# Appendix Two -
## Learning outcomes mapped to the primary examination

## ANZCA Roles in Practice

<table>
<thead>
<tr>
<th>Code</th>
<th>Learning outcome</th>
<th>Role</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>AR_ME 1.3</td>
<td>Apply knowledge of the clinical and biomedical sciences relevant to anaesthesia</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>AR_ME 3.2</td>
<td>Demonstrate knowledge and understanding of the procedure including indications, contraindications, anatomy, technique side-effects and complications</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>

## Airway management

### Introductory training

<table>
<thead>
<tr>
<th>Code</th>
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<th>Role</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT_AM 1.1</td>
<td>Describe the basic structural anatomy of the upper airway including the larynx</td>
<td>ME</td>
<td>IAACQ, PEx</td>
</tr>
<tr>
<td>IT_AM 1.6</td>
<td>Outline the equipment required to be immediately available for basic airway management and the ‘can’t intubate, can’t oxygenate’ situation (refer to College professional document: <em>PS56 Guidelines on Equipment to Manage a Difficult Airway During Anaesthesia</em>)</td>
<td>ME</td>
<td>IAACQ, PEx</td>
</tr>
<tr>
<td>IT_AM 1.9</td>
<td>Describe preoxygenation, including its physiological basis</td>
<td>ME</td>
<td>IAACQ, PEx</td>
</tr>
</tbody>
</table>

### Basic training

<table>
<thead>
<tr>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>BT_AM 1.1</td>
<td>Describe the anatomy of the upper airway, larynx and trachea, including its innervation and endoscopic appearance</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_AM 1.2</td>
<td>Describe the physiology of the airway including airway reflexes</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_AM 1.3</td>
<td>Describe the effect of anaesthetic agents and other drugs on airway reflexes</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_AM 1.4</td>
<td>Describe the physiological consequences of anaesthesia and patient positioning on the respiratory system and their management (also refer to the <em>General anaesthesia and sedation</em> clinical fundamental)</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_AM 1.19</td>
<td>Describe different modes of ventilation available on modern ventilators and their physiological consequences</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>
## General anaesthesia and sedation

### Introductory training

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>IT_GS 1.1</td>
<td>Outline the basic pharmacology of sedative/hypnotic agents (propofol, thiopentone, midazolam, ketamine), inhalational agents, opioids, muscle relaxants, reversal drugs and anti-emetic agents relevant to their clinical practice.</td>
<td>ME</td>
<td>IAACQ, PEx</td>
</tr>
<tr>
<td>IT_GS 1.5</td>
<td>Describe the chemical composition of crystalloids and colloids used in clinical practice and their effects when used in volume replacement</td>
<td>ME</td>
<td>IAACQ, PEx</td>
</tr>
<tr>
<td>IT_GS 1.8</td>
<td>Outline the physiological changes that occur with and the implications for anaesthetic management of pneumoperitoneum</td>
<td>ME</td>
<td>IAACQ, PEx</td>
</tr>
</tbody>
</table>
| IT_GS 1.9 | Outline the physiological changes that occur with and the implications for anaesthetic management of the following patient positions:  
- Supine  
- Trendelenberg and reverse trendelenberg  
- Lateral  
- Lithotomy  
- Prone  
(Also refer to the Safety and quality in anaesthetic practice clinical fundamental)                                                                                                                                                                                                                                                                                                                                                     | ME   | IAACQ, PEx       |

### Basic training

#### Pharmacodynamics

<table>
<thead>
<tr>
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</tr>
</thead>
</table>
| BT_GS 1.1 | Explain the concept of drug action with respect to:  
- Receptor theory  
- Enzyme interactions  
- Physico-chemical interactions                                                                                                                                                                                                                                                                                                                      | ME   | PEx        |
| BT_GS 1.2 | Explain receptor activity with regard to:  
- Ionic fluxes  
- Second messengers and G proteins  
- Nucleic acid synthesis  
- Evidence for the presence of receptors  
- Regulation of receptor number and activity                                                                                                                                                                                                                                                                                              | ME   | PEx        |
| BT_GS 1.3 | Define and explain dose-effect relationships of drugs with reference to:  
- Graded and quantal response  
- Therapeutic index  
- Potency and efficacy  
- Competitive and non-competitive antagonists  
- Partial agonists, mixed agonist-antagonists and inverse agonists  
- Additive and synergistic effects of drug combinations                                                                                                                                                                                                                                                                                       | ME   | PEx        |
<table>
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</thead>
<tbody>
<tr>
<td>BT_GS 1.4</td>
<td>Describe efficacy and potency with reference to dose-response curves</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.5</td>
<td>Explain the law of mass action and describe affinity and dissociation constants</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.6</td>
<td>Describe the mechanisms of adverse drug effects</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td></td>
<td><strong>Pharmacokinetics</strong></td>
<td></td>
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<tr>
<td>BT_GS 1.7</td>
<td>Explain the concept of pharmacokinetic modelling of single and multiple compartment models and define:</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td></td>
<td>- Half life</td>
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<td></td>
<td>- Clearance</td>
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<td></td>
<td>- Zero and first order kinetics</td>
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<td></td>
<td>- Volume of distribution</td>
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<td>- Bio-availability</td>
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<td></td>
<td>- Area under the plasma concentration time curve</td>
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<td></td>
<td>- Extraction ratio</td>
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<tr>
<td>BT_GS 1.8</td>
<td>Describe absorption and factors that will influence it with reference to clinically utilised sites of administration</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.9</td>
<td>Describe factors influencing the distribution of drugs (for example, protein binding, lipid solubility, pH, pKa) and their alteration in physiological and pathological disturbance</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.10</td>
<td>Describe the mechanisms of drug clearance and how physiological and pathological disturbance may affect these</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.11</td>
<td>Describe the mechanisms of non-hepatic and hepatic metabolism of drugs including:</td>
<td>ME</td>
<td>PEx</td>
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<tr>
<td></td>
<td>- Phase 1 and phase 2 reactions</td>
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<tr>
<td></td>
<td>- Hepatic extraction ratio and its significance</td>
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<td></td>
<td>- First pass effect, enzyme induction and inhibition</td>
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<tr>
<td>BT_GS 1.12</td>
<td>Explain and describe the clinical application of concepts related to intravenous and infusion kinetics including:</td>
<td>ME</td>
<td>PEx</td>
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<tr>
<td></td>
<td>- Effect-site and effect-site equilibration time</td>
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<tr>
<td></td>
<td>- Concept of context sensitive half time</td>
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<td></td>
<td>- Calculation of loading and maintenance dosage regimens</td>
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<tr>
<td>BT_GS 1.13</td>
<td>Explain clinical drug monitoring with regard to peak and trough concentrations, minimum therapeutic concentration and toxicity</td>
<td>ME</td>
<td>PEx</td>
</tr>
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<tr>
<td>BT_GS 1.14</td>
<td>Develop an understanding of variations in individual drug responses together with clinical application of this knowledge</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.15</td>
<td>Define tachyphylaxis, tolerance, addiction, dependence and idiosyncrasy and describe mechanisms of tolerance</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.16</td>
<td>Describe alterations to drug response due to physiological change with particular reference to the elderly</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.17</td>
<td>Describe alterations to drug response due to pathological disturbance with particular reference to cardiac, respiratory, renal and hepatic disease</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.19</td>
<td>Describe the mechanisms of drug interaction</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.20</td>
<td>Describe and give examples of the clinical importance of pharmacogenetic variation, for example, atypical cholinesterase, codeine metabolism</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.21</td>
<td>Describe and give examples of the clinical importance of isomerism</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.22</td>
<td>Describe the mechanisms of action and potential adverse effects of buffers, anti-oxidants, anti-microbial and solubilising agents added to drugs</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.23</td>
<td>Describe the physical properties of inhalational agents, including the:</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td></td>
<td>• Principles of vaporisation of inhalational agents</td>
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<tr>
<td></td>
<td>• Properties of an ideal inhalational anaesthetic agent</td>
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<tr>
<td></td>
<td>• Structure-activity relationships of inhalational agents</td>
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<tr>
<td>BT_GS 1.24</td>
<td>Describe the uptake, distribution and elimination of inhalational anaesthetic agents and the factors which influence induction and recovery from inhalational anaesthesia including the:</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td></td>
<td>• Concepts of partition coefficients, concentration effect and second gas effect</td>
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<tr>
<td></td>
<td>• Relationships between inhaled and alveolar concentration</td>
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<tr>
<td></td>
<td>• Significance of the distribution of cardiac output and tissue partition coefficients on uptake and distribution of volatile agents</td>
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</tr>
<tr>
<td>BT_GS 1.25</td>
<td>Describe the effects of inhalational agents on the cardiovascular, respiratory and central nervous systems</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.26</td>
<td>Describe the toxicity of inhalational agents</td>
<td>ME</td>
<td>PEx</td>
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</tbody>
</table>

