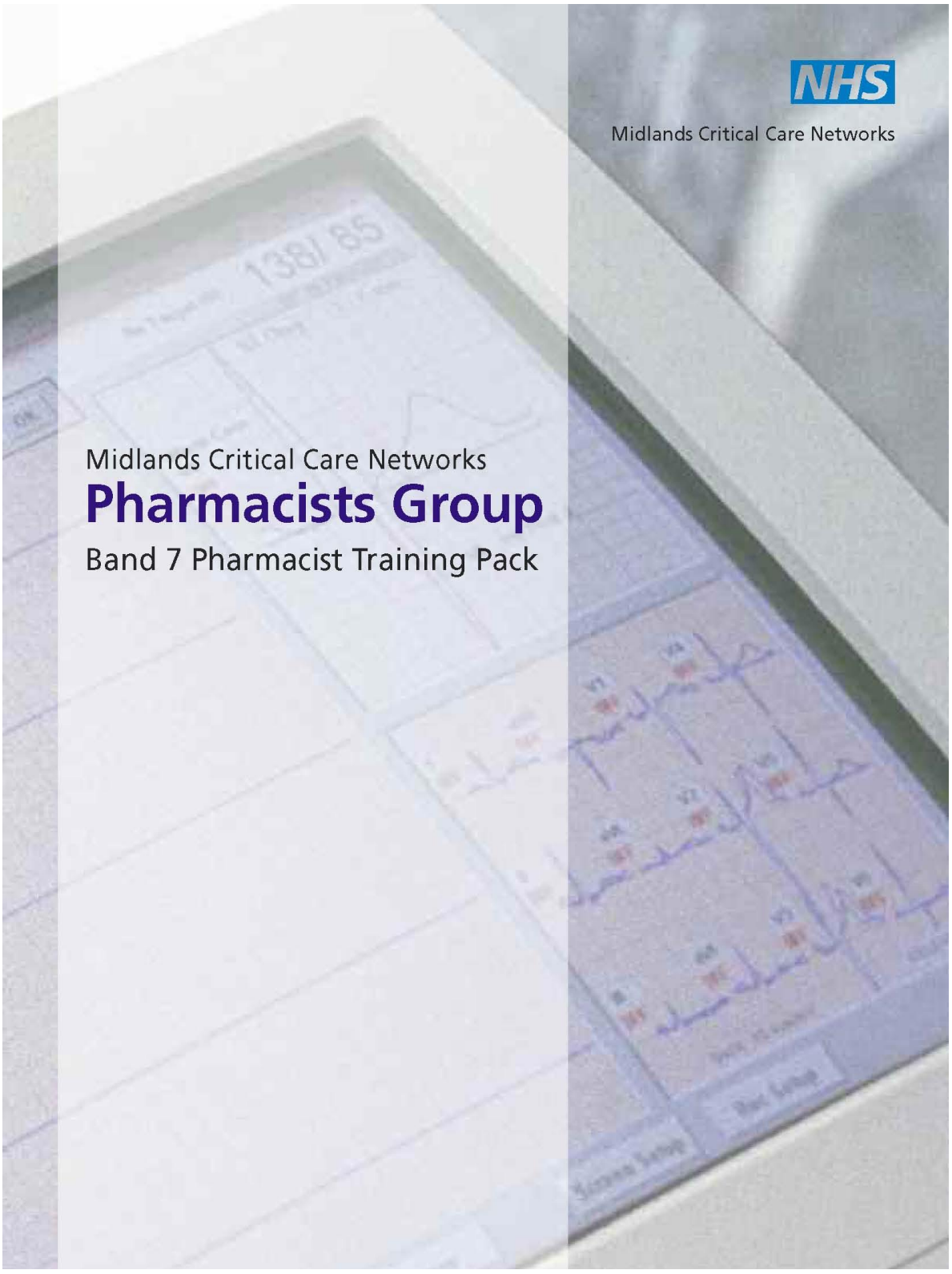

NHS

Midlands Critical Care Networks

Midlands Critical Care Networks

Pharmacists Group

Band 7 Pharmacist Training Pack

The Midlands Critical Care Network includes:

Birmingham Children's Hospital
Dudley Group of Hospitals NHS Foundation Trust
George Eliot Hospital NHS Trust
Heart of England NHS Foundation Trust
Kettering General Hospital NHS Foundation Trust
Northampton General Hospital
Robert Jones and Agnes Hunt Orthopaedic and District Hospital NHS Trust
Sandwell and West Birmingham Hospitals NHS Trust
Shrewsbury and Telford Hospitals NHS Trust
South Warwickshire General Hospitals NHS Trust
The Royal Orthopaedic Hospital NHS Foundation Trust
The Royal Wolverhampton NHS Trust
University Hospitals Birmingham NHS Foundation Trust
University Hospitals Coventry and Warwickshire NHS Trust
University Hospitals of Leicester NHS Trust
University Hospital North Midlands NHS Trust
Walsall Hospitals NHS Trust
Worcestershire Acute Hospitals NHS Trust
Wye Valley NHS Trust

Functions of the document

The document aims to:

1 Facilitate the appraisal process and set personal learning objectives.

2 Provide a record of training, learning and competency in relation to practices in care of the critically ill patient.

3 Provide evidence to the Continuing Professional Development (CPD) requirements of the General Pharmaceutical Council. (GPhC).

4 Provide evidence of competency and training that may be transferable to other Trusts, particularly those within the area covered by the Midlands Critical Care Networks.

5 Provide a structure for education in order to link theory to practice.

6 Aid pharmacy progression from foundation to advanced stage competency level within Critical Care following the Royal Pharmaceutical Society (RPS) and Expert Professional Practice Curriculum.

Guidelines for the use of this document

- The Trainee will be provided with assessment and supervision by an experienced Critical Care Pharmacist. They will provide the Trainee with guidance along with members of the multidisciplinary team.
- The document will enable the Trainee to demonstrate progression in both knowledge base and skill. The Expert Professional Practice Curriculum and Skills Framework can be related to this competency framework.
- Assessment of skills and knowledge can take place in many formats although it is understood that nothing takes the place of delivering care and relating the Trainee's knowledge to the care they provide, and why.
- Evidence must be presented for each section, as agreed with your trainer. The training log has space to provide evidence of attainment, and written and verbal records of discussions. It is ESSENTIAL this is completed as fully as possible to support the Trainee's learning AND THAT IT HAS BEEN DATED AND SIGNED by the Trainee and their Trainer upon completion.
- It is the responsibility of the Trainee to provide evidence to demonstrate learning and it is also expected that they provide evidence in their CPD portfolio.
- The Trainee and their Trainer will discuss what is required utilising the indicative content. At this stage, a development plan should be outlined using the table in the training tog.

- The competencies are divided into either Core or Specialist Knowledge

  - Core Knowledge (shown in white) is described as knowledge that is required to practice in critical care, but that may be pertinent to other areas of clinical pharmacy (e.g. a sound knowledge of altered pharmacokinetics in renal dysfunction). Such knowledge has also been described as having a "critical adjacency" (i.e. it is shared with other clinical specialties).
  - Specialist Knowledge (shown in purple) is described as knowledge that is more specific to practice in critical care and is not generally used outside that area (e.g. a sound knowledge of altered pharmacokinetics in renal dysfunction supported by haemofiltration).

Trainer's roles and responsibilities

- To liaise with the Trainee identifying their learning needs, making appropriate provision for the learning needs to be met.
- To act as a role model, motivator and enabler of the Trainee.
- To provide timely and constructive feedback to the Trainee on their performance.
- To encourage the Trainee to become a questioning, proactive member of staff who provides a consistently high standard of care.
- If the Trainer cannot provide the Trainee with support in a certain area, they must ensure alternative suitable support is provided.
- If the Trainee has difficulties in clinical practice relating to this area, the Trainer must provide support, or identify where appropriate support can be obtained from. The Trainer must ensure that the line manager is kept informed of the Trainee's progress.
- It is the Trainer's responsibility not to sign off objectives if the Trainee cannot meet the learning outcomes for the competency and/or does not demonstrate safe care.

Trainee's roles and responsibilities continued

- It is the Trainee's responsibility to identify their learning needs, discuss these with their Trainer and identify how these may be met by providing appropriate evidence.
- If the Trainee has problems achieving their objectives they must make this known to their Trainer.
- The Trainee is expected to have a basic understanding of general pharmaceutical care, for example, attained RPS foundation framework level or equivalent and be competent to direct and be responsible for their learning including private study. Time taken to meet the objectives will not be completely met within working hours.
- The Trainee is expected to provide safe, quality care to patients and act as their advocate.
- The Trainee is expected to recognise their limitations and recognise there is a network of peers within pharmacy and other professions who will support them if they are unsure of anything.
- Even though it is daunting initially, a Trainee should maximise their time in Critical Care and apply all the skills and knowledge they have already developed.

Sections

This list is based on the RPS Expert Professional Practice Curriculum for Critical Care. For completeness, all sections are listed, however the contents of the sections that are not applicable for Band 7 pharmacists have been omitted.

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Section 1 – Gastrointestinal System

1.1 Understands and manages therapy for prophylaxis and treatment of GI haemorrhage

No	Competency	Recommended Evidence and Experience
1.1.1	Can summarise the key risk factors for GI haemorrhage	• Describe drug causes of GI haemorrhage • Describe disease state causes of GI haemorrhage • Describe aetiology of drug induced GI haemorrhage • Define and describe aetiology of oesophageal varices • Define and describe aetiology of diverticular disease • Discuss local policy for stress ulcer prophylaxis and explain the pros and cons for each treatment option • Describe the endoscopic and surgical interventions used to treat acute GI haemorrhage **Recommended Resources**: Stress Ulcer Prophylaxis: Surgical Critical Care and Medical Critical Care Services at Orlando Regional Medical Centre, 2011. http://surgicalcriticalcare.net/Guidelines/stress%20ulcer%20prophylaxis%202011.pdf Surviving Sepsis Campaign. International Guidelines for Management of Severe Sepsis and Septic Shock: 2012. http://www.sccm.org/Documents/SSC-Guidelines.pdf Steinberg K.P. Stress-Related Mucosal Disease in the Critically Ill Patient: Risk Factors and Strategies to Prevent Stress Related Bleeding in the Intensive Care Unit. Critical Care Medicine, 2002; 30(6 Suppl): S362-364. Effect of Intravenous Omeprazole on Recurrent Bleeding after Endoscopic Treatment of Bleeding Peptic Ulcers NEJM 343, 3/8/2000 pp 310-6.
1.1.2	Can summarise the pathophysiological events underlying GI haemorrhage	
1.1.3	Can describe the pharmacology and pharmacokinetics of treatment options for prevention of GI haemorrhage	
1.1.4	Can describe the pharmacology and pharmacokinetics of drug treatment options for GI haemorrhage	
1.1.5	Can describe options for non-drug management of GI haemorrhage	
1.1.6	Can provide details of national or international guidelines that include the prevention of GI haemorrhage	

		Scottish Intercollegiate Guidelines Network. Management of Acute Upper and Lower Gastrointestinal Bleeding 2008. http://www.sign.ac.uk/pdf/qrg105.pdf Barletta J F, Bruno J J, Buckley M S & Cook D J. Stress Ulcer Prophylaxis Critical Care Medicine 2016; 44:1395–1405

1.2 Understands and applies methods for management of GI transit

No	Competency	Recommended Evidence and Experience
1.2.1	Can summarise the pathophysiological events leading to ileus states	• Can define and explain the signs and symptoms of paralytic ileus • Can describe drug and non-drug causes of paralytic ileus • Complete a pharmaceutical care plan for a patient with diarrhoea, identifying the potential causes (both drug and non-drug induced) and treatment options • C. difficile: See infection section • Describe the mechanism of action, indications and contra-indications of metoclopramide, domperidone, erythromycin, neostigmine and methylnaltrexone and stimulant laxatives including prucalopride. • Describe the role of NG and NJ tubes in the management of patients with GI dysmotility • Describe the importance of good fluid balance and electrolyte management **Recommended Resources**: Doherty WL, Winter B Prokinetic Agents in Critical Care. Critical Care 2003; 7:206-08. Booth C.M, Heyland DK, Paterson W.G. Gastrointestinal Promotility Drugs in the Critical Care Setting: a Systematic Review of the Evidence. Crit. Care Med 2002; 30: 1429-35. Grant K, Thomas R. Prokinetic Drugs in the Intensive Care Unit: Reviewing the Evidence. JICS 2009; 10: 34-37.
1.2.2	Can summarise the pathophysiological events leading to diarrhoeal states	
1.2.3	Can describe the pharmacology and pharmacokinetics of treatment options for GI dysmotility	
1.2.4	Can summarise options for non-drug management of GI dysmotility	
1.2.5	Can describe the key monitoring parameters for drugs used in the management of dysmotility	

1.3 Understands and applies methods for management of emesis

No	Competency	Recommended Evidence and Experience
1.3.1	Can summarise the pathophysiological events leading to emesis	• Can describe patient, surgical and drug factors which lead to emesis • Can describe antiemetic treatments that target the risk factors identified
1.3.2	Can describe the pharmacology and pharmacokinetics of treatment options for emesis	
1.3.3	Can describe the key monitoring parameters for drugs used in the management of emesis	

Section 2 – Cardiovascular System

2.1 *Understands and Applies methods for Monitoring Haemostasis*

No	Competency	Recommended Evidence and Experience
2.1.1	Can summarise the key methods for monitoring of haemostasis.	• Discuss with Critical Care Pharmacist and/or Consultant Intensivist. • Investigate own Trust guidance on monitoring of haemostasis. **Recommended Resources**: Use Medical textbook such as Kumar and Clark Clinical Medicine e.g. 8th
2.1.2	Can summarise and interpret the results of different methods for monitoring of haemostasis.	

