A Primer for the Primary FANZCA examination

Mark Reeves 2018

Many people have unknowingly contributed to this work, especially other members of the Primary Exam Subcommittee as well as most of the Panel of Examiners. The information is current as at the start of 2018. The views expressed below are entirely my own, especially with regard to textbooks and the relative importance of some of the topics. There are bound to be errors, also entirely my own, especially as the document links to about 50 workbooks and over 300 googlesheets. Please feel free to point out the shortcomings: primerfortheprimary@gmail.com
INTRODUCTION

The Primary Exam is almost certainly the most ambitious and demanding thing that you will undertake in your academic life. Failure is not only financially expensive (if it impedes your progress through the training scheme it is very costly), but it is also psychologically traumatic. For many unsuccessful candidates, it is the first exam they have ever failed. It is never worth “just having a go” as there is almost no element of chance involved and most people are no likely to pass than they are to be able to deal with their subsequent failure.

It is by no means a perfect assessment of your knowledge, understanding or fitness to continue specialist training, but a lot of effort does go into making it as fair and unbiased as possible. Not all areas of the curriculum seem reasonable or relevant to know about, and the examiners may agree with you, so some LO’s are only superficially, or rarely, examined. The hardest thing is to gauge how wide and how deep to study each area. What follows is a synthesis of the attitudes of some examiners on the relevance and importance of various learning objectives within the curriculum, organised by topic. This syllabus is hoped to help guide your study. In addition there are links to true/false statements compiled by examiners for many of the learning outcomes so that you can test your knowledge.

When I sat the Primary (over 20 years ago) I was given only one piece of advice that I can recall. It has become the unofficial motto of the Primary Examination Panel:

There is no substitute for knowledge

The quote actually comes from the economist and quality improvement guru W. Edwards Deming. In full, it is:

Knowledge is theory. We should be thankful if action of management is based on theory. Knowledge has temporal spread. Information is not knowledge. The world is drowning in information but is slow in acquisition of knowledge. There is no substitute for knowledge.

And this does have relevance for the Primary. To pass, at some point you will need to display understanding (knowledge) rather than just regurgitate facts (information), especially in the vivas.

A deeper understanding often comes from approaching the same topic from different angles. In the same spirit, it may be easier to explain how to pass the primary by advising on how to fail it.

Back to LO Groups (Contents page)
HOW TO FAIL THE PRIMARY

About 400 people sit the Primary each year, and for those who sit for the first time, the pass rate is about 70%. There is endless advice for those planning to sit about study techniques, study groups and resources. I suspect that there is a group of people who will pass whatever strategy they choose, there is another group that will pass only if they choose the right strategy and there is, sadly, a small group who will not succeed whatever they try.

I have encountered a lot of trainees struggling with the Primary, some through my own hospital and many through feedback and remediation interviews. The latter is a compulsory process after the third and fourth failed attempts. So, whilst I cannot give great guidance on how to infallibly pass the exam, over the years I have noticed some factors common amongst that group of people who sit more than once. So here are my tips for anyone determined to fail - you only need to try a few of them!

- Leave gaps in the curriculum
- Don’t distinguish between the things you ought to know in great detail and the things where a superficial knowledge is sufficient
- Don’t identify where the “one thousand hours” of study is going to come from
- Don’t use several resources
- Don’t ask questions when you don’t know the answers
- Accept other people’s answers for MCQs
- Don’t practice SAQs
- Don’t practice vivas until you get an invitation
- Only ask “nice” people for assessments
- Don’t seek out a past or current primary examiner in your region
- Don’t buy any books
- Buy lots of books but don’t read them
- Mistake familiarity for knowledge
- Don’t have a plan or, if you do, don’t stick to it
- Don’t decide on the purpose of a study group before embarking on it
- Don’t think about how any of what you study might influence your clinical practice
- Don’t cultivate any curiosity you might have about your chosen specialty
FORMAT OF THE EXAM

The exam consists of a written component (MCQ and SAQ) and an oral exam (vivas). Invitation to the vivas is dependent on achieving and minimum standard in the writtens. The MCQ must be passed, but the actual score achieved does not contribute to the final tally which is comprised of SAQ (50%) and viva (50%). The overall mark required to pass is 50%. The invitation mark for the SAQ is 40%, in which case a candidate only just on that threshold would require 60% in the vivas to pass the exam.

The use of a 50% threshold may seem, externally, to be a low bar. However, the exam is pitched at a specific level at which there is a lot of assumed knowledge and so the passing score is set at 50 - each SAQ and viva is calibrated such that 50% is a pass. This gives more potential scores either side in order to allow maximum discrimination.

MCQ

There are 150 questions of the Single Best Answer type. The entire breadth of the curriculum is examined in this paper. Some questions are easy, some hard. Some questions are highly relevant to practice, some seem more obscure. Some are repeats, some are new. The MCQ exam is “sat” by between 5 and 10 examiners, who also rate the difficulty and relevance on each question. These ratings are entered into an Ebel matrix for standard setting and a passing score derived. The passing score varies from exam to exam but usually sits in the high 80’s out of 150 (high 50’s in % terms).

Generally, questions that have been published elsewhere are not repeated, so using other resources, such as the “Black Bank”, is useful for testing your knowledge and widening your reading but not useful as rote learning.

SAQ

The SAQ paper consists of 15 short answer questions. There is usually a balance between pure physiology, pure pharmacology, integrated questions, anatomy, safety and equipment. Some questions are repeated, especially those that are deemed important that have been answered poorly in the past. Dangerously some questions appear on a quick scan to be repeats but are not, so, above all - READ THE QUESTION. How many SAQs should you practice? Certainly you should practice writing answers in 8-9 minutes (you have 10 in the exam) and be prepared to write 15 of them in a row. Practice SAQs are a good way of assessing your recall and knowledge but you should not waste time constructing “ideal answers” to rote-learn in case they
should come up. The Panel has recently elected to start using a holistic marking scheme to grade answers. Rubrics are developed for every question and each question is marked out of 5. The scale is not linear as the important distinction is between 2 (not a pass answer but adequate to be assessed at a viva) and 3 (pass answer). You need to score at least 40% (30 out of 75) to get a viva, but that leaves you needing an above-pass performance in those vivas to pass overall.

VIVAS

Certainly the most terrifying part of the exam, but most candidates do just fine once they warm up (more than 80% of people who attend the vivas, pass). You get 12 distinct topics of 5 minutes each from a total of six examiners. The lead-up is painfully slow but the hour goes very quickly. The examiners aim to assess the depth of your understanding of each topic (which is marked individually by two examiners) so you will always be taken to a point where you have nothing more to offer unless you are extraordinarily knowledgeable. Don’t panic. The range of vivas is considered very carefully and agreed in advance for each group of candidates to minimise overlap with the SAQ and to ensure a good sampling of the curriculum, especially from “core” areas.

SHOULD YOU BUY ANY BOOKS?