**Pharmacology of specific agents**

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<td>BT_GS 1.23</td>
<td>Describe the physical properties of inhalational agents, including the:</td>
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<td>PEx</td>
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<td>• Principles of vaporisation of inhalational agents</td>
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<td>• Properties of an ideal inhalational anaesthetic agent</td>
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<td></td>
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<td>• Structure-activity relationships of inhalational agents</td>
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<tr>
<td>BT_GS 1.24</td>
<td>Describe the uptake, distribution and elimination of inhalational anaesthetic agents and the factors which influence induction and recovery from inhalational anaesthesia including the:</td>
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</tr>
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<td>• Concepts of partition coefficients, concentration effect and second gas effect</td>
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<td>• Relationships between inhaled and alveolar concentration</td>
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<td>BT_GS 1.25</td>
<td>Describe the effects of inhalational agents on the cardiovascular, respiratory and central nervous systems</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.26</td>
<td>Describe the toxicity of inhalational agents</td>
<td>ME</td>
<td>PEx</td>
</tr>
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</tr>
<tr>
<td>BT_GS 1.27</td>
<td>Describe the pharmacology of nitrous oxide</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.28</td>
<td>Describe the comparative pharmacology of nitrous oxide, halothane, enflurane, isoflurane, desflurane, sevoflurane, xenon and ether</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>
| BT_GS 1.29 | Describe the physical properties of sedative/hypnotic agents, including:  
  - Formulation  
  - Properties of an ideal agent  
  - Structure-activity relationships                                                                                                                                                                         | ME   | PEx        |
<p>| BT_GS 1.30 | Describe and compare the pharmacokinetics of intravenous induction and sedative agents, the factors which affect recovery from intravenous anaesthesia and the clinical implications of these differences | ME   | PEx        |
| BT_GS 1.31 | Describe and compare the pharmacodynamics of intravenous induction and sedative agents and in particular the effects on the cardiovascular, respiratory and central nervous systems                                             | ME   | PEx        |
| BT_GS 1.32 | Describe the adverse effects of individual induction, sedative and premedicant agents                                                                                                                                                                        | ME   | PEx        |
| BT_GS 1.33 | Describe how physiological and pathological disturbance can alter the pharmacology of intravenous anaesthetic agents                                                                                                                                                       | ME   | PEx        |
| BT_GS 1.34 | Outline the pharmacology and clinical use of flumazenil                                                                                                                                                                                                                   | ME   | PEx        |
| BT_GS 1.35 | Describe the physiology of the neuromuscular junction and the mechanism of action of neuromuscular blocking agents                                                                                                                                                           | ME   | PEx        |
| BT_GS 1.36 | Describe the pharmacokinetics of neuromuscular blocking agents                                                                                                                                                                                                             | ME   | PEx        |
| BT_GS 1.37 | Describe the pharmacological differences between neuromuscular blocking agents and the clinical importance of these differences.                                                                                                                                          | ME   | PEx        |
| BT_GS 1.38 | Describe the adverse effects of neuromuscular blocking agents and factors that may modify responses to muscle relaxants                                                                                                                                                      | ME   | PEx        |
| BT_GS 1.39 | Describe the reversal of neuromuscular blockade using anti-cholinesterase agents, anticholinergics and sugammadex and the physiological effects of reversal                                                                                                                                 | ME   | PEx        |
| BT_GS 1.40 | Describe the adverse effects of anticholinesterase agents                                                                                                                                                                                                                   | ME   | PEx        |</p>
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<tbody>
<tr>
<td>BT_GS 1.41</td>
<td>Describe the clinical application of opioids to anaesthesia and sedation (also refer to the <em>Pain medicine</em> clinical fundamental)</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.42</td>
<td>Describe the pharmacokinetics of intravenous opioids (also refer to the <em>Pain medicine</em> clinical fundamental)</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.43</td>
<td>Outline the physiological basis of vomiting</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.44</td>
<td>Describe the clinical pharmacology of dopamine antagonists, anti-cholinergic agents, serotonin antagonists, anti-histamines pro-kinetics and steroids relevant to premedication and the management of nausea and vomiting</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>

**Integrated pharmacology for anaesthesia and sedation**

<table>
<thead>
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</tr>
</thead>
</table>
| BT_GS 1.46 | Discuss factors influencing choice of agents for:  
  - Sedation  
  - Induction and maintenance of anaesthesia  
  - Muscle relaxation                                                                                                                                                                                                                                                                                                                                 | ME   | PEx        |
| BT_GS 1.47 | Discuss the indications for muscle relaxation in anaesthesia                                                                                                                                                                                                                                                                                                                                                                                                              | ME   | PEx        |
| BT_GS 1.48 | Describe the effects of anaesthetic agents on regional circulation                                                                                                                                                                                                                                                                                                                                                                                                       | ME   | PEx        |
| BT_GS 1.49 | Discuss proposed mechanisms of anaesthesia and the sites of action of anaesthetic agents including the physiology and pharmacology of neurotransmitters and their receptors (that is GABA, excitatory amino acids, acetylcholine, noradrenaline, dopamine and serotonin) | ME   | PEx        |
| BT_GS 1.50 | Describe the concept and clinical application of MAC in relation to inhaled anaesthetic agents                                                                                                                                                                                                                                                                                                                                                                           | ME   | PEx        |
| BT_GS 1.51 | Describe the concept of depth of anaesthesia and how this may be monitored                                                                                                                                                                                                                                                                                                                                                                                                  | ME   | PEx        |
| BT_GS 1.51a | Outline the aetiology of and measures to prevent intra-operative awareness under general anaesthesia                                                                                                                                                                                                                                                                                                                                                                          | ME   | PEx        |
| BT_GS 1.52 | Explain the principles involved in the electronic monitoring of depth of sedation and anaesthesia, including the use of EEG analysis                                                                                                                                                                                                                                                                                                                                       | ME   | PEx        |
| BT_GS 1.53 | Describe the synergism between anaesthetic agents, opioids and regional blockade and how this is used clinically                                                                                                                                                                                                                                                                                                                                                               | ME   | PEx        |
| BT_GS 1.54 | Describe techniques to balance anaesthetic depth with changing surgical stimulus                                                                                                                                                                                                                                                                                                                                                                                             | ME   | PEx        |
Appendix two – Learning outcomes mapped to the primary examination
General anaesthesia and sedation