2.1.3	Can summarise the pathophysiological events underlying common abnormalities of haemostasis.	Edition 2012 for chapter on Haematological Disease, including the section on haemostasis and thrombosis ABC of Antithrombotic Therapy, BMJ Books 2003; Lip GYH and Blann A D (Eds). British Committee for Standards in Haematology Guidelines on the 'assessment of bleeding risk prior to surgery or invasive procedures'. British Journal of Haematol 2008; 140(5); 496-504. British Committee for Standards in Haematology Guidelines for the Diagnosis and Management of Disseminated Intravascular Coagulation. British Journal of Haematology, 2009; 145: 24-33 Access via website: http://www.bcshguidelines.com
2.1.4	Can recognise and manage drug therapy that affects haemostasis.	
2.1.5	Can interpret and apply these results to recognise drugs that are contraindicated or should be used with caution.	

2.2 Understands and Applies Methods for Treatment of Disorders of Haemostasis

No	Competency	Recommended Evidence and Experience
2.2.1	Can apply knowledge to correct underlying haemostasis abnormality in routine clinical situations.	• Be aware of methods used in own Trust for correction of clotting abnormalities, e.g. FFP, cryoprecipitate, platelet transfusions, Vit K. • Consider their indications and limitations. • Discuss with a Consultant Intensivist for perspective on clinical use **Recommended Resources**: Retter A. and Barrett N.A The Management of Abnormal Haemostasis in the ICU. Anaesthesia 2015; 70 (Suppl. 1) 121-127

2.3 Understands and Manages the Prevention of Venous or Arterial Thromboembolism

No	Competency	Recommended Evidence and Experience
2.3.1	Can summarise patient disease and iatrogenic factors influencing thrombotic risk.	• Be aware of local Trust policy for thromboprophylaxis, including assessment of patient risk factors. • Risk assess a critical care patient, report on the need for prophylaxis and select appropriate management. • Describe the components of ventilator care bundle. • Investigate non-drug modes of prophylaxis used in own Trust. e.g. anti-embolism stockings, mechanical methods and vena cava filters and consider indications/guidelines for use. • Discuss possible exclusions from prophylaxis with Critical Care Pharmacist **Recommended Resources** Intensive Care Society Guidelines for Venous Thromboprophylaxis in Critical Care (2008) Note: Update in progress. http://www.ics.ac.uk Antithrombotic Therapy and Prevention of Thrombosis: American College of Chest Physicians Evidence-Based Clinical Practice Guidelines (9th Edition). Chest February 2012; 141 (2_suppl) Several chapters on prevention. British Committee for Standards in Haematology Guidelines on the Use of Vena Cava Filters. British Journal of Haematology 2006; 134(6): 590-95. Access Kings College Hospital Thrombosis Centre website and include any appropriate material. http:/www.kingsthrombosiscentre.org.uk NICE Clinical Guideline 092 January 2010. Venous Thromboembolism: Reducing the Risk. Reducing the risk of venous thromboembolism (deep vein thrombosis and pulmonary embolism) in patients admitted to hospital. (Includes links to online e-learning modules - you can find these under the resources tab) NICE Quality Standard QS3 June 2010. Venous Thromboembolism Prevention. NICE Pathways on Venous thromboembolism – access via: http://pathways.nice.org.uk/pathways/venous-thromboembolisms NICE Technology Appraisals:
2.3.2	Can summarise the pathophysiological events predisposing patients to thromboembolism.	
2.3.3	Can describe the pharmacology and pharmacokinetics of drug treatment options for the prevention of thromboembolism.	
2.3.4	Can describe non-drug options for the prevention of thromboembolism.	
2.3.5	Can describe and apply specific factors in the critically ill patient which affects management options for the prevention of thromboembolism.	
2.3.6	Can provide details of national or international guidelines that include the prevention of thromboembolism.	

		TA 157 September 2008 – Dabigatran TA 170 April 2009 – Rivaroxaban TA 245 January 2012- Apixaban TA 354 August 2015 – Edoxaban SIGN Guideline 122 December 2010. Prevention and Management of Venous Thromboembolism: A National Clinical Guideline. http://www.sign.ac.uk/guidelines/fulltext/122/

2.4 Understands and Manages the Treatment of Venous or Arterial Thromboembolism

No	Competency	Recommended Evidence and Experience
2.4.1	Can summarise the pathophysiological events leading to thromboembolism.	• General discussions with Critical Care Pharmacist regarding available treatment options for thromboembolism and their advantages/disadvantages. • Aim to find a patient with an acute DVT/PE and/or one with heparin-induced thrombocytopenia (HIT) and use as a case study/formulate care plan to discuss with Critical Care Pharmacist. **Recommended Resources** SIGN Guideline 122 December 2010. Prevention and Management of Venous Thromboembolism: A National Clinical Guideline. http://www.sign.ac.uk/guidelines/fulltext/122/ Stirling K Low Molecular Weight Heparins for Treating Venous Thromboembolism. The Pharmaceutical Journal, 14 March 2015, Vol 294, No 7853, online| DOI: 10.1211/PJ.2015.20067996. Antithrombotic Therapy and Prevention of Thrombosis: American College of Chest Physicians Evidence-based Clinical Practice Guidelines (9th Edition). Chest February 2012; 141 (2_suppl). Several useful chapters including: Parenteral Anticoagulants: As above Chest 2012; 141: 24S-43S. Oral Anticoagulant Therapy: As above Chest 2012; 141: 44S-88S. New Antithrombotic Drugs: As above Chest 2012; 141: 120S-151S. The Perioperative Management of Antithrombotic Therapy: As above Chest 2012; 141: 326S-350S. Antithrombotic Therapy for Venous Thrombotic Disease: As Above Chest 2012; 141: 419S-494S NICE Clinical Guideline 144 June 2012. Venous Thromboembolic Diseases: the Management of Venous Thromboembolic Diseases and the Role of Thrombophilia Testing. NICE Quality Standard QS29 March 2013. Diagnosis and Management of Venous Thromboembolic Diseases. NICE Pathways on Venous Thromboembolism – access via: http://pathways.nice.org.uk/pathways/venous-thromboembolism NICE Technology Appraisals; TA 262 July 2012 – Rivaroxaban TA 287 June 2013 – Rivaroxaban TA 275 February 2013 – Apixaban
2.4.2	Can describe the pharmacology and pharmacokinetics of drug options for the treatment of thromboembolism.	
2.4.3	Can summarise the possible complications of drug options for the treatment of thromboembolism, including heparin-induced thrombocytopenia.	
2.4.4	Can describe and apply specific factors in the critically ill patient which affects management options for the treatment of thromboembolism.	
2.4.5	Can describe the key monitoring parameters of treatment options for patients with thromboembolism.	
2.4.6	Can provide details of national or international guidelines that include the treatment of thromboembolism.	

		TA 341 June 2015 – Apixaban TA 327 December 2014 – Dabigatran TA 354 August 2015 – Edoxaban British Committee for Standards in Haematology Guidelines on the Use and Monitoring of Heparin. British Journal of Haematol 2006; 133(1): 19-34. British Committee for Standards in Haematology Guideline on the Management of Bleeding in Patients on Antithrombotic Agents. British Journal of Haematology 2012; 160: 35-46. British Committee of Standards in Haematology Guidelines on the Diagnosis and Management of Heparin-induced Thrombocytopenia: second edition. British Journal of Haematology 2012; 159 (5): 528-40. Treatment and Prevention of Heparin-induced Thrombocytopenia: American College of Chest Physicians Evidence-Based Clinical Practice. Chest 2012; 141: 495S-530S. Scott I. and Webster N.R. Heparin-induced Thrombocytopenia: Is There a Role for Direct Thrombin Inhibitors in Therapy? Journal of the Intensive Care Society, 2014; 15: 131-134 NPSA Patient Safety Alert 18 March 2007. Actions that can make anticoagulant therapy safer. Access Kings website as above and also: https://www.evidence.nhs.uk/ http://www.centreformedicinesoptimisation.co.uk/

2.5 Understands and Applies the Use of Inotropes and Vasopressor Agents

No	Competency	Recommended Evidence and Experience
2.5.1	Can summarise the differences between classes of inotropes and vasopressors used in the management of critically ill patients.	• Demonstrate an understanding of the place in therapy for: ➢ Catecholamines (Adrenaline/Noradrenaline/Dobutamine/Dopamine) ➢ Phosphodiesterase Inhibitors (PDEIs) (Enoximone/Milrinone) ➢ Inodilator (Levosimendan) ➢ Vasopressin (Argipressin) • Demonstrate an understanding of the receptors stimulated by and the pharmacological effects seen following the administration of: ➢ Catecholamines ➢ PDEIs ➢ Levosimendan ➢ Vasopressin (Argipressin) • Perform an end of bed presentation of a patient in whom inotropes and/or vasopressors have been prescribed; provide details of the mechanism of action, desired therapeutic effects and monitoring requirements. • Produce a pharmaceutical care plan in which you are able to draw together the key indicators of each of the agents prescribed, as well as detailing the monitoring parameters required to access therapeutic response/benefit. **Recommended Resources** UKCPA Resource Centre – Critical Care and Cardiac Sub-Groups. Critical Care Therapeutics Rachel Ellis – The Pharmaceutical Press. Critical Care Medicine at a Glance (current version). Oxford handbook of Critical Care (current version). Any good pharmacology text book and /or: Bangash MN et al. Use of Inotropes and Vasopressor Agents in Critically Ill Patients.
2.5.2	Can describe the basic pharmacology and pharmacokinetics of inotropes and vasopressors.	
2.5.3	Knows the different uses of inotropes and vasopressors.	
2.5.4	Can describe key monitoring parameters for the use of inotropes and vasopressors.	
2.5.5	Can provide details of national or international guidelines that include the use of inotropes and vasopressors.	

		British Journal of Pharmacology 2012 pg. 2015-2033. Guidelines for the Use of Inotropic and Vasopressor Agents. (Task Force of the American College of Critical Care Medicine, Society of Critical Care Medicine, 1999. Surviving Sepsis Campaign (Haemodynamic Support). http://www.survivingsepsis.org Overgaard C.B and Dzarvik V. Inotropes and Vasopressors: Review of Physiology and Clinical Use in Cardiovascular Disease. Circulation 2008; 118: 1047-1056 McKenzie C and Berry W. Use of Inotropes in Critical Care. Clinical Pharmacist Volume 2 December 2010 General information can be found via the following links: http://www.anaesthesiauk.com/ http://www.esicm.org/publication/guidelines Gordon A C, Perkins G D, Singer M et al. Levosimendan for the Prevention of Acute Organ Dysfunction in Sepsis. N Engl J Med 2016; 375:1638-1648 DOI: 10.1056/NEJMoa1609409

2.6 Understands and Applies the Key Elements in the Management of Shock States

No	Competency	Recommended Evidence and Experience
2.6.1	Can summarise the key differences between shock states.	• Demonstrate an understanding of the different causes of shock states: ➢ Cardiogenic ➢ Obstructive (e.g. cardiac tamponade/pulmonary embolism) ➢ Hypovolaemic ➢ Distributive (e.g. anaphylaxis/sepsis) • Demonstrate an awareness of the different shock states: ➢ Self-directed reading of the different shock states, identify an appropriate patient on critical care and discuss aetiology/cause of shock state with nursing staff/CT1/CT2/pharmacist • To facilitate this, produce an overview of the patient and present back to the Senior Critical Care Pharmacist. As part of the patient work up, as well as understanding the underlying pathophysiology, you should show an awareness of the monitoring and laboratory investigations required to assess a patient's recovery and response to treatment: • Clinical assessment • Non-invasive monitoring • Invasive monitoring ➢ With examples of each: ○ Cardiovascular ○ Respiratory ○ Biochemical ○ Haematological ○ Microbiological ○ Markers of inflammatory response to infection • Produce a care plan in which all of the above can be applied to the patient **Recommended Resources** Surviving Sepsis Campaign. International Guidelines for Management of Severe Sepsis and Septic Shock: 2012. http://www.sccm.org/Documents/SSC-Guidelines.pdf
2.6.2	Can summarise the pathophysiological events leading to and resulting from different shock states.	
2.6.3	Can provide details of national or international guidelines that include the management of shock states.	