This depends on how you study. All the resources you need to pass the exam are available on the ANZCA library site as ebooks. However, I think that there is at least one that you should consider buying as it is not available as an ebook and is very useful. It is published under the Oxford Specialty Training banner of the OUP:

Magee and Tooley. The physics, clinical measurement and equipment of anaesthetic practice - for the FRCA. 2e OUP 2014.

You should seriously consider splashing out on your own copy of Miller 8e. It’s a lot of money at $340 from bookdepository.com (although as nothing compared to the cost of training and examinations), but it’s easier than hunting through an electronic version.
And so to the meat of this Primer. The syllabus is arranged by Learning Outcome groups, and these are broadly arranged into physiology, pharmacology, anatomy, safety and equipment, and miscellaneous. This taxonomy is by no means perfect, but it is how they are presented within ANZCA’s Exams Management System (actually presented alphabetically in there). Each group has one or more Learning Outcomes associated with it. Each Learning Outcome is presented as it’s summary (also in EMS).

Each group gets its own page, but links from the list below. I have included the usual number of MCQs from our template. This gives a vague guide to the distribution of your study as well. If you multiply the usual number of MCQs by 5 hours (about 150 x 5 hrs = 750 hours) you have an approximation of the amount of time you should consider devoting to each topic.

Each group has the LOs ordered by the importance that I think it merits during your study. Please remember that some LOs may be ho-hum but will have a few really essential things you should know, so it’s difficult to generalise too much.

<table>
<thead>
<tr>
<th>Importance</th>
<th>High</th>
<th>Moderate</th>
<th>Low</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth of knowledge required</td>
<td>High</td>
<td>Moderate</td>
<td>Low</td>
</tr>
<tr>
<td>Sources used to acquire knowledge</td>
<td>Several</td>
<td>Few</td>
<td>One</td>
</tr>
<tr>
<td>SAQ likelihood</td>
<td>High</td>
<td>Moderate</td>
<td>Low</td>
</tr>
<tr>
<td>Viva likelihood</td>
<td>High</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>Recall requirement</td>
<td>Immediate and familiar</td>
<td>With a bit of thought</td>
<td>Dredged up</td>
</tr>
</tbody>
</table>
Each of the LOs links to a google sheet where you can test yourself on your knowledge of an area with some True/False statements (similar to the ones that appear on PLOOTD (Primary Learning Outcome of The Day), accessed here. These statements form part of the LO curation project undertaken by Primary Exam Panel members who have tried to generate some statements for each LO. Some of the links will have no statements yet, but plenty do. Each statement is (meant to be) referenced and rated by the statement author for difficulty and relevance. The answer column is hidden; it’s useful to find your own answers. Besides, some of our answers might be wrong. Knowledge changes. The sheets cannot be edited, downloaded, printed, or shared at this stage (mostly because if you copy and paste the T/F column becomes visible!)

Please note that although Statistics was removed from the Primary Exam in the 2013 Curriculum, one LO still remains (BT_PO 1.2). All the rest was removed to make room for Anatomy and Equipment / Safety.
Learning Outcome Groups

- Acid Base Physiology
- Body Fluids and electrolytes
- Cardiovascular physiology
- Cellular Physiology
- Clinical Monitoring
- Endocrine physiology
- Fetal and Neonatal
- Gastrointestinal physiology
- Haematology
- Immunology
- Liver physiology
- Maternal physiology
- Muscle Physiology
- Nervous System Physiology
- Nutrition and Metabolism
- Principles of measurement
- Renal Physiology
- Respiratory Physiology
- Thermoregulation
Antiarrhythmics

Adrenoreceptor Blocking agents

Antiemetics

Antihypertensives

Cardiac Arrest, Ischaemia and failure

Anticholinesterase Drugs

Drugs and the Coagulation System

Diuretics

Endocrine Pharmacology

Gastrointestinal pharmacology

Pharmaceutical aspects and drug development

Pharmacodynamics

Pharmacokinetics

Variability in drug response

Histamine and Serotonin

Inhalational Anaesthetic Agents

IV anaesthetic agents

IV fluids

Local Anaesthetic Drugs

Antimicrobials/Chemotherapeutic Agents

Neuromuscular blocking agents

Neuropharmacology

NSAIDs

Obstetric Pharmacology

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Opioid agonists and antagonists

Pain

Autonomic NS Pharmacology

Respiratory Pharmacology

Anatomy

Equipment and Safety

Integrated / Miscellaneous

Back to LO Groups (Contents page)
Examiners love this stuff! You can be asked to interpret some arterial blood gases, but only those of respiratory acidosis / alkalosis (see BT_RT 1.39) so you don't need to memorise the causes of metabolic acidosis and the rules of compensation for PEx. However, you need a good understanding of acid-base chemistry, including the Stewart approach. Kerry Brandis’s website has an excellent description of this. PLOOTD has some other T/F statements on both acid base regulation and 3 days of acid base chemistry (1, 2, 3).

No more links to PLOOTD after this! You can search the site yourself by putting the LO number into the search bar.
BODY FLUIDS AND ELECTROLYTES

Physiology of Na, K, Mg, Ca and PO4 ions  High  BT_PO 1.72
Maintenance of fluid and electrolyte balance  High  BT_PO 1.73
Constituents and functions of plasma  High  BT_PO 1.74
Osmotic pressure  High  BT_PO 1.75
Regulation of osmolality  High  BT_PO 1.76
Oncotic pressure  High  BT_PO 1.77

Usual number of MCQs - 3

Kerry Brandis: Fluid and electrolyte physiology. In the Physiology Viva Miller 8ed Ch 59
Hemmings and Egan Ch 33 (especially good on IV fluid kinetics)
## CARDIOVASCULAR PHYSIOLOGY

<table>
<thead>
<tr>
<th>Topic</th>
<th>Level</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac electromechanical physiology</td>
<td>High</td>
<td>BT_PO 1.43</td>
</tr>
<tr>
<td>Cardiac muscle physiology</td>
<td>High</td>
<td>BT_PO 1.44</td>
</tr>
<tr>
<td>Cardiac output and pressure volume relationships</td>
<td>High</td>
<td>BT_PO 1.45</td>
</tr>
<tr>
<td>Myocardial oxygen supply and demand</td>
<td>High</td>
<td>BT_PO 1.46</td>
</tr>
<tr>
<td>Control of blood pressure and regional blood flow</td>
<td>High</td>
<td>BT_PO 1.47</td>
</tr>
<tr>
<td>Shock</td>
<td>High</td>
<td>BT_RT 1.1</td>
</tr>
<tr>
<td>Classification of shock</td>
<td>High</td>
<td>BT_RT 1.2</td>
</tr>
<tr>
<td>Describe the physiological consequences of shock</td>
<td>High</td>
<td>BT_RT 1.3</td>
</tr>
<tr>
<td>Cardiovascular responses to posture, exercise, IPPV, pneumoperitoneum and other stressors</td>
<td>High*</td>
<td>BT_PO 1.48</td>
</tr>
<tr>
<td>Cardiovascular changes that occur with ageing</td>
<td>Mod</td>
<td>BT_PO 1.49</td>
</tr>
<tr>
<td>Cardiovascular changes that occur with morbid obesity</td>
<td>Mod</td>
<td>BT_PO 1.50</td>
</tr>
<tr>
<td>Clinical signs of shock in ageing</td>
<td>Mod</td>
<td>BT_RT 1.30</td>
</tr>
</tbody>
</table>