<table>
<thead>
<tr>
<th>Code</th>
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</tr>
</thead>
<tbody>
<tr>
<td>BT_GS 1.55</td>
<td>Describe the concept of depth of neuromuscular blockade and explain the use of neuromuscular monitoring</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.56</td>
<td>Describe the clinical features and management of inadequate reversal of neuromuscular blockade</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.57</td>
<td>Explain the techniques of intravenous and inhalational induction and describe clinical indications and advantages and disadvantages of both techniques</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.59</td>
<td>Describe the pharmacological principles of and sources of error with target controlled infusion</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.60</td>
<td>Describe the physiological effects of anaesthesia on the respiratory system and its clinical management (also refer to the Airway management clinical fundamental)</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.61</td>
<td>Discuss the effects of anaesthesia on the immune, haematological and endocrine systems</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.62</td>
<td>Discuss the prevention and management of postoperative nausea and vomiting</td>
<td>ME</td>
<td>PEx</td>
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</table>

**Temperature homeostasis and anaesthesia**

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>BT_GS 1.65</td>
<td>Describe the mechanisms by which heat is produced by the body and transferred between the body and its environment</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.66</td>
<td>Describe the physiological effects of hypo/hyperthermia</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.67</td>
<td>Describe the energy requirements for maintenance of normal body temperature</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.68</td>
<td>Describe the physiological responses to lowered and raised environmental temperature, and the effects of anaesthesia on these responses</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.69</td>
<td>Discuss methods of maintaining body temperature during anaesthesia and sedation, including active warming of patients (also refer to the Safety and quality in anaesthetic practice clinical fundamental)</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.69</td>
<td>Describe how a patient’s temperature is monitored and discuss the indications for temperature monitoring with the advantages and disadvantages of particular sites and methods (also refer to monitors and monitoring standards, which is covered in the Safety and quality in anaesthetic practice clinical fundamental)</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
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<td>Assessment</td>
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<tr>
<td><strong>Vascular access</strong></td>
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</tr>
<tr>
<td>BT_GS 1.70</td>
<td>Describe the anatomy including ultrasonic anatomy of the peripheral venous system relevant to performing intravenous cannulation</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.72</td>
<td>Describe the anatomy and anatomical relations of the great veins relevant to performing central venous cannulation, including the ultrasound anatomy</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_GS 1.74</td>
<td>Describe the anatomy of the radial, brachial, femoral and dorsalis pedis arteries and their anatomical relations relevant to arterial cannulation including the ultrasound anatomy</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>
## Pain medicine

### Introductory training

<table>
<thead>
<tr>
<th>Code</th>
<th>Learning outcome</th>
<th>Role</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT_PM 1.3</td>
<td>Outline the basic concepts of multimodal analgesia and pre-emptive analgesia</td>
<td>ME</td>
<td>IAACQ, PEx</td>
</tr>
<tr>
<td>IT_PM 1.4</td>
<td>Outline the basic pharmacology and clinical use of available analgesic agents</td>
<td>ME</td>
<td>IAACQ, PEx</td>
</tr>
</tbody>
</table>

### Basic training

#### Neurobiology

<table>
<thead>
<tr>
<th>Code</th>
<th>Learning outcome</th>
<th>Role</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT_PM 1.1</td>
<td>Describe the anatomy of the sensory pathways with particular reference to pain sensation</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PM 1.2</td>
<td>Describe the anatomy of the autonomic nervous system</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PM 1.3</td>
<td>Describe the basic physiological mechanisms of pain including:</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td></td>
<td>- Peripheral nociception</td>
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</tr>
<tr>
<td></td>
<td>- Conduction</td>
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<tr>
<td></td>
<td>- Spinal cord modulation</td>
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</tr>
<tr>
<td></td>
<td>- Central processing of pain</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Mediators, pathways and reflexes</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- Peripheral and central sensitisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Pre-emptive and preventive analgesia</td>
<td></td>
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</tr>
<tr>
<td>BT_PM 1.4</td>
<td>Describe the physiological mechanism of progression from acute to chronic pain</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PM 1.5</td>
<td>Describe the injury response to acute pain</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PM 1.6</td>
<td>Describe the applied physiology and psychology of neuropathic pain</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PM 1.7</td>
<td>Outline the effects of pain and analgesia on injury-induced organ dysfunction</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PM 1.8</td>
<td>Describe the alterations to physiology and perception of pain in the older patient</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>Code</td>
<td>Learning outcome</td>
<td>Role</td>
<td>Assessment</td>
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<tr>
<td>--------</td>
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</tr>
<tr>
<td><strong>Pharmacology</strong></td>
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</tr>
<tr>
<td>BT_PM 1.9</td>
<td>Describe the pharmacology of the following agents applicable to pain management, including:</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td></td>
<td>- Opioids</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Tramadol</td>
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</tr>
<tr>
<td></td>
<td>- Local anaesthetic agents (also refer to the Regional and local anaesthesia clinical fundamental)</td>
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</tr>
<tr>
<td></td>
<td>- NSAIDs</td>
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<tr>
<td></td>
<td>- Paracetamol</td>
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</tr>
<tr>
<td></td>
<td>- NMDA antagonants</td>
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<td></td>
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<tr>
<td></td>
<td>- Anticonvulsants</td>
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<tr>
<td></td>
<td>- Antidepressants</td>
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<tr>
<td></td>
<td>- Corticosteroids</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Inhalational analgesics - nitrous oxide, methoxyflurane</td>
<td></td>
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</tr>
<tr>
<td>BT_PM 1.10</td>
<td>Describe the effect of physiological change and pathological disturbance on the pharmacology of the</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td></td>
<td>agents listed in learning outcome BT_PM 1.9, with special reference to the elderly</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BT_PM 1.11</td>
<td>Describe the different modes of administration of analgesic agents and evaluate their clinical application</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td><strong>Pharmacology of specific agents: Opioid agonists and antagonists</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BT_PM 1.12</td>
<td>Describe opioid receptors</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PM 1.13</td>
<td>Describe the mechanisms of action of opioids, including tramadol</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PM 1.14</td>
<td>Describe the actions of agonists, partial agonists, mixed agonists-antagonists and antagonists</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PM 1.15</td>
<td>Discuss the pharmacokinetic and clinical implications of different routes of administration for commonly used opioids, including the oral, transdermal, subcutaneous, intramuscular and intravenous routes</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PM 1.16</td>
<td>Outline the dose conversion between commonly used opioids</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PM 1.17</td>
<td>Describe the pharmacokinetics of intravenous opioids and their clinical applications</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PM 1.18</td>
<td>Describe the pharmacology of opioids deposited in the epidural space or cerebrospinal fluid</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PM 1.19</td>
<td>Describe the adverse effects of opioids administered by systemic and neuraxial routes and their prevention and management</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>Appendix two – Learning outcomes mapped to the primary examination Pain medicine</td>
<td></td>
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<tr>
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</tbody>
</table>