		Hasdai et al. Cardiogenic Shock Complicating Acute Coronary Syndromes. Lancet 2000; 356: 749-756 MP Moranville, Evaluation and Management of Shock States. Journal of Pharmacy Practice. 2011 Vol 24 No 1: 44-60. Consensus on Circulatory Shock and Haemodynamic Monitoring. Task Force of the European Society of Intensive Care Medicine. Intensive Care Medicine, Volume 40, Issue 12/December, 2014. http://www.esicm.org/publication/guidelines Sepsis: recognition, diagnosis and early management NICE guideline [NG51] July 2016 https://www.nice.org.uk/guidance/ng51

2.7 Understands and Manages Therapy for Cardiac Failure

No	Competency	Recommended Evidence and Experience
2.7.1	Can summarise the key differences between acute and chronic cardiac failure.	• Demonstrate an understanding of the differences between the two states and apply to patients on ITU. • Demonstrate an understanding of the clinical manifestations which distinguish between the two, e.g. acute cardiac failure may present with acute onset dyspnoea or pulmonary oedema OR cardiogenic shock. • Produce a pharmaceutical care plan that outlines the treatment strategies employed to treat acute cardiac failure – and chronic cardiac failure. Have an ability to understand and explain why different approaches are taken in the management of the two • conditions. • End of bed presentation relating key monitoring parameters to patient's clinical state: Awareness of non-invasive monitoring parameters - temp, HR, BP, ECG, oxygen saturation • Demonstrate an awareness of current NICE Guidelines/ESC Guidelines and relate back to a chosen patient on ITU • Demonstrate an understanding that the management of acute cardiac failure relies on correction of the underlying cause e.g. pulmonary oedema/cardiogenic shock • Demonstrate an awareness of the pharmacological agents used in the management of cardiac failure, in particular, outline the place in therapy of: ➢ Loop diuretics ➢ ACEIs ➢ Aldosterone antagonists ➢ Nitrates ➢ Beta-blockers ➢ Ivabradine ➢ Inotropic agents ○ Dopamine ○ Dobutamine ○ Adrenaline ○ Noradrenaline ○ PDEIs ○ Levosimendan **Recommended Resources** NICE – Chronic Heart Failure in Adults – Management http://www.nice.org.uk/guidance/cg108 NICE – Acute Heart Failure – Diagnosis and Management in Adults. http://www.nice.org.uk/guidance/qs103 NICE Quality Standards: Chronic Heart Failure – http://www.nice.org.uk/guidance/qs9 Acute Heart Failure – http://www.nice.org.uk/guidance/qs103
2.7.2	Can summarise the pathophysiological events leading to, and resulting from, acute and chronic cardiac failure.	
2.7.3	Can describe the pharmacology and pharmacokinetics of treatment options for acute and chronic cardiac failure.	
2.7.4	Can describe the key monitoring parameters for the treatment of acute and chronic cardiac failure.	
2.7.5	Can provide details of national or international guidelines that include the management of chronic heart failure.	

		Ivabradine for Treating Chronic Heart Failure – http://www.nice.org.uk/guidance/ta267 McMurry J.J.V et al. ESC Guidelines for the Diagnosis and Treatment of Acute and Chronic Heart Failure 2012. DOI: http://eurheartj.oxfordjournals.org/content/33/14/1787

2.8 Understands and Manages Therapy for Arrhythmias

No	Competency	Recommended Evidence and Experience
2.8.1	Can summarise the key differences between arrhythmias.	• Demonstrate an understanding of the differences between bradyarrhythmias and tachyarrhythmias and their location of origin and their subsequent management. • End of bed presentations detailing aetiology of different arrhythmias in at least 3 patients. • Demonstrate an understanding of the pharmacological management options for tachyarrhythmias and how they would differ depending on the anatomical origin of the arrhythmia (e.g. ventricular or supraventricular): ➢ Show awareness of different classes of arrhythmias. ➢ Use of cardioversion. ➢ Use of anticoagulants. • Produce a care plan detailing the rationale behind the treatment option(s) adopted. • Demonstrate an awareness of when device therapies e.g. pacemakers, implantable cardiac defibrillators or procedures such as electrical cardioversion would be required to facilitate pharmacological management. • Demonstrate an awareness of reversal of electrolyte abnormalities and correction of acidosis. • Demonstrate an understanding of when to initiate anticoagulation post-surgery if AF should develop. • Demonstrate detailed understanding of the different classes of anti-arrhythmic medications available and their indications. • Demonstrate an awareness of the parameters that should be monitored/ assessed following the initiation of an antiarrhythmic agent e.g. LFTs, TFTs with amiodarone, heart rate following a beta blocker. • Produce a pharmaceutical care plan in which you are able to draw together the key indications for which an antiarrhythmic may be prescribed, as well as detailing the monitoring parameters required to assess therapeutic response/ benefit **Recommended Resources** Atrial Fibrillation: Management http://www.nice.org.uk/guidance/cg180 2014 AHA/ACC/HRS Guidelines for the Management of Patients With Atrial Fibrillation: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines and the Heart Rhythm Society. J Am Coll Cardiol. 2014; 64(21):e1-e76. Doi:10.1016/j.jacc.2014.03.022 2012 focused update of the ESC Guidelines for the Management of Atrial Fibrillation. European Heart Journal (2012) 33, 2719-2747. Doi: 10.1093/eurheartj/ehs253
2.8.2	Can summarise at a basic level the pathophysiological events leading to different arrhythmias	
2.8.3	Can describe the pharmacology and pharmacokinetics of treatment options for different arrhythmias.	
2.8.4	Can outline indications for adjunctive therapy for certain arrhythmias.	
2.8.5	Can describe the key monitoring parameters for treatment options for different arrhythmias.	

2.9 Understands and Manages Therapy for Myocardial Infarction

No	Competency	Recommended Evidence and Experience
2.9.1	Can summarise the differences between non-ST and ST elevation myocardial infarction.	• Demonstrate an understanding of how to perform a differential diagnosis between STEMI and NSTEMI patients: ➢ Clinical presentation ➢ ECG changes ➢ Biochemical markers • Demonstrate an understanding of how to apply GRACE and TIMI risk score to determine whether NSTEMI patients are at risk of further adverse cardiac event. • Identify an appropriate patient and present the risk factors and discuss disease pathogenesis. ➢ Plaque formation/rupture ➢ Degree of vessel occlusion ➢ Clinical Presentation • End of bed presentation: Explanation of rationale and evidence base behind the choice/combination of medicines prescribed. • Immediate management: Medications administered prior to and during interventional procedure. Post-procedure medications and secondary prevention strategies • Discussion with Pharmacist: ➢ ECG Changes ➢ Biochemical markers: ○ Troponin ○ Creatinine kinase ○ U&Es ○ LFTs • Explanation of rationale and evidence base behind the choice/combination of medications prescribed. • Immediate management: Treatments used. Medications administered prior to and during interventional procedure: Thrombolysis vs PCI Loading doses – which P2Y12 antagonist and why? • Intravenous agents: ➢ IIb/IIIa inhibitors e.g. Abciximab, Eptifibatide, Tirofiban ➢ IV P2Y12 inhibitors e.g. Cangrelor ➢ IV DTIs e.g. Bivalirudin • Relate back to local formularies and treatment pathways implemented within own hospitals. The management of patients will vary depending on whether the hospital you work in offers 24/7 primary PCI service. • Anticoagulation - doses and durations of treatment. • Post-procedure medications and secondary prevention strategies. • Choice of agents e.g. ➢ Clopidogrel/Prasugrel/Ticagrelor. ➢ Atorvastatin 80mg od ➢ Aspirin ➢ ACEI and Beta-blocker • Relate each treatment choice to monitoring parameters e.g. BP, HR, renal function, hepatic function. Demonstrate an awareness of the following and how they relate to the medications prescribed: ➢ NICE Guidelines ➢ ESC Guidelines ➢ NSF **Recommended Resources** Myocardial Infarction with ST-segment Elevation: Acute Management. http://www.nice.org.uk/guidance/cg167 Unstable Angina and NSTEMI: Early Management. http://www.nice.org.uk/guidance/cg94 Prasugrel for the Treatment of Acute Coronary Syndromes with percutaneous coronary intervention. http://www.nice.org.uk/guidance/ta182 Ticagrelor for the Treatment of Acute Coronary Syndromes http://www.nice.org.uk/guidance/ta236
2.9.2	Can summarise the pathophysiological events leading to non-ST and ST elevation myocardial infarction.	
2.9.3	Can describe the pharmacology and pharmacokinetics of treatment options for non-ST and ST elevation myocardial infarction.	
2.9.4	Can describe the key monitoring parameters for the treatment of non –ST and ST elevation myocardial infarction.	
2.9.5	Can provide details of national or international guidelines that include the management of non-ST and ST elevation myocardial infarction.	

		2015 ESC Guidelines for the Management of Acute Coronary Syndromes in Patients Presenting Without Persistent ST Segmentation Elevation. European Heart Journal doi:10.1093/eurheartj/ehv320. ESC Guidelines for the Management of Acute Myocardial Infarction in Patients Presenting with ST –Segment Elevation. European Heart Journal (2102) 33, 2569-2619 Doi:10.1093/eurheartj/ehs215 http://dx.doi.org/10.1093/eurheartj/ehs215

Section 3 – Respiratory System

3.1 Understands the Basics of Mechanical ventilation

No	Competency	Recommended Evidence and Experience
3.1.1	Can summarise the physiology of pulmonary gas exchange.	• Arrange on ward teaching with senior nurse or medical staff. • Be aware of ventilator care bundles and current guidance on prevention of ventilator associated pneumonia. • List options for NIV and describe those available in your Trust. Understand how practical implications of these methods may impact on pharmaceutical care of the patient. (e.g. communication, drug administration) • Look at arterial blood gas results and relate to individual patients. • Complete a care plan on a ventilated patient and discuss with critical care pharmacist. **Recommended Resources** Williams. ABC of Oxygen. Assessing and Interpreting Blood Gases and Acid Base Balance BMJ 1998;317:113-1216 Suthersan Y, Vargas M and Pelosi P. Protective Mechanical Ventilation in the Non-Injured Lung: Review and Meta-Analysis. Critical Care 2014; 18:211.
3.1.2	Can summarise the key aims and principals of ventilation.	
3.1.3	Can summarise basic modes of non-invasive mechanical ventilation	
3.1.4	Can summarise basic modes of invasive mechanical ventilation.	
3.1.5	Can summarise the potential complications of invasive mechanical ventilation.	
3.1.6	Can describe methods of drug delivery in ventilated patients.	

3.2 Understands and Manages Therapy for Acute Lung Injury (ALI) and Acute Respiratory Distress Syndrome (ARDS)

No	Competency	Recommended Evidence and Experience
3.2.1	Can summarise the key differences between ALI and ARDS.	• Discuss understanding of ALI/ARDS with the critical care pharmacist. • Complete a care plan or end of bed presentation for an ALI/ARDS patient. **Recommended Resources** G J Bellingan. Reviews Series: The Pulmonary Physician In Critical Care. 6. The Pathogenesis of ALI/ARDS. Thorax 2002; 57:540-546. Ware LB, Matthay MA. Review Article. The Acute Respiratory Distress Syndrome. NEJM 2000; 342(18): 1334-1349. Cepkova M. Pharmacotherapy of Acute Lung Injury and the Acute Respiratory Distress Syndrome. J Intensive Care Med 2006; 21:119. Mackay A. and Al-Haddad M. Acute Lung Injury and Acute Respiratory Distress Syndrome. Continuing Education in Anaesthesia, Critical Care and Pain (2009); 9(5):152-156. MacSweeney R & McAuley D F. Acute respiratory distress syndrome; Seminar. Lancet. 2016; 388(10058):2416–2430 DOI: http://dx.doi.org/10.1016/S0140-6736(16)00578-X
3.2.2	Can describe the pharmacology and pharmacokinetics of treatment options for ALI and ARDS.	
3.2.3	Can describe the key monitoring parameters for the treatment of ALI and ARDS	

3.3 Understands and Manages Therapy for Asthma

No	Competency	Recommended Evidence and Experience
3.3.1	Can summarise the key differences between the management of acute and chronic asthma	• Discuss understanding with Critical Care Pharmacist, (if appropriate arrange a visit to Respiratory Ward). • Include: Salbutamol, Ipratropium, Steroids, Aminophylline, Magnesium and Ketamine • Be able to explain rationale for use and pharmacokinetics of the above medications. **Recommended Resources** Current British Thoracic Society Asthma Guidelines. Clinical Review: Severe Asthma Critical Care 2002; 6:30-44
3.3.2	Can summarise the pathophysiological events underlying chronic asthma.	
3.3.3	Can summarise the pathophysiological events underlying acute asthma.	
3.3.4	Can describe the pharmacology and pharmacokinetics of treatment options for management of acute asthma.	
3.3.5	Can describe the key monitoring parameters for the drugs used in the management of acute asthma.	
3.3.6	Can provide details of national guidelines including the management of asthma.	