* IPPV High, others Mod

Usual number of MCQs - 12

You can start with Miller 8e Ch10 and Hemmings and Egan Ch 20 and 21, but you will need to progress to Pappano and Wier Cardiovascular Physiology 10e. You don’t need to memorise it all, but you need to get to a level of conceptual understanding such that you can debate topics such as mean systemic filling pressure without getting in a dreadful muddle in a viva. There’s a lot to be said for reading about Guyton curves in Guyton and Hall 13e Ch 20, and the chapter on vascular distensibility (15) is enlightening. No-one is going to get you to construct a Wiggers diagram in a viva (wastes too much time), but cardiac PV loops are popular. Stoelting 5e has a good chapter (46) on the physiologic and pharmacologic impacts of ageing.
Any physiology text will give you the basic information you require. Most of it can be read and understood rather than memorised, but you need to be able to describe the generation and maintenance of transmembrane potentials.
### CLINICAL MONITORING

<table>
<thead>
<tr>
<th>Monitoring Category</th>
<th>Level</th>
<th>Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>Depth of anaesthesia</td>
<td>High</td>
<td>BT_GS 1.51</td>
</tr>
<tr>
<td>Prevention of awareness</td>
<td>High</td>
<td>BT_GS 1.51a</td>
</tr>
<tr>
<td>Monitoring depth of anaesthesia</td>
<td>High</td>
<td>BT_GS 1.52</td>
</tr>
<tr>
<td>Blood gas analysis in respiratory failure</td>
<td>High</td>
<td>BT_RT 1.39</td>
</tr>
<tr>
<td>Temperature monitoring</td>
<td>Mod</td>
<td>BT_GS 1.69a</td>
</tr>
</tbody>
</table>

Usual number of MCQs - 3

Whilst it pains me to recommend a book not available as an ebook in the ANZCA library (I wrote to OUP but they didn’t reply), I do recommend buying a copy of Physics, Clinical Measurement and Equipment of Anaesthetic Practice 2E by Magee and Tooley. It’s $100 well spent. You still need to supplement this, especially for depth of anaesthesia monitoring (Miller 8e Ch 50 for instance) but it covers nearly everything. Beware however that some equipment mentioned does not conform to AS/NZS Standards. More on that in Equipment and Safety.
ENDOCRINE PHYSIOLOGY

Role of the hypothalamus
Control of secretion and the functions of various hormones
Regulation of plasma calcium and related hormones
Role of prostaglandins and other autocoids

Usual number of MCQs - 1

Any standard physiology text, but adequately covered in Hemmings and Egan Ch 30
FOETAL AND NEONATAL

Neonatal airway anatomy High SS_PA 1.1
Foetal circulation High SS_PA 1.21
Circulatory and respiratory changes that occur at birth Mod SS_PA 1.22
Body fluid composition in the neonate Mod SS_PA 1.25
Pharmacodynamics of drugs used in anaesthesia in neonates and children Mod SS_PA 1.52
Pharmacology of agents used for premedication in children Mod SS_PA 1.53
Physiological changes during growth and development of the neonate Low SS_PA 1.24
Glucose homeostasis in the neonate Low SS_PA 1.26
Vital signs for children of different ages Low SS_PA 1.27
Pharmacokinetics of drugs used in anaesthesia in neonates and children Low SS_PA 1.51

Usual number of MCQs - 1

This is not a core topic for PEx but this and obstetrics are the only two SSUs that have some of their LO’s in PEx. It’s hard to recommend a text that will give you what you need without side-tracking you with a load of information that will be important in FEx but not examined here. Power and Kam 3e Ch 14 is fairly comprehensive for the neonatal material, as is Stoelting 5e 44 and 45. Another good source is Spoors and Kiff: Training in Anaesthesia, the essential curriculum (Oxford Specialty Training). This is available as an ebook in the ANZCA library. It is a superb introduction to anaesthesia training and provides excellent revision on just about everything in Basic Training, including much of what is examined in PEx. OST does an Advanced Training one too.
GASTROINTESTINAL PHYSIOLOGY

Nausea & Vomiting - Physiology
Physiology of swallowing, the oesophagus and stomach

Usual number of MCQs - 1

Most physiology texts will have the necessary information, however it is neatly covered (with an anaesthetic flavour) in Spoor and Kiff Ch 17.
HAEMATOLOGY

Physiology of haemostasis  
High  
BT_PO  
1.112

Blood products  
High  
BT_PO  
1.116

Changes in stored blood  
High  
BT_PO  
1.117

Changes in stored blood  
High  
BT_RT 1.8

Physiological consequences of acute and chronic anaemia  
Mod  
BT_PO  
1.110

Physiological mechanisms of limiting and preventing thrombosis  
Mod  
BT_PO  
1.113

Methods for assessing coagulation, platelet function and fibrinolysis  
Mod  
BT_PO  
1.114

Blood groups and transfusion reactions  
Mod  
BT_RT 1.7

Massive transfusion  
Mod  
BT_RT 1.9

Haemoglobinopathies  
Low  
BT_PO  
1.111

Blood groups and cross matching  
Low  
BT_PO  
1.115

Usual number of MCQs - 2

Hemmings and Egan Ch 35 and 36 covers much of the material, as does Power and Kam 3e Ch 9.

Needless to say, many of our patients are either on anticoagulant drugs or have profound abnormalities of haemostasis. In the middle of the night, the only person in theatre who is likely to have any understanding of what the issues are will be the one standing next to the anaesthetic machine.
IMMUNOLOGY

Hypersensitivity Mod BT_PO 1.128
Systemic inflammatory response Mod BT_RT 1.5
Anaphylactic and anaphylactoid reactions Mod BT_RT 1.6
Body defences against infection Low BT_PO 1.126
Effects of anaesthesia and surgery on immune function Low BT_PO 1.127
Tissue/organ transplantation and rejection Low BT_PO 1.129

Usual number of MCQs - 2

Power and Kam 3e Ch 10

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LIVER PHYSIOLOGY

Hepatic blood flow and effect of anaesthesia  Mod  BT PO 1.104
Laboratory assessment of liver function and hepatic failure  Mod  BT PO 1.106
Functions of the liver and consequences of hepatic disease  Low  BT PO 1.103
Portal circulation  Low  BT PO 1.105

Usual number of MCQs - 1

Hemmings and Egan Ch 27
MATERNAL PHYSIOLOGY

Physiological changes in pregnancy  High  SS_OB 1.1
Transition from foetal to neonatal circulation and ventilation  Mod  SS_OB 1.3
Reference ranges for physiological and biochemical variables in pregnancy  Low  SS_OB 1.2
Placental physiology  Low  SS_OB 1.4
Aortocaval compression  Low  SS_OB 1.5

Power and Kam 3e Ch 14 covers it better than most, so does Stoelting 5e Ch
MUSCLE PHYSIOLOGY

Skeletal muscle physiology

Usual number of MCQs - 2

This is an area that, beyond the neuromuscular junction, is not really core anaesthesia. In many ways cardiac and smooth muscle are far more relevant to our working lives. However, skeletal muscle physiology is well-understood as well as being quite interesting. Hence it tends to get examined. All you need to know is contained in a few pages of Ch 1 in Power and Kam 3e.