### Learning outcomes mapped to the primary examination

#### Pain medicine

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Mode</th>
<th>Examine</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT_PM 1.20</td>
<td>Describe the potential adverse drug interactions between opioids and other agents</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PM 1.21</td>
<td>Describe the pharmacology of opioid antagonists</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PM 1.22</td>
<td>Describe the pharmacodynamics of individual opioids and evaluate their clinical applications</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>

#### Pharmacology of specific agents: NSAIDs

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Mode</th>
<th>Examine</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT_PM 1.23</td>
<td>Describe the prostaglandin pathways and their physiological role in the production of pain</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PM 1.24</td>
<td>Classify non-steroidal anti-inflammatory drugs and outline their pharmacology in relation to enzyme inhibition, mode of administration and adverse effects</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PM 1.25</td>
<td>Describe in detail pharmacology of paracetamol including mode of action, clinical utility, metabolism and toxicity, advantages and disadvantages of different routes of administration</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>

#### Pharmacology of specific agents: NMDA receptor antagonists

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Mode</th>
<th>Examine</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT_PM 1.26</td>
<td>Describe the location and role of NMDA receptors</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PM 1.27</td>
<td>Describe in detail the pharmacology of ketamine including mode of action, clinical utility, metabolism and toxicity, advantages and disadvantages of different routes of administration</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>

#### Pharmacology of specific agents: Anticonvulsants

<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
<th>Mode</th>
<th>Examine</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT_PM 1.28</td>
<td>Describe the pharmacology of anticonvulsants relevant to pain medicine, including gabapentin and carbamazepine</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>
### Perioperative medicine

#### Basic training

<table>
<thead>
<tr>
<th>Code</th>
<th>Learning outcome</th>
<th>Role</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT_PO 1.2</td>
<td>Describe the features of a diagnostic test, including the concepts of sensitivity, specificity, positive and negative predictive value and how these are affected by the prevalence of the disease in question</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.3</td>
<td>Describe the adverse effects of antimicrobial agents</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.3a</td>
<td>Outline the pharmacology of commonly encountered illicit drugs and their interactions with drugs used in anaesthetic care</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.4a</td>
<td>Outline the pharmacology of herbal medicines</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.4b</td>
<td>Describe adverse effects and potential drug interactions of herbal medicines with particular reference to the perioperative period</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>

#### Respiratory anatomy and physiology

<table>
<thead>
<tr>
<th>Code</th>
<th>Learning outcome</th>
<th>Role</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT_PO 1.6</td>
<td>Discuss the structure of the chest wall and diaphragm and the implications for respiratory mechanics</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.7</td>
<td>Outline the anatomy of the lower airways</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.8</td>
<td>Outline the anatomy of the pulmonary and bronchial circulations</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.9</td>
<td>Describe the neural and chemical control of ventilation via central and peripheral chemoreceptors and indicate how this is altered by anaesthesia and abnormal clinical states</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.10</td>
<td>Describe the properties of surfactant and relate these to its role in influencing respiratory mechanics</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.11</td>
<td>Define compliance (static, dynamic and specific) and relate this to the elastic properties of the lung</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.12</td>
<td>Discuss ‘fast’ and ‘slow’ alveoli, including the concept of ‘time constants’</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.13</td>
<td>Describe the elastic properties of the chest wall and plot pressure-volume relationships of the lung, chest wall and the total respiratory system</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.14</td>
<td>Explain the vertical gradient of pleural pressure and its significance</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>Code</td>
<td>Learning outcome</td>
<td>Role</td>
<td>Assessment</td>
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</tr>
<tr>
<td>BT_PO 1.15</td>
<td>Explain the physics of gas flow and the significance of the relationship between resistance and flow in the respiratory tract</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.16</td>
<td>Describe the factors affecting airway resistance and how airway resistance may be measured</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.17</td>
<td>Describe closing capacity and its relationship to airway closure and explain its clinical significance and measurement</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.18</td>
<td>Describe the work of breathing</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.19</td>
<td>Describe altered lung mechanics in common disease states</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.20</td>
<td>Discuss lung volumes and capacities, their measurement and normal values</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.21</td>
<td>Discuss dead space, its measurement and apply the Bohr equation and alveolar gas equation</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.22</td>
<td>Describe the composition of ideal alveolar and mixed expired gases</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.23</td>
<td>Describe the oxygen cascade</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.24</td>
<td>Describe the alveolar exchange of oxygen and carbon dioxide</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.25</td>
<td>Discuss diffusion capacity and its measurement</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.26</td>
<td>Discuss normal ventilation-perfusion matching</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.27</td>
<td>Discuss West's zones of the lung</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.28</td>
<td>Describe the shunt equation</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.29</td>
<td>Discuss regional ventilation-perfusion inequalities, venous admixture and the effect on oxygenation and carbon dioxide elimination</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.30</td>
<td>Outline methods used to measure ventilation-perfusion inequalities</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.31</td>
<td>Discuss the carriage of oxygen in blood, the oxyhaemoglobin dissociation curve, oxygen stores in the blood and their clinical significance and implications</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.32</td>
<td>Discuss the carriage of carbon dioxide in blood, the carbon dioxide dissociation curve and their clinical significance and implications</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.33</td>
<td>Discuss the difference between the pulmonary and systemic circulations</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>Code</td>
<td>Learning outcome</td>
<td>Role</td>
<td>Assessment</td>
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</tr>
<tr>
<td>BT_PO 1.34</td>
<td>Discuss pulmonary vascular resistance and the control of pulmonary vascular tone</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.35</td>
<td>Discuss the physiological consequences of intermittent positive pressure ventilation and positive end-expiratory pressure</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.36</td>
<td>Discuss the physiological effects of hypoxaemia, hyper and hypocapnia, and carbon monoxide poisoning</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>
| BT_PO 1.37 | Discuss the effect of the following on ventilation:  
- Changes in posture  
- Exercise  
- Altitude  
- Anaesthesia  
- Ageing  
- Morbid obesity  | ME   | PEx        |
| BT_PO 1.38 | Define humidity and outline the importance of humidification                                                                                                                                                    | ME   | PEx        |
| BT_PO 1.39 | Outline the non-ventilatory functions of the lungs                                                                                                                                                             | ME   | PEx        |

**Respiratory pharmacology**

<table>
<thead>
<tr>
<th>Code</th>
<th>Learning outcome</th>
<th>Role</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT_PO 1.40</td>
<td>Describe the pharmacology of anti-asthma drugs, including beta 2 agonists, corticosteroids, anticholinergics, leukotriene antagonists and theophylline</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.41</td>
<td>Outline the pharmacology of drugs used to treat pulmonary hypertension including nitric oxide</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.41a</td>
<td>Discuss oxygen therapy including methods of delivery, indications and contraindications, physiological and pathophysiological effects</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>