Section 4 – Central Nervous System

4.1 Understands and Applies Methods of Pain Management

No	Competency	Recommended Evidence and Experience
4.1.1	Can summarise the difference between classes of different analgesic agents in a level 2 (or below) patient.	• Demonstrate an understanding of any relevant Trust policies and procedures relating to pain management. • Complete a care plan or case study which covers choice of analgesic agent, monitoring, and possible effects of organ dysfunction **Recommended Resources** Any good pharmacology/pharmacokinetic text book. Acute Pain Management: Scientific Evidence 3rd Ed 2010. Australian and New Zealand College of Anaesthetists and Faculty of Pain Medicine. Analgesia and Sedation in the Intensive Care Unit: Critical Care 2008; 12 (suppl 3). Hall J.B, Schweickert W & Kress J.P. Role of Analgesics, Sedatives, Neuromuscular Blockers and Delirium. Crit Care Med 2009; 37 (Suppl) S416-S421. Barr J. Fraser G L, Puntillo K, Ely W. E, Gelinas C, et al. Clinical Practice Guidelines for the Management of Pain, Agitation and Delirium in Adult Patients in the Intensive Care Unit.. Critical Care Medicine 2013; 41(1): 263-306. doi: 10.1097/CCM.0b013e3182783b72
4.1.2	Can summarise the differences between classes of different analgesic agents in a level 3 patient.	
4.1.3	Can describe the basic pharmacology and pharmacokinetics of analgesic agents in a level 2 (or below) patient.	
4.1.4	Can describe the basic pharmacology and pharmacokinetics of analgesic agents in a level 3 patient.	
4.1.5	Knows the different uses of analgesic agents.	
4.1.6	Can describe the key monitoring parameters for the use of analgesic agents in a level 2 (or below) patient	
4.1.7	Can describe the key monitoring parameters for the use of analgesic agents in a level 3 patient.	
4.1.8	Can provide details of national or international guidelines that include the use of analgesic agents in a level 3 patient.	

4.2 Understands and Manages Therapy for Acute Seizures

No	Competency	Recommended Evidence and Experience
4.2.1	Can summarise the key differences between different agents used for the management of acute seizures in a level 2 (or below) patient.	• Demonstrate an understanding of these drugs. • Produce a short summary on the use of thiopental sodium in the treatment of seizures. • Discuss safety issues concerning intravenous phenytoin administration • Demonstrate knowledge of other guidelines available **Recommended Resources** Any good pharmacology / pharmacokinetic text book. Clinical Pharmacy and Therapeutics Walker and Edwards. Seizures and Status Epilepticus in the Critically Ill Mirski M.A & Vareles P.N Critical Care Clinics – 2008; 24(1). CG137 The Epilepsies: the Diagnosis and Management of the Epilepsies in Adults and Children in Primary and Secondary Care. https://www.nice.org.uk/guidance/cg137 NHS Improvement. Patient safety alert - Risk of death and severe harm from error with injectable phenytoin. 2016. https://improvement.nhs.uk/news-alerts/risk-death-and-severe-harm-error-injectable-phenytoin/
4.2.2	Can summarise the key differences between different agents used for the management of acute seizures in a level 3 patient.	
4.2.3	Can describe the basic pharmacology and pharmacokinetics of agents used for the management of acute seizures in a level 2 (or below) patient.	
4.2.4	Can describe the basic pharmacology and pharmacokinetics of agents used for the management of acute seizures in a level 3 patient.	
4.2.5	Can describe the key monitoring parameters for the use of agents used for the management of acute seizures in a level 2 (or Below) patient.	
4.2.6	Can describe key monitoring parameters for the use of agents used for the management of acute seizures in a level 3 patient.	
4.2.7	Can provide details of national or international guidelines that include the use of agents used for the management of acute seizures in a level 3 patient.	

4.3 Understands and Manages Therapy for Delirium

No	Competency	Recommended Evidence and Experience
4.3.1	Can summarise the agents used for the management of delirium.	• Demonstrate an awareness of any relevant Unit/Trust guidance. • Be able to describe any monitoring system used for the detection of delirium. **Recommended Resources:** Any good pharmacology/pharmacokinetic text book. Detection, Prevention and Treatment of Delirium in Critically Ill Patients. Borthwick M. Bourne R, Craig M, Egan. A & Oxley J. UKCPA/ICS – Currently being updated. http://www.ics.ac.uk/ICS/guidelines-and-standards.aspx ICU Delirium website: http://www.icudelirium.co.uk/ British Association of Critical Care Nurses position statement on the use of restraint in adult critical care units. Bray K, Hill K, Robson W, Leaver G, Walker N et al. Nursing in Critical Care 2004; 9(5:199-212) NICE CG103 – Delirium: Diagnosis, Prevention and Management. http://www.nice.org.uk/guidance/cg103 Clinical Practice Guidelines for the Management of Pain, Agitation, and Delirium in Adult Patients in the Intensive Care Unit. Barr J, Fraser G L, Puntillo K, Ely W E, Gelinas C et al. Critical Care Medicine 2013; 41(1): 263-306 doi: 10.1097/CCM.0b013e3182783b72. A Systematic Review of Risk Factors for Delirium in the ICU. Zaal I J, Devlin J W, Peelen L M, & Slooter A J C Critical Care Medicine 2015; 43(1): 40-47.
4.3.2	Can describe the basic pharmacology and pharmacokinetics of agents used for the management of delirium.	
4.3.3	Can describe the key monitoring parameters for the use of agents used for the management of delirium.	
4.3.4	Provide details of national or international guidelines that include the use of agents used for the management of delirium.	
4.3.5	Can summarise the key differences between different agents used for the management of delirium in a level 2 (or below) patient.	
4.3.6	Can summarise the key differences between different agents used for the management of delirium in a level 3 patient.	

4.4 Understands and Applies Mental Health Strategies (depression, insomnia and anxiety)		
No	**Competency**	**Recommended Evidence and Experience**
4.4.1	Knows the key differences between agents used for mental health in the critically ill patient.	• Investigate the use of antidepressants in critical care. **Recommended Resources:** Any good Pharmacology text book The Patient Experience Website: www.Healthtalk.org (search for ICU/Intensive Care). This site has records of interviews with patients and their family. Access the website and in particular, read the extracts associated with emotion – (both during the stay and during recovery) Reflect on what you read and what you have seen in critical care and write a short reflective piece on how this may affect your future practice. Sleep Disruption in Critically Ill Patients – Pharmacological Considerations – Bourne RS & Mills GH. Anaesthesia 2004; 59: 374-384
4.4.2	Knows the basic pharmacology and pharmacokinetics of mental health agents in the critically ill patient.	
4.4.3	Can describe non-drug options for optimisation of mental health in the critically ill patient.	
4.4.4	Know the different uses of agents for mental health in critically ill patients	
4.4.5	Can describe the key parameters for monitoring the use of mental health agents in the critically ill patient.	

4.5 Understands and Manages Therapy of Parkinson's Disease.		
No	**Competency**	**Recommended Evidence and Experience**
4.5.1	Can give advice on management of therapies for Parkinson's Disease, including conversion to alternative treatment modalities/routes such as Rotigotine Patches and/or Apomorphine if required	• Demonstrate an understanding of any relevant Unit/Trust policies. • Complete a care plan for a Parkinson's patient who is NBM **Recommended Resources:** Any good pharmacology /pharmacokinetic text book NICE CG35 – Parkinson's Disease in over 20s: Diagnosis and Management http://www.nice.org.uk/guidance/cg35 Managing Parkinson's Disease During Surgery- Brennan K. A & Genever R .W BMJ – 2010; 341: c 5718. Doi: http://www.bmj.com/content/341/bmj.c5718

Section 5 – Infections

5.1 Understands and Manages Therapy for Infections		
No	**Competency**	**Recommended Evidence and Experience**
5.1.1	Can summarise the basic pathophysiological events, underlying and leading to infection.	• Describe the four cardinal signs of inflammation. • Describe the vascular and cellular events occurring within the tissues. • Define sepsis and septic shock. • Complete pharmaceutical care plan for a septic patient and discuss with critical care pharmacist. • Attend microbiology ward rounds. • Awareness of Trust antimicrobial guidelines for empiric treatment of the infections listed below. Discuss with the pharmacist. • Awareness of the diagnosis, likely organisms and management of the following infections. (Read articles and discuss with critical care pharmacist/antibiotic pharmacist). • Complete pharmaceutical care plan for a patient with/receiving: ➢ Clostridium Difficile ➢ CAP ➢ HAP/VAP ➢ Vancomycin and Gentamicin and discuss with critical care
5.1.2	Can describe the concept of SIRS, sepsis, severe sepsis and septic shock.	
5.1.3	Can outline common sources of infection for different body systems.	
5.1.4	Can describe the pharmacology and pharmacokinetics of anti-infective agents.	
5.1.5	Can outline the place in therapy, of supportive agents for sepsis (for example, steroids).	

5.1.6	Can summarise the key evidence base, regarding the use of supportive agents for sepsis.	pharmacist. • Describe the mechanism of action of anti-infectives and their routes of elimination – discuss with critical care pharmacist. • Awareness of Trust guidelines for Gentamicin and Vancomycin and how to adjust doses • Complete case studies and discuss with critical care pharmacist • Describe the role of temperature, WCC and CRP in monitoring treatment of infection. • Describe other methods of monitoring treatment of infection relating to source. • Spend time with infection control nurse. • Attend Annual Trust infection control training. • Awareness of Trust antimicrobial activity chart- discuss with critical care pharmacist/antibiotic pharmacist. • Describe the advantages and disadvantages of selective decontamination of the digestive tract (SDD) and if it is used in the Trust. • Awareness of Trust MRSA decolonisation policy. • Awareness of the professional bodies producing guidelines for management of infections – discuss with critical care pharmacist. **Recommended Resources:** An Overview of the Immune System. Nursing Standard 2008; 23(15-17): 47-56. National Institute for Health and Care Excellence (NICE). Sepsis: recognition, diagnosis and early management. NICE guideline NG51. July 2016 available online at: http://www.nice.org.uk/guidance/ Surviving Sepsis Campaign: International Guidelines for Management of Sepsis and Septic Shock: 2016. Intensive Care Med (2017) 43:304–377 NHS England. Patient Safety Alert. Resources to Support the Prompt Recognition of Sepsis and the Rapid Initiation of Treatment 2nd September 2014. Available on line at: http://www.england.nhs.uk/2014/09/02/psa-sepsis/ The JAMA Network: Sepsis. Available online at: http://sites.jamanetwork.com/sepsis/ Jamieson C. Healthcare Associated Infection- Hospital Acquired Infection, Hospital Pharmacist 2008; 15: 7-12 Moulder E. Healthcare Associated Infection Intervention Related Infection, Hospital Pharmacist 2008; 15: 13-15. Wickens H and Wade P. the Right Drug for the Right Bug. Pharm J 2005; 274: 365-368. Wickens H and Wade P. How Pharmacists Can Promote the Sensible Use of Antimicrobials. Pharm J 2005; 274: 427-430. Wickens H and Wade P. Understanding Antibiotic Resistance. Pharm J 2005; 274: 501-504. **** GASTROINTESTINAL SYSTEM **** UK Medicines Information (UKMI) Medicines Q and As. Clostridium Difficile Infection – Which Antimicrobials are Implicated. All current UKMi Q&As are available on the Specialist Pharmacy Services website www.sps.nhs.uk UK Medicines information (UKMI) Medicines Q and As Clostridium Difficile Infection – Are Acid Suppressant Medicines a Risk Factor? All current UKMi Q&As are available on the Specialist Pharmacy Services website www.sps.nhs.uk Department of Health (DoH). Clostridium Difficile Infection: How to Deal with the Problem DoH 2009. Cohen S.H, Gerding N.D, Johnson S et al Clinical Practice Guidelines for Clostridium Difficile Infection in Adults: 2010 update by the Society for Healthcare Epidemiology of America (SHEA) and the Infectious Diseases Society of America (IDSA). Infection Control Hosp Epidemiol 2010;
5.1.7	Can outline specific local strategies for optimisation of anti-infective therapy in critically ill patients. (For example, aminoglycosides, and vancomycin).	
5.1.8	Can outline monitoring parameters for anti-infective therapies	
5.1.9	Can summarise factors that lead to the development of resistance.	
5.1.10	Can describe the strategies for prevention and management of healthcare associated and cross infection	
5.1.11	Can describe the strategies for preventing ventilator-associated pneumonia	
5.1.12	Can summarise the spectrum of activity of common anti-infective agents	
5.1.13	Can describe infection reduction strategies, such as selective decontamination of the digestive tract (SDD), oral decontamination, and total skin decontamination – along with their underlying principals, where used.	
5.1.14	Can provide details of national or international guidelines that include the management of infection.	
5.1.15	Can provide details of national or international guidelines that include the management of infection in the critically ill patient.	

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**** CENTRAL NERVOUS SYSTEM ****

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Brouwer M.C, Thwaites GE, Tunkel A.R et al Bacterial Meningitis 1: Dilemmas in the Diagnosis of Acute Community Acquired Bacterial Meningitis. Lancet 2012: 380: 1684-1692.