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NERVOUS SYSTEM PHYSIOLOGY

<table>
<thead>
<tr>
<th>Topic</th>
<th>Importance</th>
<th>MCQs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Basic electrophysiology of nerve conduction</td>
<td>High</td>
<td>BT PO 1.92</td>
</tr>
<tr>
<td>Physiology of nerve conduction</td>
<td>High</td>
<td>BT RA 1.1</td>
</tr>
<tr>
<td>Determinants and regulation of intracranial pressure</td>
<td>High</td>
<td>BT RT 1.12</td>
</tr>
<tr>
<td>Autonomic nervous system</td>
<td>Mod</td>
<td>BT PO 1.51</td>
</tr>
<tr>
<td>Physiology of spinal cord perfusion, intracranial pressure, cerebral blood flow</td>
<td>Mod</td>
<td>BT PO 1.95</td>
</tr>
<tr>
<td>Cerebrospinal fluid</td>
<td>Mod</td>
<td>BT PO 1.97</td>
</tr>
<tr>
<td>Cerebral circulation and autoregulation</td>
<td>Mod</td>
<td>BT RT 1.13</td>
</tr>
<tr>
<td>Cerebral perfusion pressure</td>
<td>Mod</td>
<td>BT RT 1.14</td>
</tr>
<tr>
<td>Physiology of sleep</td>
<td>Low</td>
<td>BT PO 1.93</td>
</tr>
<tr>
<td>Basis of the electroencephalogram</td>
<td>Low</td>
<td>BT PO 1.94</td>
</tr>
<tr>
<td>Blood brain barrier</td>
<td>Low</td>
<td>BT PO 1.96</td>
</tr>
<tr>
<td>Cerebral and spinal cord metabolism, cell damage and death</td>
<td>Low</td>
<td>BT PO 1.98</td>
</tr>
<tr>
<td>Spinal cord blood supply and blood flow</td>
<td>Low</td>
<td>BT RT 1.15</td>
</tr>
<tr>
<td>Spinal cord perfusion pressure</td>
<td>Low</td>
<td>BT RT 1.16</td>
</tr>
</tbody>
</table>

Usual number of MCQs - 5

It’s difficult to assign importance level to some of these LO’s. Many of them overlap. Some of them have some elements of high importance (e.g. some components of the ANS) in a morass of less important features. Equally I don’t consider that the composition, generation and absorption of CSF is very important for most anaesthetists, but it is easy to examine, so beware. The physiology of sleep should be really important to an anaesthetist but is actually quite difficult to examine; same goes for the basis of the EEG given the current fad for monitoring processed frontal EEG despite little understanding of how it is generated. So don’t spend lots of precious time on the detail of these things but know some core facts well so that you can avoid a blank SAQ answer book or an unpleasant, lengthy silence in a viva.

Hemmings and Egan Ch 7 & 8 is a great place to start, so is Power and Kam 3e Ch 2
NUTRITION AND METABOLISM

Control of blood glucose  High  BT_PO 1.85
Physiological consequences of starvation  Low  BT_PO 1.83
Factors that influence metabolic rate  Low  BT_PO 1.84

Usual number of MCQs - 2

Obviously the effects of fasting are important, but starvation less so. Knowledge of blood glucose control and lactate metabolism are very pertinent. Many of our sicker patients have been effectively starved for days due to their illness, or from a prolonged stay in Intensive Care.

Miller 8e Ch 106 Power and Kam 3e Ch 12
PRINCIPLES OF MEASUREMENT

Basic physics applicable to anaesthesia   High    BT SQ 1.5
Methods of measurement applicable to anaesthesia   High    BT SQ 1.6

Usual number of MCQs - 2

SQ 1.6 is HUGE. Our profession is very equipment-heavy; that and the modern drugs are probably what has really improved the safety of anaesthesia, rather than an improved knowledge of physiology. You are almost certain to get some of this in the viva, and probably at least one SAQ. I recommend Magee and Tooley, but there are other dedicated equipment books in the reading list you can use. Miller has excellent sections. You can also try https://www.howequipmentworks.com which is a great site and quite entertaining. One key thing to bear in mind is to identify the circumstances in which monitoring equipment may give misleading results. It is just as important to know when a device may be misleading as it is to know what it means when it is accurate.

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RENAL PHYSIOLOGY

Renal responses to hypovolaemia                        High       BT.PO 1.70
Physiology of renal blood flow                           Mod        BT.PO 1.62
Glomerular filtration and tubular function                  Mod        BT.PO 1.63
Counter-current mechanisms in the kidney                   Mod        BT.PO 1.64
Regulation of renal function                                Mod        BT.PO 1.65
Physiological effects and clinical assessment of renal dysfunction Mod        BT.PO 1.69
Functional anatomy of the kidneys and urinary tract               Low        BT.PO 1.61
Effects of anaesthesia on renal function                             Mod        BT.PO 1.71
Endocrine functions of the kidney                                             Low        BT.PO 1.66
Role of the kidney in the handling of glucose, nitrogenous products and drugs    Low        BT.PO 1.67
Principles of measurement of glomerular filtration rate and renal blood flow             Low        BT.PO 1.68

Usual number of MCQs - 6

Whilst Vander is a good book, you probably do not need to read it all to get through the Primary. It’s covered pretty well in Power and Kam 3e Ch 7 and Hemmings and Egan Ch 32.
RESPIRATORY PHYSIOLOGY

Preoxygenation
Artificial ventilation and physiological consequences
Control of ventilation
Surfactant
Compliance
Fast and slow alveoli / time constants
Elastic properties of the chest wall
Pleural pressure gradient
Physics of gas flow
Airway resistance
Closing capacity
Work of breathing
Altered lung mechanics
Lung volumes
Dead space
Ideal alveolar and mixed expired gases
Oxygen cascade
Alveolar exchange of oxygen and carbon dioxide
Diffusion capacity
V/Q matching
West's zones
Shunt
V/Q mismatch - oxygenation and carbon dioxide elimination
Carriage of oxygen in the blood
Carriage of carbon dioxide in the blood
Pulmonary v systemic circulation
Pulmonary vascular resistance
IPPV and PEEP - Physiological effects
Effects of hypoxaemia, hyper and hypocapnia, and carbon monoxide
Causes of hypoxaemia
Consequences of hypoxaemia
Respiratory failure

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Physiology of the airway
Anatomy - chest wall and diaphragm
Anatomy - lower airways
Anatomy - pulmonary and bronchial circulations
V/Q mismatch - measurement
Ventilatory effects of posture, exercise, altitude, anaesthesia, ageing, morbid obesity
Humidity
Non-ventilatory functions of the lungs

Usual number of MCQs - 14

Depressing isn’t it? A lot of the material is succinctly covered in Power and Kam 3e Ch 3 and Miller 3e Ch 19, however there is no getting away from the fact that the Primary Exam tome for respiratory physiology is Nunn’s 8e, and the vade mecum is West 9e.