**Cardiovascular anatomy and physiology**

<table>
<thead>
<tr>
<th>Code</th>
<th>Learning outcome</th>
<th>Role</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT_PO 1.42</td>
<td>Describe the anatomy of the heart including the coronary circulation and territories supplied.</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>
| BT_PO 1.43 | Discuss the physiological basis of electrical activity and its relationship to mechanical events including the:  
- Ionic basis of automaticity the normal and abnormal processes of cardiac excitation  
- Physiological basis of the electrocardiograph in normal and common pathological states  
- Factors that may influence cardiac electrical activity  
- Correlation of the mechanical events of the cardiac cycle with the electrical and ionic events | ME   | PEx        |
<table>
<thead>
<tr>
<th>Code</th>
<th>Learning outcome</th>
<th>Role</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT_PO 1.44</td>
<td>Describe the physiology of cardiac muscle and the mechanism of excitation contraction coupling</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>
| BT_PO 1.45 | Discuss the factors that determine and control cardiac output and the implications for clinical practice including:  
  - Preload, afterload and contractility  
  - The Frank-Starling mechanism  
  - Cardiac output and vascular function curves  
  - Pressure volume relationships in the heart | ME   | PEx        |
| BT_PO 1.46 | Describe the factors determining myocardial oxygen supply and demand and their clinical implications | ME   | PEx        |
| BT_PO 147 | Discuss the control of blood pressure and the distribution of blood volume and flow throughout the cardiovascular system including:  
  - The factors determining systemic blood pressure and its regulation and control  
  - Total peripheral resistance and factors affecting it  
  - The relationship between organ blood flow and demand and the role of autoregulation  
  - Clinically significant features of the coronary, cerebral, skin, muscle, renal, hepatic and splanchnic circulations  
  - The essential features of the microcirculation including fluid exchange and its control | ME   | PEx        |
| BT_PO 1.48 | Discuss the cardiovascular responses to:  
  - Changes in posture  
  - Exercise  
  - Valsalva manoeuvre  
  - Positive pressure ventilation and PEEP  
  - Pneumoperitoneum  
  - Haemorrhage and hypovolaemia  
  - Surgery and trauma | ME   | PEx        |
<p>| BT_PO 1.49 | Describe the cardiovascular changes that occur with ageing                      | ME   | PEx        |
| BT_PO 1.50 | Describe the cardiovascular changes that occur with morbid obesity              | ME   | PEx        |</p>
<table>
<thead>
<tr>
<th>Code</th>
<th>Learning outcome</th>
<th>Role</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Cardiovascular pharmacology</strong></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
| BT_PO 1.51 | Describe the autonomic nervous system and its physiological roles including:  
- Autonomic receptors and cellular effects of receptor activation  
- Autonomic transmitters, their synthesis, release and fate                                                                                                    | ME   | PEx        |
| BT_PO 1.52 | Describe the mechanism of action and effects of sympathomimetic and anticholinergic drugs used clinically                                                                                                     | ME   | PEx        |
| BT_PO 1.53 | Describe the pharmacology and clinical application of adrenergic agonists                                                                                                                                     | ME   | PEx        |
| BT_PO 1.54 | Describe the pharmacology of commonly used alpha and beta receptor blocking agents, their clinical use, adverse effects and use in the perioperative period                                                                 | ME   | PEx        |
| BT_PO 1.55 | Outline clinically important drug interactions with the autonomic nervous system                                                                                                                               | ME   | PEx        |
| BT_PO 1.56 | Describe the physiological and pharmacological basis of antiarrhythmic therapy including classification based on electro-physiological activity and mechanism of action                                                                 | ME   | PEx        |
| BT_PO 1.57 | Describe the pharmacology of antiarrhythmic agents and their clinical applications including the following agents: lignocaine, flecainide, beta blockers, amiodarone, sotalol, ibutilide, calcium antagonists, digoxin, adenosine and magnesium | ME   | PEx        |
| BT_PO 1.58 | Describe the pharmacology of anti-hypertensive agents and their clinical application, including the following agents: clonidine, alpha-methyl dopa, alpha and beta blockers, nitric oxide, sodium nitroprusside and glyceryl trinitrate, calcium antagonists, ACE inhibitors and angiotensin receptor antagonists, hydralazine and the potassium channel activators | ME   | PEx        |
| BT_PO 1.59 | Describe the pharmacology of drugs used to manage myocardial ischaemia/infarction, including: nitrates, beta blockers, calcium antagonists, anti-platelet agents, anticoagulants and fibrinolytic agents | ME   | PEx        |
| BT_PO 1.60 | Describe the pharmacology of drugs used to manage acute or chronic cardiac failure, including: sympathomimetics, phosphodiesterase inhibitors, digoxin, diuretics, ACE inhibitors, nitrates and beta blockers | ME   | PEx        |
### Renal and fluid and electrolytes

<table>
<thead>
<tr>
<th>Code</th>
<th>Learning outcome</th>
<th>Role</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT_PO 1.61</td>
<td>Describe the functional anatomy of the kidneys and urinary tract</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.62</td>
<td>Explain the physiology of renal blood flow</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.63</td>
<td>Describe glomerular filtration and tubular function</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.64</td>
<td>Explain the counter-current mechanisms in the kidney</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.65</td>
<td>Explain the mechanisms involved in the regulation of renal function</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.66</td>
<td>Outline the endocrine functions of the kidney</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.67</td>
<td>Describe the role of the kidney in the handling of glucose, nitrogenous products and drugs</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.68</td>
<td>Describe the principles of measurement of glomerular filtration rate and renal blood flow</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.69</td>
<td>Describe the physiological effects and clinical assessment of renal dysfunction</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.70</td>
<td>Explain the renal responses to hypovolaemia</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.71</td>
<td>Explain the effects of anaesthesia on renal function</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.72</td>
<td>Describe the function, distribution and physiological importance of sodium, potassium, magnesium, calcium and phosphate ions</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.73</td>
<td>Describe the mechanisms involved in the maintenance of fluid and electrolyte balance</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.74</td>
<td>Outline the constituents and functions of plasma</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.75</td>
<td>Define osmotic pressure and explain the factors that determine it</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.76</td>
<td>Describe the regulation of osmolality</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.77</td>
<td>Outline the significance of oncotic pressure, colloid osmotic pressure and reflection coefficients</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.78</td>
<td>Describe the regulation of acid/base balance</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.79</td>
<td>Describe acid-base chemistry using the Henderson-Hasselbach equation and strong ion difference</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>
### Renal and fluid and electrolytes

<table>
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</thead>
<tbody>
<tr>
<td>BT_PO 1.80</td>
<td>Describe alterations to drug response due to renal disease</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.81</td>
<td>Outline a physiological basis of classifying diuretics related to their site of action</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.82</td>
<td>Describe the pharmacology of diuretics including mannitol, frusemide, thiazides, aldosterone antagonists and carbonic anhydrase inhibitors</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>