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Section 6 – Endocrine System

6.1 Understands and manages acute diabetic emergencies

No	Competency	Recommended Evidence and Experience
6.1.1	Can summarise the pathophysiological events leading to acute diabetic emergencies	• Can define Hypoglycaemia, Diabetic Ketoacidosis, Hyperglycaemia, Hyperosmolar Non-Ketotic Coma/Hyperosmolar Hyperglycaemic State (HONK/HHS) and Lactic Acidosis • Make a list of drug groups that could potentially affect blood glucose control • Review common IV drugs administered on critical care for alternative routes/methods of administration and familiarise yourself with different diluents used for IV administration and the consequences associated with the choice of diluents • Become familiar with own Trust's guidance on management of Hypoglycaemia, Diabetic Ketoacidosis, Hyperglycaemia, Hyperosmolar Non-Ketotic Coma (HONK/HHS) and Lactic Acidosis • Develop a care plan for patients admitted to ITU with Hypoglycaemia, Diabetic Ketoacidosis, Hyperglycaemia, Hyperosmolar Non-Ketotic Coma (HONK/HHS) and Lactic Acidosis • Review ITU observation chart for a patient admitted with Hypoglycaemia, Diabetic Ketoacidosis, Hyperglycaemia, Hyperosmolar Non-Ketotic Coma (HONK/HHS) and Lactic Acidosis and also any results on results reporter. • Perform/shadow monitoring with critical care nurse **Recommended Resources:** Any good pharmacology textbook Leach R. Critical Care Medicine at a Glance. Third edition. Wiley-Blackwell. Oxford. 2014. 50 Diabetic Emergencies. Pages 100-102 McConachie I. Handbook of ICU Therapy. Second Edition. Cambridge University Press. London. 2006. 28 the Critically Ill Diabetic. Pages 392-400 Bersten AD, Soni N. OH's Intensive Care Manual. Seventh Edition. Butterworth Heinemann Elsevier. 2013. Chapter 58 Diabetic Emergencies. Pages 629-636
6.1.2	Can recognise and manage drug therapy and other factors that affect blood glucose control in critically ill patients	
6.1.3	Can summarise strategies for the management of acute diabetic emergencies	
6.1.4	Can describe the key monitoring parameters for patients with acute diabetic emergencies	

		**** HYPOGLYCAEMIA **** Heller SR. Hypoglycaemia in Diabetes. Medicine 2006; 34(3):107-110 Wright J, Gray AH, Goodey V. Clinical Pharmacy. First Edition. London. Pharmaceutical Press. 2006. Hypoglycaemia. Pages 92-95 Longmore M, Wilkinson I, Baldwin A, Wallin E. Oxford Handbook of Clinical Medicine. Ninth Edition. Oxford University Press. Oxford. 2014. Hypoglycaemic Coma. Page 206, 844 **** DIABETIC KETOACIDOSIS **** Nattrass M. Diabetic Ketoacidosis. Medicine 2006; 34(3):104-106 Wright J, Gray AH, Goodey V. Clinical Pharmacy. First Edition. London. Pharmaceutical Press. 2006. Diabetic Ketoacidosis. Pages 96-99 Elliott R. Critical Care Therapeutics. First Edition. Pharmaceutical Press. London. 1999. Chapter 12 Management of Acute Medical Crisis. Pages 154-155 Longmore M, Wilkinson I, Baldwin A, Wallin E. Oxford Handbook of Clinical Medicine. Ninth Edition. Oxford University Press. Oxford. 2014. Diabetic Ketoacidosis. Pages 842-843 Kumar P, Clark M. Clinical Medicine. Eighth Edition. Saunders Elsevier. London. 2012. Chapter 20 Diabetes Mellitus and Other Disorders of Metabolism. Diabetic Metabolic Emergencies. Pages 1001-1046 **** HYPERGLYCAEMIA **** Kitabchi A, Kreisberg R, Umpierrez G et al. Management of Hyperglycaemic Crises in Patients with Diabetes. Diabetes Care 2001. 24(1): 131-153 http://care.diabetesjournals.org/content/27/suppl_1/s94.full.pdf+html Wright J, Gray AH, Goodey V. Clinical Pharmacy. First Edition. London. Pharmaceutical Press. 2006. Hyperglycaemia. Page 92 **** HYPEROSMOLAR NON-KETOTIC COMA/HYPEROSMOLAR HYPERGLYCAEMIC STATE (HONK/HHS) **** Wright J, Gray AH, Goodey V. Clinical Pharmacy. First Edition. London. Pharmaceutical Press. 2006. Hyperosmolar Non-Ketotic Syndrome (HONS or HONK/HHS). Pages 99-101 Elliott R. Critical Care therapeutics. First Edition. Pharmaceutical Press. London. 1999. Chapter 12 Management of Acute Medical Crisis. Page 156 Longmore M, Wilkinson I, Baldwin A, Wallin E. Oxford Handbook of Clinical Medicine. Ninth Edition. Oxford University Press. Oxford. 2014. Hyperglycaemic Hyperosmolar Non-Ketotic (HONK/HHS) Coma. Page 844 Kumar P, Clark M. Clinical Medicine. Eighth Edition. Saunders Elsevier. London. 2012. Chapter 20 Diabetes Mellitus and Other Disorders of Metabolism. Diabetic Metabolic Emergencies. Pages 1001-1046 **** LACTIC ACID **** Elliott R. Critical Care Therapeutics. First Edition. Pharmaceutical Press. London. 1999. Chapter 12 Management of Acute Medical Crisis. Page 156 Kumar P, Clark M. Clinical Medicine. Eighth Edition. Saunders Elsevier. London. 2012. Chapter 20 Diabetes Mellitus and Other Disorders of Metabolism. Diabetic Metabolic Emergencies. Pages 1001-1046

		**** Blood Glucose Control **** Wright J, Gray AH, Goodey V. Clinical pharmacy. First Edition. London. Pharmaceutical Press. 2006. Factors Affecting Insulin Requirements. Pages 84-87 **** ALTERNATIVE ROUTES/METHODS OF ADMINISTRATION/ HYPOGLYCAEMIA, DIABETIC KETOACIDOSIS, HYPEROSMOLAR NON-KETOTIC COMA (HONK/HHS) AND LACTIC ACIDOSIS **** Leach R. Critical Care Medicine at a Glance. Third edition. Wiley-Blackwell. Oxford. 2014. 50 Diabetic Emergencies. Pages 100-102 McConachie I. Handbook of ICU therapy. Second Edition. Cambridge University Press. London 2006. 28 The Critically Ill Diabetic. Pages 392-400 Kumar P, Clark M. Clinical Medicine. Eighth Edition. Saunders Elsevier. London. 2012. Chapter 20 Diabetes Mellitus and Other Disorders of Metabolism. Diabetic Metabolic Emergencies. Pages 1001-1046 Bersten AD, Soni N. OH's Intensive Care Manual. Seventh Edition. Butterworth Heinemann Elsevier. 2013. Chapter 58 Diabetic Emergencies. Pages 629-636 For looking at alternative routes consult: • Current BNF • Electronic Medicines Compendium http://www.medicines.org.uk/emc/ • Medusa Injectable Medicines Guide: http://www.injguide.nhs.uk/ • UCL Hospitals Injectable Medicines Administration Guide. Third Edition. Wiley-Blackwell. London. 2010. Perform/shadow monitoring with ITU nurse • Jevon P, Ewens B. Monitoring the Critically Ill Patient. Second Edition. Blackwell Publishing. Oxford. 2008. Monitoring Endocrine Function. Pages 210-216 • Leach R. Critical Care Medicine at a Glance. Third edition. Wiley-Blackwell. Oxford. 2014. 50 Diabetic Emergencies. Pages 100-102 • Kumar P, Clark M. Clinical Medicine. Eighth Edition. Saunders Elsevier. London. 2012. Chapter 20 Diabetes Mellitus and Other Disorders of Metabolism. Diabetic Metabolic Emergencies. Pages 1001-1046 • Bersten AD, Soni N. OH's Intensive Care Manual. Seventh Edition. Butterworth Heinemann Elsevier. 2013. Chapter 58 Diabetic Emergencies. Pages 629-636

6.2 Understands and applies strategies for glycaemic control

No	Competency	Recommended Evidence and Experience
6.2.1	Can summarise local strategies for the use of glycaemic control in critically ill patients	• Look at ITU/own Trust's protocol for tight glycaemic control in critically ill patients • Look at patients on ITU and their blood glucose results and interpret the readings and how they influence the management of that patient • Can describe how blood glucose is measured • List the key monitoring parameters and frequency of which they should be monitored • Make a list of different types of patients that would need tight glycaemic control and discuss the list with the ITU pharmacist **Recommended Resources:** Any good pharmacology textbook and/or NICE – sugar Study investigators. Intensive versus conventional glucose control in critically ill patients. NEJM 2009; 360:1283-97 Van Den Berghe G et al. Intensive Insulin Therapy in Critically Ill Patients. N
6.2.2	Can describe the key monitoring parameters for patients on glycaemic control regimens	
6.2.3	Can interpret criteria to identify patients suitable for glycaemic control	
6.2.4	Can summarise the key evidence base regarding tight glycaemic control	
6.2.5	Can provide details of national or international guidelines that include tight glycaemic control	

		Engl J Med 2006; 354(19):1359-67 http://content.nejm.org/cgi/reprint/345/19/1359.pdf Van Den Berghe G Et al. Intensive Insulin Therapy in the Medical ICU. N Engl J Med 2006: 354(5):449-461 http://content.nejm.org/cgi/reprint/354/5/449.pdf Implementation of a Safe and Effective Insulin Infusion Protocol in a Medical Intensive Care Unit http://care.diabetesjournals.org/content/27/2/461.full?sid=7ce76213-daab-4d71-8f22-81e205956fca Dellinger RP, Levy MM, Rhodes A, Annane D et al. Surviving Sepsis Campaign: International Guidelines for Management of Severe Sepsis and Septic Shock: 2012. Critical Care Medicine. Pages 580-637

6.3 Understands and applies strategies for the use of steroids

No	Competency	Recommended Evidence and Experience
6.3.1	Can differentiate the pharmacological properties of different corticosteroids	• Formulate a table with the different corticosteroids used on your ITU in one column and a summary of their pharmacological properties in another column. Also look at the dose equivalents between the different corticosteroids • Make a list of different uses and the doses prescribed of corticosteroids in the treatment of critically ill patients on ITU and discuss this list with the Critical Care Pharmacist • Do a care plan for a patient on corticosteroids • List the biochemical monitoring needed for patients on corticosteroids • Corticosteroids – Formulate a table and for each side effect list a management option. Discuss the table with the Critical Care Pharmacist • Make a list of adverse effects that are associated with corticosteroid use and discuss them with the Critical Care Pharmacist **Recommended Resources:** Any good pharmacology textbook and/or Richards D, Aronson J, Coleman J, Reynolds DJ. Oxford Handbook of Practical Drug Therapy. Oxford University Press. 2011. Corticosteroids. Pages 486-494 Rang HP, Dale MM, Ritter JM, Flower RJ Pharmacology. Seventh Edition. Churchill Livingstone. London. 2011. Chapter 32: The Pituitary and Adrenal Cortex. Pages 394-409 **** SEPSIS **** Annane D, Sebille V, Charpentier C et al. Effect of treatment with low doses of hydrocortisone and fludrocortisone on mortality in patients with septic shock. JAMA, 2002; 288(7):862-871
6.3.2	Can describe various uses of corticosteroids in the critically ill	
6.3.3	Can describe the key monitoring parameters for corticosteroids in the critically ill	
6.3.4	Can recognise adverse effects of corticosteroids	
6.3.5	Can describe options to minimise the adverse effects of corticosteroids in the critically ill	
6.3.6	Can provide details of national or international guidelines that include the use of steroids in critically ill patients	

Section 7 – Obstetrics, Gynaecology & Urinary Tract Disorders is not applicable for Band 7 Training

Section 8 – Malignant Diseases and Immunosuppresion is not applicable for Band 7 Training

Section 9 – Nutrition & Blood

9.1 Understands and Applies Methods of Providing Adequate Nutrition

No	Competency	Recommended Evidence and Experience
9.1.1	Can summarise the key risks and benefits of enteral and parenteral feeding options.	• Make a list of the Pros and Cons of Enteral Nutrition vs Parenteral Nutrition. • Make a list of the different types of Enteral Feeding tubes and describe for each, where they are placed. • Look at a few of the ITU drug charts and for each drug on them, that is given enterally, look up and note down issues re drug administration and absorption • Make a list of the disease states that have an impact on Nutrition Support and note down why. • Create a table of the key elements of Nutrition and describe their function. • Attend the Nutrition Team ward round and/or arrange to spend time with Critical care Dietician or Nutrition Pharmacist. • Find out what the procedure is for obtaining PN/enteral nutrition in your Trust, and what role, if any, pharmacy has in this. (Consider in and out of normal working hours.) • Read your Trust's PN Policy. • Make a list of Common Critical Care drugs that affect what is put in a patient's PN bag. • Complete a care plan on a patient receiving total parenteral nutrition and discuss with the Critical Care Pharmacist. **Recommended Resources** Kreymann KG et al. ESPEN Guidelines on Enteral Nutrition: Intensive Care. Clinical Nutrition 2006; 25:210-223. Singer P et al. ESPEN Guidelines on Parenteral Nutrition: Intensive Care. Clinical Nutrition 2009; 28: 387-400. Thomson FC. Managing Drug Therapy in Patients Receiving Enteral and Parenteral Nutrition. Hospital Pharmacist 2000; Vol 7 (6): 155-164. White R, Bradnam V. Handbook of Drug Administration via Enteral Feeding Tubes. Third Edition. Pharmaceutical Press London. 2015. National Institute for Health and Care Excellence. Nutrition Support in Adults: Oral Nutrition Support, Enteral Tube Feeding and Parenteral Nutrition. February 2006. https://www.nice.org.uk/guidance/cg32
9.1.2	Can describe different routes for providing enteral nutrition	
9.1.3	Can describe the implications of different routes of enteral administration on drug absorption	
9.1.4	Can summarise the implications of different disease states on the constitution of nutritional support.	
9.1.5	Can describe the key elements of enteral and parenteral feeding regimes.	
9.1.6	Can provide details of national or international guidelines that include nutritional recommendations	