In the old days, we were advised to read through Nunn and revise from West. That is perhaps a bit extreme as Nunn has expanded somewhat with the addition of interesting, but not so relevant, chapters. However, you need to know nearly everything in West and it helps to dip into Nunn to clarify some of the conceptual material and fill in a few gaps. The various effects of trekking at high altitude, or even to the top of Everest will be of practical use to very few trainees, but it is fair to say that you will not be able to adequately explain the effects of altitude without a solid understanding of the basic physiology, which is why this topic is of such enduring interest to examiners.
## THERMOREGULATION

<table>
<thead>
<tr>
<th>Topic</th>
<th>Level</th>
<th>Page</th>
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<tbody>
<tr>
<td>Maintenance of temperature during anaesthesia</td>
<td>High</td>
<td>BT GS 1.69</td>
</tr>
<tr>
<td>Heat</td>
<td>Mod</td>
<td>BT GS 1.65</td>
</tr>
<tr>
<td>Hypo/hyperthermia</td>
<td>Mod</td>
<td>BT GS 1.66</td>
</tr>
<tr>
<td>Environmental temperature changes and anaesthesia</td>
<td>Mod</td>
<td>BT GS 1.68</td>
</tr>
<tr>
<td>Thermoneutral zone, neonatal thermoregulation</td>
<td>Mod</td>
<td>SS PA 1.23</td>
</tr>
<tr>
<td>Energy requirements and body temperature</td>
<td>Low</td>
<td>BT GS 1.67</td>
</tr>
</tbody>
</table>

Usual number of MCQs - 2

Power and Kam 3e Ch 12; Spoor and Kiffs 18.11
ANTIARRHYTHMICS

Physiology and pharmacology basis of antiarrhythmic therapy
Pharmacology of antiarrhythmic agents

Usual number of MCQs - 2

At last some pharmacology LO’s!

Hemmings and Egan has a good chapter on this topic (24), but lacks some detail on digoxin and amiodarone - two antiarrhythmics that you will encounter frequently in clinical practice. Stoelting 5e Ch 21 is better, but even that is weak on digoxin. Goodman and Gilman 13e Ch 30 is probably the best for that detail. In all of them remember to ignore drugs not available in Australia and New Zealand.
ADRENORECEPTOR BLOCKING AGENTS

Pharmacology of alpha and beta blockers

Usual number of MCQs - 2

Any standard pharmacology text should do, but remember to ignore those drugs that are not available in Australia and New Zealand. Focus on the agents commonly encountered in clinical practice. Hemmings and Egan Ch 23 covers all the drugs, but you may want to get more detail on some specific agents from Goodman and Gilman 13e.
ANTIEMETICS

Management of PONV  Mod  BT_GS.1.62

Usual number of MCQs - 2

Hemmings and Egan Ch 29, Miller 8e Ch 97. Both chapters are authored by Christian Apfel.

Back to LO Groups (Contents page)
ANTIHYPERTENSIVES

Pharmacology of antihypertensive agents

Usual number of MCQs - 2

Same advice as for adrenoceptor blockers. Alpha-2 agonists are particularly popular. Focus on those that are used clinically in anaesthesia care rather than those for the treatment of chronic hypertension.
CARDIAC ARREST, ISCHAEMIA AND FAILURE

<table>
<thead>
<tr>
<th>Topic</th>
<th>Level</th>
<th>Code</th>
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</thead>
<tbody>
<tr>
<td>Drugs for management of shock</td>
<td>High</td>
<td>BT_RT 1.17</td>
</tr>
<tr>
<td>Drugs for cardiopulmonary resuscitation</td>
<td>High</td>
<td>BT_RT 1.18</td>
</tr>
<tr>
<td>Pharmacology of drugs to manage myocardial ischaemia</td>
<td>Mod</td>
<td>BT_PO 1.59</td>
</tr>
<tr>
<td>Pharmacology of drugs to manage cardiac failure</td>
<td>Low</td>
<td>BT_PO 1.60</td>
</tr>
<tr>
<td>Oxygen delivery and indicators of tissue oxygenation in resuscitation</td>
<td>High</td>
<td>BT_RT 1.4</td>
</tr>
</tbody>
</table>

Usual number of MCQs - 2

No single text seems to have all the information you need. The chapter on CPR in Oh’s Intensive Care Manual 7e Ch 21 is very good. Other chapters in there are good too but don’t have a lot of detailed pharmacology. Hemmings and Egan Ch 22 and 23 has a fair bit of information, but again, you may need to get more detailed pharmacology from Goodman and Gilman 13e. I’m not convinced that the LO’s are really up to date in this section as lignocaine is still in the BT_RT 1.18 and there is less appetite for measuring mixed venous oxygen saturation (requires a PA catheter) than in former times (BT_RT 1.4).
ANTICHOLINESTERASE DRUGS

Neuromuscular blocking agents - reversal agents  High  BT_GS 1.39
Anticholinesterases  High  BT_GS 1.40

Usual number of MCQs - 1

There’s some good information in most anaesthetic pharmacology texts but it’s worth reading through Ch 35 in Miller 8e at least once.
The first four are popular viva topics, and given that nearly every inpatient will get a LMWH and every other patient seems to be on some antiplatelet therapy, perhaps these should be rated as “High”. Even though I have yet to read reports of patients dying from haemorrhage caused by anaesthesia, perioperative management of these medicines frequently falls to the anaesthetist. It’s all well-covered in Hemmings and Egan Ch 37. As for the other three LO’s I would stick to knowing something about protamine and tranexamic acid (aminocaproic acid and aprotinin are no longer available in Australia and will not be examined). I’ve not seen anyone quizzed on thrombolytic agents in my 12 years of examining.
DIURETICS

Physiological basis for classification of diuretics related to their site of action