### Metabolic and endocrine physiology

<table>
<thead>
<tr>
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</tr>
</thead>
</table>
| BT_PO 1.82a| Outline basic cellular physiology in particular  
- The structure of the cell membrane and trans-membrane transport mechanisms  
- The composition and regulation of intracellular fluid  
- The generation of the trans-membrane potential  
- Energy production by metabolic processes in cells | ME   | PEx        |
| BT_PO 1.83 | Describe the physiological consequences of starvation                                                                                                                                                         | ME   | PEx        |
| BT_PO 1.84 | Discuss the factors that influence metabolic rate                                                                                                                                                             | ME   | PEx        |
| BT_PO 1.85 | Explain the control of blood glucose                                                                                                                                                                          | ME   | PEx        |
| BT_PO 1.86 | Describe the role of the hypothalamus in the integration of neuro-humoral responses                                                                                                                          | ME   | PEx        |
| BT_PO 1.87 | Describe control of secretion and the functions of:  
- Pituitary hormones  
- Thyroid hormones  
- Adrenocortical hormones  
- Adrenomedullary hormones  
- Renin and angiotensin  
- Atrial natriuretic peptide | ME   | PEx        |
<p>| BT_PO 1.88 | Describe the regulation of plasma calcium including the actions and control of vitamin D, parathormone and calcitonin                                                                                         | ME   | PEx        |
| BT_PO 1.89 | Outline the role of prostaglandins and other autocoids                                                                                                                                                    | ME   | PEx        |</p>
<table>
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<tbody>
<tr>
<td><strong>Endocrine pharmacology</strong></td>
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</table>
| BT_PO 1.90 | Describe the pharmacology of:  
  - Insulin preparations  
  - Oral hypoglycaemics  
  - Corticosteroid drugs                                                                                                                                  | ME   | PEx        |
| BT_PO 1.91 | Outline the pharmacology of:  
  - Thyroid hormone replacement and anti-thyroid drugs  
  - Glucagon  
  - Vasopressin and analogues                                                                                                                                   | ME   | PEx        |
| **Neurophysiology**                                                                                                                                                |                                               |           |
| BT_PO 1.92 | Outline the basic electrophysiology of nerve conduction                                                                                                           | ME   | PEx        |
| BT_PO 1.93 | Describe the physiology of sleep                                                                                                                                                                        | ME   | PEx        |
| BT_PO 1.94 | Outline the basis of the electroencephalogram                                                                                                              | ME   | PEx        |
| BT_PO 1.95 | Discuss the determinants and control of:  
  - Intracranial and intraspinal pressure  
  - Cerebral blood flow and autoregulation  
  - Cerebral perfusion pressure  
  - Spinal cord perfusion                                                                                                                                  | ME   | PEx        |
<p>| BT_PO 1.96 | Discuss the significance of the blood brain barrier                                                                                                          | ME   | PEx        |
| BT_PO 1.97 | Describe the dynamics and metabolism of cerebrospinal fluid                                                                                                     | ME   | PEx        |
| BT_PO 1.98 | Describe cerebral and spinal cord metabolism including energy production, effects of temperature and factors leading to cell damage and cell death | ME   | PEx        |
| BT_PO 1.98a | Describe the physiology of skeletal muscle including mechanism of excitation contraction coupling and compare and contrast the physiology of skeletal, cardiac and smooth muscle                                           | ME   | PEx        |
| <strong>Neurological pharmacology</strong>                                                                                                                                   |                                               |           |
| BT_PO 1.99 | Outline the pharmacology of anti-depressant, anti-psychotic, anti-convulsant, anti-parkinsonian and anti-migraine medication                              | ME   | PEx        |
| BT_PO 1.100 | Outline the pharmacology of histamine antagonists                                                                                                             | ME   | PEx        |
| BT_PO 1.101 | Outline the pharmacology of drugs acting via effects on serotonin or serotonin receptors                                                                         | ME   | PEx        |
| BT_PO 1.102 | Discuss the clinical features and management of serotonin syndrome                                                                                             | ME   | PEx        |</p>
<table>
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</thead>
<tbody>
<tr>
<td>BT_PO 1.103</td>
<td>Describe the storage, synthetic, metabolic, immunological and excretory functions of the liver and identify the physiological consequences of hepatic disease</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.104</td>
<td>Describe the anatomical and physiological considerations in hepatic blood flow, and the changes that occur with anaesthesia</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.105</td>
<td>Describe the portal circulation and its significance</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.106</td>
<td>Describe the laboratory assessment of liver function and hepatic failure</td>
<td>ME</td>
<td>PEx</td>
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</tbody>
</table>
| BT_PO 1.107 | Explain the:  
  • Physiology of swallowing  
  • Factors preventing reflux of gastric contents into the oesophagus  
  • Control of gastric motility and emptying  
  • Composition of gastric fluid  
  • Physiology of nausea and vomiting                                                                                                             | ME   | PEx        |
| BT_PO 1.108 | Describe alterations to drug response due to hepatic disease                                                                                                                                                  | ME   | PEx        |
| BT_PO 1.109 | Outline the pharmacological treatment of peptic ulcer disease and reflux                                                                                                                                     | ME   | PEx        |
| BT_PO 1.110 | Describe the physiological consequences of acute and chronic anaemia                                                                                                                                          | ME   | PEx        |
| BT_PO 1.111 | Outline the major haemoglobinopathies and their clinical significance                                                                                                                                          | ME   | PEx        |
| BT_PO 1.112 | Describe the physiology of haemostasis, including:  
  • Coagulation  
  • The role of platelets  
  • Fibrinolysis                                                                                                                     | ME   | PEx        |
<p>| BT_PO 1.113 | Describe the physiological mechanisms of limiting and preventing thrombosis                                                                                                                                    | ME   | PEx        |
| BT_PO 1.114 | Outline the methods for assessing coagulation, platelet function and fibrinolysis                                                                                                                            | ME   | PEx        |
| BT_PO 1.115 | Describe blood groups and methods of cross matching blood                                                                                                                                                    | ME   | PEx        |</p>
<table>
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</tr>
</thead>
<tbody>
<tr>
<td>BT_PO 1.116</td>
<td>Outline the composition, indications and risks of use of the following blood components and products:</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td></td>
<td>- Packed red cells</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>- Fresh frozen plasma</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>- Cryoprecipitate</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Platelets</td>
<td></td>
<td></td>
</tr>
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<td></td>
<td>- Factor VIIa</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BT_PO 1.117</td>
<td>Describe the changes that occur during blood storage and their clinical implications.</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>

**Pharmacology of haematology, transfusion medicine and oncology**

<table>
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<tbody>
<tr>
<td>BT_PO 1.118</td>
<td>Describe the pharmacology of heparin and low molecular weight heparins including their side-effects</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.119</td>
<td>Describe the mode of action of protamine and potential adverse reactions</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.120</td>
<td>Describe the pharmacology of warfarin and other anticoagulant drugs</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.121</td>
<td>Describe methods to reverse the effect of warfarin</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.122</td>
<td>Classify and describe the pharmacology of anti-platelet drugs</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.123</td>
<td>Outline the pharmacology of thrombolytic agents</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.124</td>
<td>Outline the pharmacology of antifibrinolytic agents in particular tranexamic acid and aprotinin</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.125</td>
<td>Outline the pharmacology of cancer chemotherapeutic agents with particular reference to problems that such agents may cause during the perioperative period</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>

**Immunology**

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>BT_PO 1.126</td>
<td>Explain how the body defends against infection</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.127</td>
<td>Outline the effects of anaesthesia and surgery on immune function</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.128</td>
<td>Describe the immunological basis and pathophysiological effects of hypersensitivity</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.129</td>
<td>Outline the principles of tissue/organ transplantation and the mechanisms of rejection of allogeneic organs</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>
### Immunology related pharmacology