9.2 Understands and Applies Methods of Fluid Management.

No	Competency	Recommended Evidence and Experience

9.2.1	Can summarise the differences and properties of the various classes of fluids	• Demonstrate an understanding of the difference of fluids:
		  ➢ Crystalloids – with examples
		  ➢ Colloids – with examples
		• Demonstrate an understanding of the body's fluid compartments and the way in which crystalloids/colloids can be used for replacement.
		• For each crystalloid/colloid identified above, know of its composition and how that would compare to normal physiological fluid.
		• Demonstrate an understanding of the five basic principles of fluid replacement.
		• For each of the fluids identified above, list the situations in which each would be used e.g. Post-surgery.
		• Review fluid balance charts for a selection of patients and look to see if the fluids prescribed were appropriate for their condition/balance.
		• Produce a pharmaceutical care plan for a patient requiring fluid replacement and detail monitoring parameters, indications for use, etc.
		
		Recommended Resources:

9.2.2	Can describe the key monitoring parameters for the use of fluids	
9.2.3	Can provide details of national or international guidelines that include the use of fluids	

		Any good pharmacological text book and/or Powell-Tuck J et al. British Consensus Guidelines on intravenous Fluid Therapy for Adult Surgical Patients. March 2011. www.bapen.org.uk/pdfs/bapen_pubs/giftasup.pdf National institute for Health and Care Excellence. Intravenous Fluid Therapy in Adults in Hospital. December 2013. http://www.nice.org.uk/guidance/cg174/resources/intravenousfluid-therapy-in-over-16s-in-hospital-35109752233669

Section 10 – Musculoskeletal & Joint Diseases is not applicable for Band 7 Training

Section 11 – Eye

11.1 Can give advice on basic eye care for critically ill patients

No	Competency	Recommended Evidence and Experience
11.1.1	Can give advice on basic eye care for critically ill patients	• Demonstrate an awareness of any relevant unit/ trust guidance • Can describe basic eye care in a critically ill patient • Has an awareness of common eye problems in the critically ill patient, especially the issues with loss of protective mechanisms. **Recommended Resources:** Eye Care, Mooney G. Nursing times. 21 June 2007. https://www.nursingtimes.net/clinical-archive/assessment-skills/eye-care/199389.article JBIEBNM 2002 Eye care for intensive care patients, Best Practice Vol 6 Issue 1, Blackwell Publishing, Australia. ISSN 1329-1874 The neglected eye: Ophthalmological Issues in the intensive unit. Ramirez F, Ibarra S, Varon J, Tang R. Critical care and Shock (2008) 11: 72-82 Developing Clinical guidelines in eye care for intensive care. Douglas L, Berry S. Ophthalmology. June 2011 : Vol 23 : Number 5

Section 12 – Ear, Nose & Oropharynx is not applicable for Band 7 Training

Section 13 – Skin is not applicable for Band 7 Training

Section 14 – Immunological Products & Vaccines

14.1 Understands the Rationale of Splenectomy Prophylaxis		
No	**Competency**	**Recommended Evidence and Experience**
14.1.1	Can give advice on vaccination and antibiotic prophylaxis for splenectomy patients.	• Describe the structure and function of the spleen. • Describe the indications for splenectomy. • Describe the complications of splenectomy including immunisations required and antimicrobial prophylaxis. **Recommended Resources:** Any good pharmacology text book. Patient UK. Splenectomy and Hyposplenism. Last checked 19th Dec 2016. Available online at: http://patient.info/doctor/splenectomy-and-hyposplenism Yildzi AE, Ariyurek O and Karcaaltincaba M. Splenic Anomalies of Shape, Size and Location. The Scientific World Journal 2013: 1-9. Strickland A and Lloyd D. The Spleen and Indications for Splenectomy. Surgery 2007; 25(2): 98-101. Davies J.M, Lewis M.P, Wimperis J et al. Review of Guidelines for the Prevention and Treatment of Infection in Patients with an Absence or Dysfunctional Spleen: Prepared on behalf of the British Committee for Standards in Haematology by a Working Party of the Haematol- Oncology Task Force. Br J Haematol 2011; 155(3): 308-317. Rubin L.G, Levin M.J, Ljungman P et al. ISDA Practice Guideline for Vaccination of the Immunocompromised Host. Clin Infect Dis 2014; 58(3): 309-318. Public Health England. Immunisation Against Infectious Diseases https://www.gov.uk/government/collections/immunisationagainst-infectious-disease-the-green-book Immunisation of Individuals with Underlying Medical Conditions: The Green Book, Chapter 7. Public Health England. First published 20th March 2013. Updated regularly, see website for most recent version. Available online at: https://www.gov.uk/government/publications/immunisation-ofindividuals-with-underlying-medical-conditions-the-green-bookchapter-7 Influenza: The Green Book, chapter 19. Public Health England. First published 20th March 2013. Updated regularly, see website for most recent version. Available online at: https://www.gov.uk/government/publications/influenza-the-green-book-chapter-19 Meningococcal: The Green Book chapter 22. Public Health England. First published 20th March 2013. Updated regularly, see website for most recent version. Available online at: https://www.gov.uk/government/publications/meningococcal-the-green-book-chapter-22 Pneumococcal: The Green Book chapter 25. Public Health England. First published 20th March 2013. Updated regularly, see website for most recent version. Available online at https://www.gov.uk/government/publications/pneumococcal-the-green-book-chapter-25

14.2 Understands the Rationale of Treatment and Prevention of Tetanus		
No	**Competency**	**Recommended Evidence and Experience**
14.2.1	Can give advice on the use of products to prevent tetanus in trauma patients	• Describe tetanus. • Define the risk factors for a tetanus prone wound. • An awareness of the immunisation recommendations for clean and tetanus prone wounds, including when tetanus immunoglobulin is used. **Recommended Resources:** Rhee P, Nunley M.K, Demetriades D et al. Tetanus and Trauma: A Review and Recommendations. J Trauma 2005; 58: 1082 – 1088. Public Health England. Immunisation Against infectious Diseases – available online at: https://www.gov.uk/government/collections/immunisation-against-infectious-disease-the-green-book Tetanus: The Green Book Chapter 30. Public Health England. First published 20th March 2013. Updated regularly, see website for most recent version. Available online at: https://www.gov.uk/government/publications/tetanus-the-green-book-chapter-30 Tetanus Immunoglobulin: Tetanus Immunoglobulin Alternatives. Public Health England 30th June 2015. Updated regularly, see website for most recent version. Available online at: https://www.gov.uk/government/publications/immunoglobulin-when-to-use

Section 15 – Anaesthesia

15.1 Understands and Applies Methods of Sedation Management.		
No	**Competency**	**Recommended Evidence and Experience**
15.1.1	Knows the difference between classes of commonly used sedative agents, used in the management of a level 2 (or below) patient.	• Demonstrate an awareness of different classes used. • Demonstrate an awareness of the impact of organ failure on pharmacokinetics. • Review Unit Sedation policy and demonstrate an understanding of the drugs used. • Be able to describe the monitoring strategy used in the Trust/Unit. • Develop either a case study on a sedated patient or a pharmaceutical care plan for a level 3 patient, on sedation. • Include the monitoring used in either the care plan above or the case study and critically assess it. **Recommended Resources:** Any good pharmacology/pharmacokinetic book. Analgesia and Sedation in the Intensive Care Unit. Critical Care 2008; 12 [Suppl. 3]. Critical Care Med 2009; 37 [Suppl.] S416-S421. Patients' Recollections of Stressful Experience, While Receiving Prolonged Mechanical Ventilation in an Intensive Care Unit. Rotondi A.J, Ladshmipathi C et al. Critical Care Med 2002; 30(4): 746-752. Cooperative Sedation: Optimizing Comfort while Maximizing Systemic and Neurological Function. Goodwin et al Critical Care 2012, 16:217 Patient Experience website: http://www.healthtalkonline.org/Intensive_care/ ICS Sedation Guidelines: http://www.ics.ac.uk/ICS/guidelines-and-standards.aspx
15.1.2	Knows the difference between classes of commonly used sedative agents used in the management of a level 3 patient	
15.1.3	Knows the basic pharmacology and pharmacokinetics of sedative agents in a level 2 (or Below) patient	
15.1.4	Can describe the basic pharmacology and pharmacokinetics of sedative agents in a level 3 patient	
15.1.5	Knows the common uses of sedative agents in critically ill patients.	
15.1.6	Can describe the key monitoring parameters for the use of sedative agents, in a level 2 (or below) patient	
15.1.7	Can describe key monitoring parameters for the use of sedative agents, in a level 3 patient	
15.1.8	Can provide details of national or international guidelines that include the use of sedative agents in a level 3 patient.	

15.2 Understands and Applies Methods of Neuromuscular Blockade Management.		
No	**Competency**	**Recommended Evidence and Experience**
15.2.1	Knows the key differences between different neuromuscular blocking agents	• Be aware of any Unit guidelines on neuromuscular blocking agents. • Investigate the use of Train of Four and BIS monitoring, and any other methods used by the Unit. **Recommended Resources:** Any good pharmacology/pharmacokinetic text book. (BNF chapter 15, Martindale, etc.) Clinical Practice Guidelines for Sustained Neuromuscular Blockade in the Adult Critically Ill Patient. American Journal of Health-System Pharmacy. 2002; 59(2). http://www.medscape.com/viewarticle/424720 Role of Analgesics, Sedatives, Neuromuscular Blockers and Delirium. Hall J.B, Schweickert W & Kress J.P.Critical Care Med 2009; 37 [Suppl.]:S416-S421
15.2.2	Can describe the basic pharmacology and pharmacokinetics of neuromuscular blocking agents	
15.2.3	Knows the different uses of neuromuscular blocking agents	
15.2.4	Can describe the key monitoring parameters for the use of neuromuscular blocking agents	
15.2.5	Can provide details of national or international guidelines that include the use of neuromuscular blocking agents.	

Section 16 – Liver Disease

16.1 Understands and Manages patients with acute and chronic hepatic failure		
No	**Competency**	**Recommended Evidence and Experience**

16.1.1	Can summarise the basics of hepatic physiology.	• Can demonstrate and understanding of the role/importance of:
		  • Hepatocytes
		  • Biliary tree and gallbladder
		  • Blood supply to the liver
		
		• Can describe and demonstrate a working knowledge of normal ranges for liver
		  ➢ Enzymes
		  ➢ Ammonia
		  ➢ Bilirubin
		  ➢ Blood glucose
		  ➢ Albumin
		
		• Other markers of synthetic function based on discussion
		• Can describe the role of Biopsy/USS and understand the importance of signs on physical examination:
		  ➢ Gynaecomastia
		  ➢ Spider Naevi
		  ➢ Ascites
		  ➢ Encephalopathy
		  ➢ Pruritus, etc
		
		• Case based discussion on:
		  ➢ Liver function tests
		  ➢ Drug dose
		  ➢ Choices with Mentor
		
		Recommended Resources:
		
		ABC of Disease of the Liver, Pancreas and Biliary System. Investigation of Liver and Biliary Disease. BMJ 2001; 322:33
		
		Any up to date Physiology textbook.
		
		Bernal W Wendon J. Acute Liver Failure. N Engl J Med 2013; 369: 2525-2534
		
		Drugs and the Liver. Ed Penny North Lewis. Pharmaceutical Press 2008. London.