Pharmacology of diuretics

Usual number of MCQs - 1

A topic that lends itself to the integrated exam, although pretty mind-numbing and something an anaesthetist would rarely prescribe (at least, not for their diuretic action). Hemmings and Egan Ch 34 canters through it pretty well without too much excruciating detail.
ENDOCRINE PHARMACOLOGY

Pharmacology of insulin, oral hypoglycaemics, corticosteroid drugs
High BT PO 1.90

Pharmacology of thyroid hormone, anti-thyroid drugs, glucagon, vasopressin and analogues
Low BT PO 1.91

Usual number of MCQs - 1

A lot of patients get steroids, a great many are diabetic. Again, it often falls to the anaesthetist to manage these perioperatively. Hemmings and Egan Ch 31 covers it nicely. There is an overlap here with the physiology of metabolism of fat and glucose, which was covered in a previous topic.
GASTROINTESTINAL PHARMACOLOGY

Nausea & Vomiting - Treatment

Pharmacological treatment of peptic ulcer disease and reflux

Usual number of MCQs - 1

The first of these is really the same material as in ANTIEMETICS. Acid suppression is covered in most dedicated pharmacology texts.
The best single resource remains Ross McPherson’s article from 2001. It’s on the recommended reading list and can be downloaded through the ANZCA library. You can also view it here. It is unlikely that you will ever get a mark for pointing out that a drug is presented as a “clear, colourless solution”.
PHARMACODYNAMICS

Mechanisms of drug action High BT_GS 1.1
Receptors High BT_GS 1.2
Dose-effect relationships High BT_GS 1.3
Efficacy and potency High BT_GS 1.4
Law of mass action High BT_GS 1.5
Mechanisms of adverse drug effects High BT_GS 1.6
Mechanisms of anaesthesia High BT_GS 1.49

Usual number of MCQs - 5

Hemmings and Egan Ch 1, 2, 5 & 6 covers most of these, and Ch 9 & 10 has plenty of detail on mechanisms. This and pharmacokinetics are the main conceptually difficult topics in Pharmacology, so it is worth reading it several times and from several sources and perspectives to get a good understanding. Examiners care far more about this than the rote learning of pharmacokinetic parameters of various drugs.
**PHARMACOKINETICS**

<table>
<thead>
<tr>
<th>Pharmacokinetic Modelling</th>
<th>High</th>
<th><strong>BT_GS 1.7</strong></th>
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</thead>
<tbody>
<tr>
<td>Drugs absorption</td>
<td>High</td>
<td><strong>BT_GS 1.8</strong></td>
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<tr>
<td>Drug distribution</td>
<td>High</td>
<td><strong>BT_GS 1.9</strong></td>
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<tr>
<td>Drug clearance</td>
<td>High</td>
<td><strong>BT_GS 1.10</strong></td>
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<tr>
<td>Drug metabolism</td>
<td>High</td>
<td><strong>BT_GS 1.11</strong></td>
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<tr>
<td>Drug infusion kinetics</td>
<td>High</td>
<td><strong>BT_GS 1.12</strong></td>
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<tr>
<td>Drug monitoring</td>
<td>High</td>
<td><strong>BT_GS 1.13</strong></td>
</tr>
<tr>
<td>Target controlled infusions</td>
<td>High</td>
<td><strong>BT_GS 1.59</strong></td>
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</tbody>
</table>

Usual number of MCQs - 4

Hemmings and Egan Ch 2, 3 & 4 packs it in but, as with pharmacodynamics, read widely. You need a detailed understanding of propofol pharmacokinetics and TCI models, especially their limitations.
**VARIABILITY IN DRUG RESPONSE**

<table>
<thead>
<tr>
<th>Topic</th>
<th>Level</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Variations in individual drug responses</td>
<td>High</td>
<td>BT_GS 1.14</td>
</tr>
<tr>
<td>Tachyphylaxis, tolerance, addiction, dependence and idiosyncrasy</td>
<td>High</td>
<td>BT_GS 1.15</td>
</tr>
<tr>
<td>Changes in drug response due to physiological change with particular reference to the elderly</td>
<td>High</td>
<td>BT_GS 1.16</td>
</tr>
<tr>
<td>Adverse drug effects</td>
<td>High</td>
<td>BT_GS 1.18</td>
</tr>
<tr>
<td>Drug interactions</td>
<td>High</td>
<td>BT_GS 1.19</td>
</tr>
<tr>
<td>Pharmacogenetics</td>
<td>High</td>
<td>BT_GS 1.20</td>
</tr>
<tr>
<td>Changes in drug response due to cardiac, respiratory, renal and hepatic disease</td>
<td>Mod</td>
<td>BT_GS 1.17</td>
</tr>
<tr>
<td>Isomerism</td>
<td>Mod</td>
<td>BT_GS 1.21</td>
</tr>
<tr>
<td>Analgesic agents and pathological disturbance</td>
<td>Mod</td>
<td>BT_PM 1.10</td>
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<tr>
<td>Alterations to drug response due to renal disease</td>
<td>Mod</td>
<td>BT_PO 1.80</td>
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<tr>
<td>Alterations to drug response due to hepatic disease</td>
<td>Mod</td>
<td>BT_PO1.108</td>
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<tr>
<td>Use of dantrolene for treating malignant hyperthermia</td>
<td>Mod</td>
<td>BT_RT 1.19</td>
</tr>
<tr>
<td>Changes in pharmacokinetics and pharmacodynamics of drugs during pregnancy</td>
<td>Mod</td>
<td>SS_OB 1.9</td>
</tr>
<tr>
<td>Inadvertent intra-arterial injection</td>
<td>Low*</td>
<td>BT_GS 1.58</td>
</tr>
<tr>
<td>Failure to wake</td>
<td>Low*</td>
<td>BT_GS 1.63</td>
</tr>
<tr>
<td>Postoperative delirium</td>
<td>Low*</td>
<td>BT_GS 1.64</td>
</tr>
</tbody>
</table>

Usual number of MCQs - 3

*The last three are rated “low” not because they are not important but because they really belong in the Final Exam, so whilst technically fair game it would be bad form to examine them in any detail.