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>BT_PO 1.130</td>
<td>Outline the pharmacology of antimicrobial drugs and their interactions with other drugs used during the perioperative period</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.131</td>
<td>Explain the principles of antibiotic prophylaxis</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_PO 1.132</td>
<td>Outline the pharmacology of antiseptics and disinfectants, their clinical use and associated risks</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>
# Regional and local anaesthesia

## Basic training

<table>
<thead>
<tr>
<th>Code</th>
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</tr>
</thead>
<tbody>
<tr>
<td>BT_RA 1.1</td>
<td>Describe the physiology of nerve conduction</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RA 1.2</td>
<td>Describe the physiological consequences of a central neuraxial block</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RA 1.3</td>
<td>Discuss the pharmacology of local anaesthetic agents including:</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td></td>
<td>• Mechanisms of action</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• Comparative pharmacology of different agents</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Toxicity</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>• Use of adjuvant agents to enhance the quality or extend duration of block</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>• Pharmacokinetics of drugs administered in the epidural and subarachnoid space</td>
<td></td>
<td></td>
</tr>
<tr>
<td>BT_RA 1.4</td>
<td>Describe the anatomy of the vertebral column spinal cord and meninges relevant to the performance of central neuraxial block with appropriate surface markings.</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RA 1.5</td>
<td>Describe the dermatomal innervations</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RA 1.6</td>
<td>Describe the myotomal innervation</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RA 1.7</td>
<td>Describe the pain and sensory pathways</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RA 1.8</td>
<td>Describe the principles of ultrasound imaging and the safe use of ultrasound equipment for regional anaesthesia</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RA 1.9</td>
<td>Describe the principles of nerve stimulation to locate nerves and the safe use of nerve stimulators</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>

## Central neuraxial blocks

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>BT_RA 1.14</td>
<td>Describe factors influencing dose and choice of anaesthetic agents for spinal anaesthesia and epidural anaesthesia/analgesia</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RA 1.15</td>
<td>Describe how the baricity of the agents used and positioning of patients may affect the extent of block in spinal anaesthesia</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RA 1.16</td>
<td>Describe the drugs that may be injected into the intrathecal or epidural space as adjuvant agents to a central neuraxial block and discuss their risks and benefits</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RA 1.17</td>
<td>Describe the midline and paramedian approaches to the sub-arachnoid space and epidural space</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>
# Resuscitation, trauma and crisis management

## Basic training

<table>
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<tr>
<th>Code</th>
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</tr>
</thead>
<tbody>
<tr>
<td>BT_RT 1.1</td>
<td>Define shock</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RT 1.2</td>
<td>Integrate knowledge of factors determining cardiac output to classify causes of shock</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RT 1.3</td>
<td>Describe the physiological consequences of shock</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RT 1.4</td>
<td>Describe oxygen delivery and outline the use of indicators of tissue oxygenation (base deficit, lactate, mixed venous oxygen saturation) in resuscitation</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RT 1.5</td>
<td>Describe the systemic inflammatory response and its physiological effects</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RT 1.6</td>
<td>Describe the physiological basis of anaphylactic and anaphylactoid reactions</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RT 1.7</td>
<td>Describe blood groups and the physiological basis of transfusion reactions</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RT 1.8</td>
<td>Outline the changes that occur in stored blood</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RT 1.9</td>
<td>Describe physiological consequences of massive transfusion</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RT 1.10</td>
<td>Outline the causes of hypoxaemia</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RT 1.11</td>
<td>Describe the physiological consequences of hypoxaemia</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RT 1.12</td>
<td>Outline the factors determining intracranial pressure and discuss its regulation</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RT 1.13</td>
<td>Describe the cerebral circulation, the regulation of cerebral blood flow and factors leading to the loss of autoregulation</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RT 1.14</td>
<td>Discuss cerebral perfusion pressure</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RT 1.15</td>
<td>Describe the blood supply to the spinal cord and the regulation of spinal cord blood flow</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RT 1.16</td>
<td>Discuss spinal cord perfusion pressure</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
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<tr>
<td><strong>Pharmacology</strong></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>BT_RT 1.17</td>
<td>With reference to the management of shock, describe the pharmacology of vasopressors and inotropes, including: adrenaline, noradrenaline, phenylephrine, metaraminol, dopamine, dobutamine, phosphodiesterase inhibitors, vasopressin</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RT 1.18</td>
<td>With reference to cardiopulmonary resuscitation, describe the pharmacology of adrenaline, vasopressin, amiodarone and lignocaine</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RT 1.19</td>
<td>With reference to the treatment of malignant hyperthermia, describe the pharmacology of dantrolene</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td><strong>Anatomy</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BT_RT 1.20</td>
<td>Outline the anatomy relevant to vascular access in resuscitation: specifically for safe cannulation of antecubital, saphenous jugular and subclavian veins and placement of intraosseous infusion devices</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RT 1.21</td>
<td>Outline the anatomy relevant to the drainage of pericardial fluid</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RT 1.22</td>
<td>Outline the anatomy relevant to drainage of the pleural space</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RT 1.23</td>
<td>Outline the anatomy of the cerebral and spinal cord circulation</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td><strong>Resuscitation of the shocked patient</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BT_RT 1.30</td>
<td>Outline how the clinical signs of shock may be altered by age</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td><strong>Acute respiratory failure</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BT_RT 1.38</td>
<td>Define respiratory failure and differentiate between type 1 and type 2 respiratory failure</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_RT 1.39</td>
<td>Interpret blood gas analysis in respiratory failure</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>
### Safety and quality in anaesthetic practice

#### Introductory training

<table>
<thead>
<tr>
<th>Code</th>
<th>Learning outcome</th>
<th>Role</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>IT_SQ 1.5</td>
<td>Outline the standards to which reusable anaesthetic equipment needs to be cleaned and/or treated. (Refer to College professional document <em>PS28 Guidelines on Infection Control in Anaesthesia</em>)</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>

#### Basic training

<table>
<thead>
<tr>
<th>Code</th>
<th>Learning outcome</th>
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<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT_SQ 1.3</td>
<td>Outline the mandatory safety requirements for anaesthetic machines. (Refer to College professional document <em>PS54 Statement on the Minimum Safety Requirements for Anaesthetic Machines and Workstations for Clinical Practice</em>)</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>