16.1.2	Can summarise the key methods for the monitoring of hepatic function.	
16.1.3	Can interpret the results of different methods for monitoring of hepatic function results	
16.1.4	Can interpret possible underlying causes of abnormal hepatic function results.	
16.1.5	Can interpret and apply these results to inform appropriate drug dosing decisions.	
16.1.6	Can interpret the likely underlying causes of hepatic function results.	
16.1.7	Can summarise the key differences between acute and chronic hepatic failure.	
16.1.8	Can summarise the basic pathophysiological events leading to acute and chronic hepatic failure	
16.1.9	Can recognise and manage drug therapy that affectepatic functions	

Section 17 – Renal Impairment

17.1 Understands and Applies Methods for Monitoring Renal Function.		
No	**Competency**	**Recommended Evidence and Experience**
17.1.1	Can summarise the basics of renal physiology	• Describe the structure and function of the kidney. • Describe the different methods for measuring renal function and their limitations. • Demonstrates an awareness of the role of creatinine, urea and urine output in monitoring renal function. • Describe characteristics of drugs, which will be most affected by renal impairment and what factors to consider when selecting drugs for patients with renal impairment. • Demonstrates an awareness of when to use eGFR and when to use creatinine clearance for adjusting drug doses. • Demonstrates ability to calculate creatinine clearance (including for obese patients) GFR absolute when necessary. • Demonstrates an awareness of reference sources available, (including their advantages and disadvantages) can give advice on drug dosing in renal impairment. • Demonstrates ability to adjust dosing regimens for patients with impaired renal function. **Recommended Resources:** Any good pharmacology/pharmacokinetic text book. Traynor J, Mactier R, Geddes C.C. How to Measure Renal Function in Clinical Practice. BMJ 2006; 333: 733-737. How the Reclassification of Kidney Disease Impacts on Dosing Adjustments. PJ 2006; 277: 403-404. How to Approach Prescriptions for Patients with Renal Impairment. Clinical Pharmacist 2009; 1: 179-183. Drug Use and Dosing in the Renally Impaired Adult. PJ 2003; 271: 744-746. What factors need to be considered when dosing patients with renal impairment? Most recent information available from www.sps.nhs.uk/articles/what-factors-need-to-be-considered-when-dosing-patients-with-renal-impairment-2/
17.1.2	Can summarise the key methods for monitoring of renal function.	
17.1.3	Can interpret the results of different methods for monitoring of renal function.	
17.1.4	Can apply monitoring results to inform appropriate drug dosing decisions.	

17.2 Understands and Manages Patients with Acute and Chronic Renal Failure		
No	**Competency**	**Recommended Evidence and Experience**
17.2.1	Can summarise the key differences between acute and chronic renal failure.	**** ACUTE KIDNEY INJURY **** • Describe the characteristics of acute kidney injury and ability to identify these patients on an Intensive Care unit. • Define anuria, oliguria and non-oliguria. • Describe the causes of acute kidney injury including prerenal, intrinsic and post renal. • Demonstrate an awareness of drugs which cause kidney injury and their mechanisms. • Describe the Acute Kidney Injury Network staging system for acute kidney injury. • Demonstrate an awareness of drugs and diseases which can affect serum urea and creatinine. • Describe the strategies for preventing acute kidney injury, secondary to radiological contrast media. • Describe the treatment strategies for patients with acute kidney injury, including volume replacement, treatment of underlying medical condition and avoidance of nephrotoxic drugs.
17.2.2	Can summarise the pathophysiological events leading to acute and chronic renal failure.	
17.2.3	Can recognise and manage drug therapy that affects renal function	
17.2.4	Can summarise pharmacological strategies for the prevention of acute renal failure in at risk patients.	
17.2.5	Can describe options for the management of acute renal failure.	

17.2.6	Can describe the key monitoring parameters for patients with acute renal failure.	• Demonstrate an awareness of the role of creatinine, urea and urine output in monitoring renal function. • Complete pharmaceutical care plan for patient with acute kidney injury and discuss with critical care pharmacist. **** CHRONIC KIDNEY DISEASE **** • Define chronic kidney disease. • Describe the risk factors for chronic kidney disease. • Knows the classification of chronic kidney disease. • Describe interventions to slow the rate of progression of chronic kidney disease. • Describe how other complications of chronic kidney disease are managed e.g. ➢ Blood pressure ➢ Cardiovascular disease ➢ Anaemia ➢ Mineral and bone disorders • Complete pharmaceutical care plan for a patient with chronic renal failure and discuss with critical care pharmacist. **Recommended Resources:** Any good pharmacology/pharmacokinetic text book. Lewington A. Communities at Risk of Developing Acute Kidney Injury. "Think Kidneys". NHS England in Partnership with UK Renal Registry 1st July 2015. Shaw S and Coleman A. Acute kidney Injury – Diagnosis, Staging and Prevention. Clinical Pharmacist 2012 (4): 98- 102. Shaw S, Morley C, Ashley C and Selby N. Acute Kidney Injury – Management. Clinical Pharmacist 2012 (4) 103-106. Ashley C Renal Failure – How Drugs Can Damage the Kidney. Hospital Pharmacist 2004; 11: 48-53. Ashley C, Ostermann M and Shaw S. Guidelines for Medicines Optimisation in Patients with Acute Kidney Injury in Secondary Care. "Think Kidneys". NHS England in Partnership with UK Renal Registry 1st June 2015. Faculty of Intensive Care Medicine and the Intensive Care Society. Acute Kidney Injury. Guidelines for Provision of Intensive Care Services. Edition 1 2015. National Institute for Health and care Excellence (NICE). Acute Kidney Injury: Prevention, Detection and Management. NICE guideline CG169. August 2013. Available online at: https://www.nice.org.uk/guidance/cg169 Lewington A and Kanagasundaram S. Clinical Practice Guidelines: Acute Kidney Injury. UK Renal Association. 2008. Available at: http://www.renal.org/guidelines/modules/acute-kidney-injury Bosch X, Poch E and Grau J.M. Rhabdomyolysis and Kidney Injury. NEJM 2009; 361: 62-72. Health Education England. E Learning for Healthcare. Renal Medicine Kidn-e 01 Acute Kidney Injury available online at: http://www.e-lfh.org.uk/programmes/renal-medicine/ Sexton J. Chronic kidney Disease – A Refresher. Pharm J 2013; 291: 85-88. Popat R. Chronic Kidney Disease – Clinical Features and Renal Replacement Therapies. Clinical Pharmacist 2011; (3): 15-19. Popat R Chronic Kidney Disease – Managing the Complications. Clinical Pharmacist 2011; (3): 20-24. National Institute for Health and Care Excellence (NICE). Chronic Kidney Disease in Adults: Assessment and Management. NICE guideline CG182. July 2014. Available online at: https://www.nice.org.uk/Guidance/cg182

		Stage IV Chronic Kidney Disease. NEJM 2010; 362: 56-65. Scottish Intercollegiate Guidelines Network (SIGN). Diagnosis and Management of Chronic Kidney Disease. SIGN Guideline 103 2008 available online at: http://www.sign.ac.uk/guidelines/fulltext/103/index.html Health Education England. e learning for healthcare. Renal medicine Kidn-e 02 Chronic kidney disease available online at: www.e-lfh.org.uk/home/

17.3 Understands the Basics of Renal Replacement Therapy

No	Competency	Recommended Evidence and Experience
17.3.1	Can summarise the indications for renal replacement therapies.	• Describe the indications for renal replacement therapy. • Describe the difference between intermittent haemodialysis and continuous renal replacement therapy, know when each one is used and their respective dosing requirements • Demonstrate an awareness of the different types of renal replacement therapy including: ➢ CVVH (Continuous Venovenous Hemofiltration) ➢ CVVHD (Continuous Venovenous Haemodialysis) ➢ CVVHDF (Continuous Venovenous Haemodiafiltration) ➢ SCUF (Slow Continuous Ultrafiltration) ➢ SLED (Slow Extended Daily Dialysis) ➢ IHD (Intermittent Haemodialysis) • Know which form(s) of renal replacement therapy are used in own Intensive Care Unit. • Describe the composition of renal replacement fluids and understand the role of buffering. Know which renal replacement fluids are used in own Intensive Care Unit. • Describe the choices available for anticoagulation in renal replacement therapy and when not to use anticoagulation. • Know which anticoagulation strategies are used in own Intensive Care Unit. • Demonstrates and awareness of the complications associated with renal replacement therapy • Describe which drugs are usually dialysed and how the following factors affect removal of a drug, from the blood by renal replacement therapy. ➢ Renal clearance as a proportion of total body clearance ➢ Protein binding ➢ Volume of distribution ➢ Water/lipid solubility ➢ Molecular weight ➢ Presence of active and /or toxic metabolites • Demonstrates ability to adjust dosing regimens for patients receiving renal replacement therapy. • Observe a patient receiving continuous renal replacement therapy, including: ➢ Initiation ➢ Preparation and changing of bags ➢ Monitoring and associated documentation ➢ Complications Complete pharmaceutical care plan for a patient receiving continuous renal replacement therapy and discuss with critical care pharmacist. **Recommended Resources:** Any good pharmacology/pharmacokinetics text book. Faculty of Intensive Care Medicine and the Intensive Care Society. Acute Renal Replacement Therapy. Guidelines for Provision of Intensive Care Services. Edition 1 2015. Green A. Dialysis: Principles and Treatment Options. Clinical Pharmacist 2015;
17.3.2	Can describe the key differences between different methods of renal replacement therapy.	
17.3.3	Can describe the difference between renal replacement fluids.	
17.3.4	Can describe the objectives and monitoring parameters for anticoagulation strategies in patients on RRT.	
17.3.5	Can summarise the possible complications of RRT.	
17.3.6	Can describe the various factors that affect drug removal in different methods of RRT.	
17.3.7	Can apply an understanding of methods of RRT to inform decisions around appropriate drug doses for patients.	

		7(2): DOI: 10.1211/CP.2015.20068038. Green A. Dialysis: Management. Clinical Pharmacist 2015; 7(2): DOI: 10.1211/CP.2015.20068052. Ashley C. Renal Failure – Options for Renal Replacement Therapy. Hospital Pharmacist 2004; 11: 54-61. Short A and Cumming A. ABC of Intensive Care: Renal Support. BMJ 1999; 319: 41-44. Dirkes S and Hodge K. Continuous Renal Replacement Therapy in the Adult Intensive Care Unit. Critical Care Nurse 2007; 27: 61-80. Pannu N and Gibney N. Renal Replacement Therapy in the Intensive Care Unit. Therapeutics and Clinical Risk Management 2005; 1 (2): 141-150. Intensive Care Society (ICS). Standards and Recommendations for the Provision of Renal Replacement Therapy on Intensive Care Units in the United Kingdom. The Intensive Care Society 2009. (Under review). Pannu N, Klarenbach S and Wiebe N et al. Renal Replacement Therapy in Patients with Acute Renal Failure: A Systematic Review. JAMA 2009; 299 (7): 793-805. What factors need to be considered when dosing patients on renal replacement therapies? All current UKMi Q&As are available on the Specialist Pharmacy Services website www.sps.nhs.uk

Section 18 – Pregnancy is not applicable for Band 7 training

Section 19 – Breast Feeding is not applicable for Band 7 training

Section 20 – Older People is not applicable for Band 7 training

Section 21 – Toxicology

21.1 Understands the Basics of Poisoning Emergencies

No	Competency	Recommended Evidence and Experience
21.1.1	Knows the basic pharmacology and pharmacokinetics of Naloxone, Flumazenil and N-Acetylcysteine when used for the management of poisoning	• Complete pharmaceutical care plan for a patient with overdose/discuss with Critical Care Pharmacist if a suitable patient is not available. • Awareness of the common antidotes stocked within the Trust **Recommended Resources** Toxbase available online at: http://www.toxbase.org/ Toxbase® app available for iPhone, iPad and Android – free for NHS employees when registering with an NHS email account Martindale the Complete Drug Reference - available online through Medicines Complete at: http://www.medicinescomplete.com/mc/martindale/current/ Micromedex available online at: http://www.micromedexsolutions.com/home/dispatch Medscape available online at: http://medscape.com Parsons G. Illicit Drug Overdose: Managing Emergency Care. Pharm J 2015;
21.1.2	Can list information resources where further detailed information can be found on the management of toxicological emergencies.	