You will need to cast your net wide to gather most of the material for this topic as it is quite diverse and often buried in chapters on other things. Fortunately there are a few double-ups. Hemmings and Egan Ch 4, 5 & 6 is a good place to start.
HISTAMINE AND SEROTONIN

Pharmacology of drugs acting via serotonin or serotonin receptors
Clinical features and management of serotonin syndrome
Pharmacology of histamine antagonists

Usual number of MCQs - 1

Drugs acting on serotonergic pathways are relevant to anaesthetic pharmacology, but obviously the detailed pharmacology of antidepressants is not required. It’s hard to find a single source for all the information you might want. Katzung 13e Ch 16 has a comprehensive chapter on histamine, serotonin and the ergot alkaloids - it’s more than you need for everything (except the antiemetics!) and is available directly through the Primary library guide.
INHALATIONAL ANAESTHETIC AGENTS

Inhalational agents - physical properties               High       BT_GS 1.23
Inhalational agents - pharmacokinetics                  High       BT_GS 1.24
Inhalational agents - system effects                    High       BT_GS 1.25
Inhalational agents - toxicity                         High       BT_GS 1.26
Inhalational agents - nitrous oxide                     High       BT_GS 1.27
Inhalational agents - comparative pharmacology          High       BT_GS 1.28
MAC                                                      High       BT_GS 1.50

Usual number of MCQs - 6

It would be surprising if you didn’t get an SAQ and/or a viva on inhalational agents.
There is plenty of material in Hemmings and Egan Ch 3 & 10, massive amounts in Miller
8e Ch 25-28, but my favourite is “The Pharmacology of Inhaled Anaesthetics” by Eger,
Eisenkraft and Weiskopf, for sheer elegance, readability, authority, and brevity (250
pages but not close-written). It was written by a giant of anaesthesia, Ted Eger, who
passed away last year. He developed the concept of MAC and produced a huge volume
of research about inhalational agents. The book was available free (thanks to an
Educational Foundation and Baxter) so someone in your department may well have a
copy to lend you. It came with two DVDs of excellent lectures and has a bunch of MCQs
at the back some of which might make their way into our MCQ bank.... You can get it on
Amazon (which is a bit outrageous as it was given away free when it came out in 2003).
The last chapter alone is worth the price of admission.
## IV ANAESTHETIC AGENTS

<table>
<thead>
<tr>
<th>Category</th>
<th>Difficulty</th>
<th>Reference</th>
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</thead>
<tbody>
<tr>
<td>Sedatives and hypnotics</td>
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<td><strong>BT_GS 1.29</strong></td>
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<tr>
<td>Intravenous and sedative agents - pharmacokinetics</td>
<td>High</td>
<td><strong>BT_GS 1.30</strong></td>
</tr>
<tr>
<td>Intravenous and sedative agents - effects on body systems</td>
<td>High</td>
<td><strong>BT_GS 1.31</strong></td>
</tr>
<tr>
<td>Intravenous, sedative and premedicant agents - adverse effects</td>
<td>High</td>
<td><strong>BT_GS 1.32</strong></td>
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<tr>
<td>Intravenous and sedative agents - altered physiological states</td>
<td>High</td>
<td><strong>BT_GS 1.33</strong></td>
</tr>
<tr>
<td>Ketamine</td>
<td>High</td>
<td><strong>BT_PM 1.27</strong></td>
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</tbody>
</table>

Usual number of MCQs - 6

No excuses :)  Hemmings Ch 9, Miller 8e Ch 30
IV FLUIDS

Colloids and crystalloids  High  IT GS 1.5

Usual number of MCQs - 1

Hemmings and Egan Ch 33
LOCAL ANAESTHETIC DRUGS

<table>
<thead>
<tr>
<th>Topic</th>
<th>Level</th>
<th>Reference</th>
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<tbody>
<tr>
<td>Pharmacology of local anaesthetic agents</td>
<td>High</td>
<td>BT_RA 1.3</td>
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<tr>
<td>Maximum safe doses of local anaesthetic agents in neonates and children</td>
<td>High</td>
<td>SS_PA 1.79</td>
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<tr>
<td>Pharmacokinetics of local anaesthetic agents in neonates and children</td>
<td>Low</td>
<td>SS_PA 1.78</td>
</tr>
</tbody>
</table>

Usual number of MCQs - 4

Stoelting 5e Ch 10 is particularly comprehensive, even more so perhaps than Miller 8e Ch 36.
ANTIMICROBIALS/CHEMOTHERAPEUTIC AGENTS

Antimicrobial agents                       Mod   BT_PO 1.3
Pharmacology of antimicrobial drugs       Mod   BT_PO 1.130
Principles of antibiotic prophylaxis       Mod   BT_PO 1.131
Cancer chemotherapeutic agents            Low   BT_PO 1.125
Pharmacology of antiseptics and disinfectants Low   BT_PO 1.132

Usual number of MCQs - 1

Stoelting 5e Ch 41 and 42 has it all. You may also want to skim through ANZCA’s professional document PS28 on infection control.

Back to LO Groups (Contents page)
### NEUROMUSCULAR BLOCKING AGENTS

- Neuromuscular physiology and blocking agents: High [BT GS 1.35]
- Neuromuscular blocking agents - pharmacokinetics: High [BT GS 1.36]
- Neuromuscular blocking agents - comparative pharmacology: High [BT GS 1.37]
- Neuromuscular blocking agents - adverse effects: High [BT GS 1.38]
- Neuromuscular blocking agents - reversal agents: High [BT GS 1.39]
- Depth of neuromuscular blockade and neuromuscular monitoring: High [BT GS 1.55]
- Inadequate reversal of neuromuscular blockade: High [BT GS 1.56]
- Indication for muscle relaxation: Mod [BT GS 1.47]

Usual number of MCQs - 6

One of the few topics that truly lends itself to integrated assessment of physiology, pharmacology and equipment, and therefore popular with examiners, especially in vivas. I think it is well-covered in Hemmings and Egan Ch 18 and 19, also Miller 8e 34 and 35. Sugammadex is well-covered in Stoelting 5e Ch 12. Obviously the indications for muscle relaxation are important but there are a bit more FEX than PEX. The same argument could be mounted for inadequate reversal, but it is so important, and so tied up with the pharmacology of the agents, that you should be very familiar with it.
NEUROPHARMACOLOGY

Physiological consequences of a central neuraxial block  High  BT_RA 1.2
Dose and choice of agents for spinal anaesthesia and epidural anaesthesia/analgesia  High  BT_RA 1.14
Adjuvant drugs in neuraxial blockade  High  BT_RA 1.16
Anticonvulsants  Mod  BT_PM 1.28
Effect of baricity in spinal anaesthesia  Mod  BT_RA 1.15
Flumazenil  Low  BT_GS 1.34
Pharmacology of psychiatric drugs and other neurological disorders  Low  BT_PO 1.99

Usual number of MCQs - 4

Some odd ones lumped in together here. Hence it is impossible to find a single source of information. Miller 8e Ch 56 covers neuraxial blocks more than comprehensively. Spoor and Kiff Ch 6.11-6.15 is an excellent introduction. Hemmings and Egan Ch 11 covers the rest (gapapentinoids are covered in Ch 16). My rating of the LO on flumazenil accords precisely with my view on its clinical worthlessness in anaesthesia.
**NSAIDs**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
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<tbody>
<tr>
<td>NSAIDs</td>
<td>High</td>
<td>BT_PM 1.24</td>
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<tr>
<td>Paracetamol</td>
<td>High</td>
<td>BT_PM 1.25</td>
</tr>
<tr>
<td>Prostaglandins</td>
<td>Low</td>
<td>BT_PM 1.23</td>
</tr>
</tbody>
</table>