#### Basic sciences relevant to anaesthesia equipment, measurement and safety

<table>
<thead>
<tr>
<th>Code</th>
<th>Learning outcome</th>
<th>Role</th>
<th>Assessment</th>
</tr>
</thead>
</table>
| BT_SQ 1.5 | Describe basic physics applicable to anaesthesia in particular:  
- Behaviour of fluids (gases and liquids)  
- Electrical concepts, current, potential difference, resistance, impedance, inductance and capacitance  
- Principles of humidification and use of humidifiers  
- Principles of ultrasound imaging and use of doppler                                                                                     | ME   | PEx        |
| BT_SQ 1.6 | Describe the methods of measurement applicable to anaesthesia, including clinical utility, complications and sources of error in particular:  
- SI units  
- Measurement of volumes, flows, and pressures, including transducers.  
- Measurement of blood pressure  
- Measurement of cardiac output  
- Measurement of temperature  
- Oximetry  
- Gas analysis, including capnography  
- Methods used to measure respiratory function, including:  
  - Forced expiratory volume  
  - Peak expiratory flow rate  
  - Vital capacity  
  - Flow-volume loops  
  - Functional residual capacity and residual volume                                                                                                                                 | ME   | PEx        |
<table>
<thead>
<tr>
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<th>Role</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>BT_SQ 1.7</td>
<td>Describe microshock and macroshock and the mechanisms for preventing these, with particular reference to ensuring the compatibility of medical procedure, treatment area, and medical equipment used</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_SQ 1.8</td>
<td>Outline the causes of fires and explosions in the operating suite and discuss methods for prevention and management (refer to the Resuscitation, trauma and crisis management clinical fundamental)</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_SQ 1.9</td>
<td>Describe the hazards of anaesthetic gas pollution and the methods of scavenging anaesthetic gases</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_SQ 1.10</td>
<td>Describe the supply of medical gases (bulk supply and cylinder) and features to ensure supply safety including pressure valves and regulators and connection systems</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_SQ 1.11</td>
<td>Describe how medical suction is generated and how to set up and test suction systems, both fixed and portable</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_SQ 1.12</td>
<td>Describe the principles and safe operation of vaporisers</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_SQ 1.13</td>
<td>Describe and classify breathing systems used in anaesthesia. Evaluate their clinical utility and hazards associated with their use.</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_SQ 1.14</td>
<td>Describe different systems to deliver supplemental oxygen and the advantages and disadvantages of these systems</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_SQ 1.15</td>
<td>Outline how CO2 is absorbed in a circle system and the hazards associated with the use of CO2 absorption</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_SQ 1.16</td>
<td>Describe when a level 1 anaesthesia machine check is required. (Refer to College professional document PS31 Recommendations on Checking Anaesthesia Delivery Systems)</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_SQ 1.17</td>
<td>Discuss the safety of methods for maintaining body temperature during anaesthesia and sedation, including active warming of patients</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_SQ 1.18</td>
<td>Discuss the principles of surgical diathermy, its safe use and the potential hazards</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_SQ 1.19</td>
<td>Describe the principles of surgical lasers, their safe use and the potential hazards</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>BT_SQ 1.20</td>
<td>Outline the pharmacology of radiological contrast agents</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>
### Obstetric anaesthesia and analgesia

<table>
<thead>
<tr>
<th>Code</th>
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<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS_OB 1.1</td>
<td>Describe the physiological changes and their implications for anaesthesia that occur during pregnancy, labour and delivery, in particular the respiratory, cardiovascular, haematological and gastrointestinal changes.</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>SS_OB 1.2</td>
<td>Outline the reference ranges for physiological and biochemical variables in pregnancy</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>SS_OB 1.3</td>
<td>Describe the transition from foetal to neonatal circulation and the establishment of ventilation</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>SS_OB 1.4</td>
<td>Describe the utero-placental circulation and the principles of placental physiology as related to placental gas exchange and regulation of placental blood flow</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>SS_OB 1.5</td>
<td>Describe the mechanism and consequences of aorto-caval compression in pregnancy</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>SS_OB 1.6</td>
<td>Describe the changes in the anatomy of the maternal airway and their impact on airway management during anaesthesia</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>SS_OB 1.7</td>
<td>Describe the changes in the anatomy of the maternal vertebral column, the spinal cord and meninges relevant to the performance of a central neuraxial block including epidural, spinal and combined spinal-epidural, with appropriate surface markings (refer to the Regional and local anaesthesia clinical fundamental)</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>SS_OB 1.8</td>
<td>Describe the anatomy and physiology of pain in labour and childbirth</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>SS_OB 1.9</td>
<td>Describe the influence of pregnancy on the pharmacokinetics and pharmacodynamics of drugs commonly used in anaesthesia and analgesia</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>SS_OB 1.10</td>
<td>Describe the pharmacology of oxytocic agents with special reference to oxytocin derivatives, ergot derivatives and prostaglandins</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>SS_OB 1.11</td>
<td>Describe the pharmacology of tocolytic agents with particular reference to beta 2 agonists, calcium antagonists, magnesium, inhalational anaesthetics, nitrates and NSAIDS</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>SS_OB 1.12</td>
<td>Describe the pharmacology of agents used for the treatment of pre-eclampsia including magnesium, hydralazine and labetol</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>Code</td>
<td>Learning outcome</td>
<td>Role</td>
<td>Assessment</td>
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</tr>
<tr>
<td>SS_OB 1.13</td>
<td>Explain the factors which influence the transfer of drugs across the placenta to the foetus</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>SS_OB 1.14</td>
<td>Outline the potential effects on the foetus and neonate of drugs administered during pregnancy</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>SS_OB 1.15</td>
<td>Outline the potential effects on the neonate of drug administration in association with lactation</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>
## Paediatric anaesthesia

<table>
<thead>
<tr>
<th>Code</th>
<th>Learning outcome</th>
<th>Role</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><strong>Airway management</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SS_PA 1.1</td>
<td>Describe the anatomy of the neonatal airway, how this changes with growth and development and the implications for airway management</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td></td>
<td><strong>Perioperative medicine – physiology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SS_PA 1.21</td>
<td>Describe the foetal circulation</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>SS_PA 1.22</td>
<td>Describe the circulatory and respiratory changes that occur at birth</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>SS_PA 1.23</td>
<td>Define the thermoneutral zone, describe temperature regulation in the neonate and the physiological responses to lowered and raised environmental temperature, the effects of anaesthesia on these responses and how this changes with growth and development</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>SS_PA 1.24</td>
<td>Describe the physiology of the cardiovascular, respiratory, renal and neurological systems in the neonate and the changes that occur with growth and development and the implications of this for anaesthetic care</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>SS_PA 1.25</td>
<td>Describe the composition of body fluids in the neonate and explain the changes that occur with growth and development</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>SS_PA 1.26</td>
<td>Describe glucose homeostasis in the neonate and explain the changes that occur with growth and development</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>SS_PA 1.27</td>
<td>Describe vital signs for children of different ages</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td></td>
<td><strong>General anaesthesia and sedation - clinical and applied pharmacology</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SS_PA 1.52</td>
<td>Describe how the pharmacokinetics of drugs commonly used in anaesthesia in neonates and children differ from adults and the implications for anaesthesia</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>SS_PA 1.53</td>
<td>Describe the changes in the pharmacodynamics of volatile agents, analgesics, opioids and neuromuscular blocking agents in the neonate and the changes that occur with growth and development and the implications for anaesthesia</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>SS_PA 1.54</td>
<td>Describe the pharmacology of agents used for premedication in children, including midazolam, clonidine, and ketamine</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>
## Appendix two – Learning outcomes mapped to the primary examination

### Paediatric anaesthesia

<table>
<thead>
<tr>
<th>Code</th>
<th>Learning outcome</th>
<th>Role</th>
<th>Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>SS_PA 1.79</td>
<td>Describe the difference in pharmacokinetics of local anaesthetic agents in neonates and children from adults and the implications for regional blockade</td>
<td>ME</td>
<td>PEx</td>
</tr>
<tr>
<td>SS_PA 1.80</td>
<td>Describe the maximum safe doses of local anaesthetic agents in different age groups</td>
<td>ME</td>
<td>PEx</td>
</tr>
</tbody>
</table>