		294: 485-487. **** NALOXONE **** Boyer E.W. Management of Opioid Analgesic Overdose. N Engl J Med 2012; 367: 146-155. Bateman D.N. Opioids. Medicine 2012; 40(3): 141-143. UK Medicines Information (UKMI). Medicines Q and A's. What Naloxone doses should be used in adults to reverse urgently, the effects of opioids or opiates? All current UKMi Q&As are available on the Specialist Pharmacy Services website www.sps.nhs.uk Toxbase – Naloxone – Antidotes and Anti-venoms, most recent information is available online at: https://www.toxbase.org Toxbase – Naloxone – Flow Chart – most recent information is available online at: https://www.toxbase.org https://www.england.nhs.uk/2014/11/psa-naloxone/ **** FLUMAZENIL **** Bateman D.N. Benzodiazepines. Medicine 2012; 40(3): 111 Toxbase – Flumazenil – Antidotes and Anti-venoms – most recent information is available online at: https://www.toxbase.org **** ACETYLCYSTEINE **** Towers K and Wagle S. Question from Practice: Management of Paracetamol Overdose: Pharm J 2014; 292: DOI: 10.1211/PJ. 2014.11137924. Ferner R.E, Dear J.W and Bateman D.N. Management of Paracetamol Poisoning BMJ 2011; 342: d2218. Vale A. Paracetamol. Medicine 2012; 40(3): 144-146. Heard K.J. Acetylcysteine for Acetaminophen Poisoning. N Engl J Med 2008; 359: 285-292 Toxbase- Acetylcysteine – Antidotes and Anti-venoms.- most recent information is available online at https://www.toxbase.org Toxbase – Acetylcysteine Dosing tablets for adults > 40kg – most recent information is available online at: https://www.toxbase.org Regional Medicines Information Centres – TIC TAC for Tablet Identification. Further information available online at: http://www.tictac.org.uk/ Royal College of Emergency Medicine Guidelines – Antidote Availability for Emergency Departments- available online at: https://www.rcem.ac.uk

Section 22– Parenteral Therapy

22.1 *Parenteral Therapy*		
No	**Competency**	**Recommended Evidence and Experience**
22.1.1	Can describe different options for the intravenous delivery of medicines.	• Attendance on Trust IV therapy study day. • To spend time shadowing critical care nurse preparing and administering IV drugs – ensure inotrope changeover seen. • Observe a peripheral and central line placement. Discuss with medical colleagues on ICU issues surrounding central line placement. • Be able to describe the central line care bundle in use at the Trust. • Know the differences between cannulae, midlines, long lines/ PICC lines, central venous lines, long term devices and intraosseous needle. Know which line is preferred in which situation with regards to drug selection or duration of therapy. • Review the different types of lines and connectors on your unit.
22.1.2	Can outline the pros and cons of central and peripheral venous catheters.	
22.1.3	Can describe the different factors that determine whether or not a drug may be infused peripherally, or centrally only.	• Be able to work out/estimate the osmolarity of IV solutions when required. • Be familiar with using Trisell Handbook of Injectable Drugs/ Medusa national IV guide/ Kings Guide (or similar reference sources). • Work through ICU 'stock list' and construct list of drugs with limited stability in solution in preparation for administration. Where no guideline exists, write a guideline for submission to clinical practice group.
22.1.4	Can describe the basic properties of injectable medicines and their diluents that influence their compatibility when infused into the same lumen of a central venous catheter.	• Ability to list common compatibilities for the Unit. • Ability to provide rationale for 'mixing' combinations of drugs. • Review how drugs are connected to lines when mixing occurs.
22.1.5	Knows the methods for a variety of complex drug calculations.	• Undertakes the nursing calculation workbook.
22.1.6	Can list information resources where further detailed information on minimum infusion volumes, standard syringe concentrations, intravenous compatibilities, and iv to other administration route dose conversions can be found.	• Be aware of the UKCPA Minimum Infusion volumes for IV drugs. • To provide evidence of IV to oral or oral to IV switches of medicines for 5 patients. • To provide evidence of intervening to minimise fluid intake in 5 patients. • Tutor to assess correct interpretation of the information during clinical assessment. • South Central SHA e-learning on IV incompatibilities. • http://www.learning.nesc.nhs.uk/login/index.php (login required) • IV therapy section of UK MI workbook. • http://www.npsa.nhs.uk/corporate/news/free-e-learning-module-providing-guidance-on-the-safe-use-of-injectable-medicines/ • Towards standardisation of drug infusion concentration on UK Critical Care Units. JICS 2009 10:3; 197–200 • Infusion medication concentrations in UK's critical care areas: Are the Intensive Care Society's recommendations being used? JICS 2017 18:1;30 – 35 https://doi.org/10.1177/1751143716662664
22.1.7	Can interpret the information found in the above reference sources to make rational decisions in practice.	
22.1.8	Can list the commonly used drugs where the stability of solutions limits the infusion volume in some way, and provide advice on appropriate usage (for example, cyclizine, co-trimoxazole, phenytoin, etc).	
22.1.9	Can outline factors that influence the relative safety of medicines administered by injectable routes.	• Be aware of the Trust Extravasation Policy. • Describe patient related factors and drug factors that increase the risks of extravasation. Be aware of vascular assessment and phlebitis scoring tools to minimise the risk of extravasation when using peripheral cannulae • Demonstrate ability to risk assess an IV preparation as per the NPSA alert 20.
22.1.10	Can demonstrate awareness of national safety alerts and	• Undertake a risk assessment of 5 drugs, as determined by mentor, from procurement to monitoring of patient.

	legislation relating to parenteral therapy.	• Provide risk minimisation strategy for high risk drugs highlighted in your risk assessment.

Section 23 – Palliative and End of Life Care

23.1 *Understands the role & practical aspects regarding the use of a syringe driver in palliative and end of life care*		
No	**Competency**	**Recommended Evidence and Experience**
23.1.1	Can describe the role of syringe drivers in palliative care including the mixing of drugs in syringe drivers	• Look at Trust's Palliative/End of Life Care policy • Contact Palliative Care Nurse to arrange for a demonstration on how a syringe driver is set up (practicalities/consumables/brand of syringe driver in use within trust) • Make a list/table of the common Palliative/End of Life Care drugs used in a syringe driver & what they are used for/dose range • Look at compatibility issues for Palliative/End of Life Care drugs used in a syringe driver – what is compatible with what, what cannot be mixed with each other, what diluent must be used, what volume is required • Practice 'prescribing' how a syringe driver should be prescribed stating each medicine, dose, diluent and final volume, duration of infusion • Familiarise with local procedure for monitoring of syringe driver/documentation used • Arrange to spend time with local palliative care nurse specialist/consultant/hospice in reviewing patients with syringe drivers in situ • Complete a care plan for a patient receiving Palliative/End of Life Care and discuss with the critical care pharmacist • Familiarise with the local process for supply or palliative care syringe drivers in the hospital setting and if patient being transferred home for palliation **Recommended Resources** Scottish Palliative Care Guidelines – Syringe Pumps http://www.palliativecareguidelines.scot.nhs.uk/guidelines/end-of-life-care/syringe-pumps.aspx <accessed 23/05/17> Current Palliative Care Formulary - Book or online (registration required for online) Current edition of Association of Paediatric Palliative Medicine Master Formulary available from http://www.appm.org.uk/10.html Dickman A. The Syringe Driver. 4th Edition. Oxford University Press. Oxford. 2016. Dickman A. Drugs in Palliative Care. 2nd Edition. Oxford University Press. Oxford. 2012. T. Mitten, (2000) Subcutaneous drug infusions, a review of problems and solutions. International Journal of Palliative Nursing Vol 7, No 2 McNeilly P, Price J, McCloskey S. The use of syringe drivers: a paediatric perspective. International Journal of Palliative Nursing 2004;10(8):399-404. Fleming G (2002) A handy reference tool for syringe drivers Journal of Community Nursing Vol 16, No 9, p11-16

Section 24 – Clinical Trials is not applicable for Band 7 training

Section 25 – Other Issues in Surgery/Miscellaneous is not applicable for Band 7 training

Appendix 1

ITU Care Plan

Student:

Date:

Patient:	**Age:**	**Height**
Gender:	**Actual weight:**	**Surface area:**
	Ideal body weight:	

Patient Details:

Presenting complaint:	**Previous relevant medical history:** **Allergies/sensitivities**
Diagnosis:	**Social/family history**

Drug History (pre-admission to ITU/hospital)

Drug	Route	Dose	Indication	Stop/started/dose changed and why

Current Drug Chart

Oral, topical, PR, IVs (not continuous or Abxs see below) when required medicines

Date	Drug	Route	Dose	Indication	Why – stop/started/dose change

Continuous Infusions

Date	Drug	Route	Dose	Indication	Why – stop/started/dose change

C=Central P=Peripheral

Antimicrobials and sensitivities

Date	Drug	Route	Dose	Indication	Why – stop/started/dose change

Medication and Pharmaceutical Care Issues Identified

(Separate table for each individual issue. Follow up recorded under new date in original table)

Date	Issue	Desired outcome	Therapeutic action plan	Outcome	Monitoring	Record of communication

Pharmaceutical Monitoring (Relevant to medication and pharmaceutical care)

Parameter	Ref. Range	Date	Date	Date	Date	Date	Date	Date	Date	Date

Other relevant general progress notes (including available access)

Learning outcomes (at least 2)	Learning outcomes (at least 2)
1. **2.**	

Band 7 Pharmacist Training Pack – User Feedback Questionnaire

Dear Colleague – Please could you take a few minutes to complete the following questionnaire, so that we may obtain some feedback from the users of the Band 7 Pharmacist Training Pack. This questionnaire is anonymised for reporting purposes.

1. Are you still in training in critical care? If not, how long were you working in critical care?'	
2. Job and grade? Were/are you new to critical care or not?	
3. What sections of the training pack have you completed?	
4. Approximately how long has each section taken you do?	
5. How useful were the sections you completed?	
6. Have you used any of the useful resources?	
7. Would you like more guidance? If yes, give examples	
8. Any topic not covered that you think should be covered?	
9. Has it been useful for your Continued Professional Development?	
10. How long was your training period in critical care? Proportional WTE?	
11. Do you get adequate time to do the training, both reading and practical?	
12. Has this stimulated you to pursue a career in critical care?	
13. Would you like a chance to work in another ITU?	
14. Any other comments?	

Please return completed questionnaires & comments to sarahgraham3@nhs.net or via post to Sarah Graham, Midlands Critical Care & Trauma Networks, 15 Frederick Road, Edgbaston, Birmingham, B15 1JD

Acknowledgements

Critical Care Syllabus – foundation and excellence level
UKCPA Critical Care Group 2009
BBCCCN Nursing Competencies 2002

Contributors:

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Section 1: Gastrointestinal System- Keith Hinton, Pharmacist, Worcestershire Acute Hospitals NHS Trust	**Keith Hinton: Pharmacist, Worcestershire Acute Hospitals NHS Trust.**
Section 2: Cardiovascular System- Nazish Khan, Pharmacist. The Royal Wolverhampton NHS Trust	**Jane Lewis: Pharmacist, The Royal Wolverhampton NHS Trust. / Nazish Khan: Pharmacist, The Royal Wolverhampton NHS Trust.**
Section 3: Respiratory System – Vicky Glaister, Pharmacist, University Hospitals, Coventry & Warwickshire NHS Trust	**Vicky Glaister: Pharmacist, University Hospitals Coventry & Warwickshire NHS Trust.**
Section 4: Central Nervous System – Emma Graham-Clarke, Consultant Pharmacist, Network AHP/HCS Lead, Sandwell & West Birmingham Hospitals NHS Trust.	**Emma Graham-Clarke: Consultant Pharmacist, Network AHP/HCS Lead, Sandwell & West Birmingham Hospitals NHS Trust.**
Section 5: Infections – Lisa Higgins, Pharmacist, University Hospital North Midlands NHS Trust	**Lisa Higgins: Pharmacist, University Hospital North Midlands NHS Trust.**
Section 6: Endocrine System - Aimee Cope, Pharmacist, Shrewsbury & Telford Hospitals NHS Trust.	**Vicky Slipper: Pharmacist, Shrewsbury & Telford Hospitals NHS Trust**
Section 9: Blood – Jane Lewis, Pharmacist, The Royal Wolverhampton NHS Trust. / Nutrition – Aimee Cope, Pharmacist, Shrewsbury & Telford Hospitals NHS Trust.	**Aimee Cope: Pharmacist, Shrewsbury & Telford Hospitals NHS Trust**
Section 11: The Eye - DOES NOT APPEAR ON ORIGINAL CONTRIBUTION LIST	**Vicky Slipper: Pharmacist, Shrewsbury & Telford Hospitals NHS Trust.**
Section 14: Immunological Products & Vaccines - DOES NOT APPEAR ON ORIGINAL CONTRIBUTION LIST	**Lisa Higgins: Pharmacist, University Hospital North Midlands NHS Trust**
Section 15: Anaesthesia - DOES NOT APPEAR ON ORIGINAL CONTRIBUTION LIST	**Maximiliane Wagner: Pharmacist, Heart of England NHS Foundation Trust**
Section 16: Liver Disease - Ruth Roadley Battin, Pharmacist, University Hospitals Birmingham NHS Trust.	**Ruth Roadley-Battin: Pharmacist, University Hospitals Birmingham NHS Trust.**
Section 17: Renal Impairment - DOES NOT APPEAR ON ORIGINAL CONTRIBUTION LIST	**Lisa Higgins: Pharmacist, University Hospital North Midlands NHS Trust**
Section 21: Toxicology – Matthew Elliot, Pharmacist, Sandwell & West Birmingham Hospitals NHS Trust	**Lisa Higgins: Pharmacist, University Hospital North Midlands NHS Trust**
Section 22: Parenteral Therapy - DOES NOT APPEAR ON ORIGINAL CONTRIBUTION LIST	**To follow**
Section 23: Palliative Care, End of Life - DOES NOT APPEAR ON ORIGINAL CONTRIBUTION LIST	**Aimee Cope: Pharmacist, Shrewsbury & Telford Hospitals NHS Trust**
Lucy Paskin: Pharmacist, Sandwell & West Birmingham Hospitals NHS Trust: Appendix 1 – ITU Care Plan	**Lucy Paskin: Pharmacist, Sandwell & West Birmingham Hospitals NHS Trust: Appendix 1 – ITU Care Plan**
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