Usual number of MCQs - 2

Anything you prescribe frequently, you need to know a lot about. Evers and Maze 2e Ch 34 covers NSAIDs and prostaglandins very nicely. Paracetamol is surprisingly well-covered in Spoor and Kiff Ch 7.28 and overdose on p439, and surprisingly poorly-covered in most anaesthetic pharmacology texts.
OBSTETRIC PHARMACOLOGY

Pharmacology of oxytocic agents High SS_OB 1.10
Pharmacology of tocolytic agents Mod SS_OB 1.11
Pharmacology of agents used for the treatment of pre-eclampsia Mod SS_OB 1.12
Placental drug transfer Mod SS_OB 1.13
Drugs and breastfeeding Mod SS_OB 1.15
Foetal and neonatal effect of drugs administered during pregnancy Low SS_OB 1.14

Usual number of MCQs - 2

Evers and Maze 2e Ch 58 has good coverage of this topic, also Miller 8e Ch 77.
### OPIOID AGONISTS AND ANTAGONISTS

<table>
<thead>
<tr>
<th>Topic</th>
<th>Level</th>
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</thead>
<tbody>
<tr>
<td>Opioids - clinical application</td>
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<td>BT_GS 1.41</td>
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<tr>
<td>Opioids - pharmacokinetics</td>
<td>High</td>
<td>BT_GS 1.42</td>
</tr>
<tr>
<td>Opioid receptors</td>
<td>High</td>
<td>BT_PM 1.12</td>
</tr>
<tr>
<td>Opioids - mechanisms of action</td>
<td>High</td>
<td>BT_PM 1.13</td>
</tr>
<tr>
<td>Agonists, partial agonists, mixed agonists-antagonists, antagonists</td>
<td>High</td>
<td>BT_PM 1.14</td>
</tr>
<tr>
<td>Opioids - routes of administration</td>
<td>High</td>
<td>BT_PM 1.15</td>
</tr>
<tr>
<td>Opioid conversions</td>
<td>High</td>
<td>BT_PM 1.16</td>
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<tr>
<td>Opioid pharmacokinetics</td>
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<td>BT_PM 1.17</td>
</tr>
<tr>
<td>Opioids - epidural and intrathecal</td>
<td>High</td>
<td>BT_PM 1.18</td>
</tr>
<tr>
<td>Opioids - adverse effects</td>
<td>High</td>
<td>BT_PM 1.19</td>
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<tr>
<td>Opioids - drug interactions</td>
<td>High</td>
<td>BT_PM 1.20</td>
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<tr>
<td>Individual opioid pharmacodynamics</td>
<td>High</td>
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<tr>
<td>Opioid antagonists</td>
<td>Mod</td>
<td>BT_PM 1.21</td>
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</table>

Usual number of MCQs - 5

Evers and Maze 2e Ch 31-33; Hemmings and Egan Ch 15; Stoelting 5e Ch 7. Each is good in its own way. If you read all of them then you'll get plenty of reinforcement! There is also a lot of clinical information in the [Acute Pain Management handbook](http://example.com).
PAIN

<table>
<thead>
<tr>
<th>Topic</th>
<th>Importance</th>
<th>Reference</th>
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<tbody>
<tr>
<td>Physiology of pain</td>
<td>High</td>
<td>BT_PM 1.3</td>
</tr>
<tr>
<td>Response to acute pain</td>
<td>High</td>
<td>BT_PM 1.5</td>
</tr>
<tr>
<td>Pain and the elderly</td>
<td>High</td>
<td>BT_PM 1.8</td>
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<tr>
<td>Analgesic agents</td>
<td>High</td>
<td>BT_PM 1.9</td>
</tr>
<tr>
<td>Analgesic agents - modes of administration</td>
<td>High</td>
<td>BT_PM 1.11</td>
</tr>
<tr>
<td>NMDA receptors</td>
<td>High</td>
<td>BT_PM 1.26</td>
</tr>
<tr>
<td>Pain and sensory pathways</td>
<td>High</td>
<td>BT_RA 1.7</td>
</tr>
<tr>
<td>Multimodal and pre-emptive analgesia</td>
<td>Mod</td>
<td>IT_PM 1.3</td>
</tr>
<tr>
<td>Pharmacology of analgesics</td>
<td>Mod</td>
<td>IT_PM 1.4</td>
</tr>
<tr>
<td>Progression from acute to chronic pain</td>
<td>Mod</td>
<td>BT_PM 1.4</td>
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<tr>
<td>Neuropathic pain</td>
<td>Low</td>
<td>BT_PM 1.6</td>
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<tr>
<td>Pain and organ dysfunction</td>
<td>Low</td>
<td>BT_PM 1.7</td>
</tr>
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</table>

Usual number of MCQs - 2

There are several double-ups here. Everything you need is probably in the Acute Pain Management handbook, but it is a comprehensive survey and interpretation of the literature to be used as a guide, thus it is not as readable as the narrative style of textbooks. Pain physiology is well-covered in Hemmings and Egan Ch 14, Stoelting 5e Ch6, Power and Kam 3e Ch 13, and even more succinctly in Spoor and Kiffs 7.26 and 7.27. A lot of the pharmacology is covered elsewhere but remember to fill in any gaps (like antidepressants and methoxyflurane). The Introductory Training LOs and the more clinical ones have been rated of lower importance simply because of the timing of the Primary (after IT and before AT).
AUTONOMIC NS PHARMACOLOGY

- Pharmacology of sympathomimetic and anticholinergic drugs (High BT_PO 1.52)
- Pharmacology of adrenergic agonists (High BT_PO 1.53)
- Drug interactions with the autonomic nervous system (High BT_PO 1.55)

Usual number of MCQs - 3

Hemmings and Egan Ch 13, Evers and Maze 2e Ch 40 and 41. No-one expects you to be able to draw the drugs, however you may be asked to recognise one and be asked about structure activity relationships (ditto for local anaesthetics).
RESPIRATORY PHARMACOLOGY

Drugs and airway reflexes            High   BT_AM 1.3
Anti-asthma drugs                   High   BT_PO 1.40
Oxygen therapy                      High   BT_PO 1.41a
Drugs for pulmonary hypertension    Low    BT_PO 1.41

Usual number of MCQs - 1

Hemmings and Egan Ch 26 covers pulmonary pharmacology. The “airway reflex” LO is just a compilation of this specific side-effect of drugs covered elsewhere. Oxygen therapy is is best covered in Oh’s Intensive Care Manual 7e Ch 28.
## ANATOMY

<table>
<thead>
<tr>
<th>Topic</th>
<th>Level</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upper airway and laryngeal anatomy</td>
<td>High</td>
<td>IT_AM 1.1</td>
</tr>
<tr>
<td>Anatomy of the upper airway, larynx and trachea</td>
<td>High</td>
<td>BT_AM 1.1</td>
</tr>
<tr>
<td>Anatomy relevant to central neuraxial blockade</td>
<td>High</td>
<td>BT_RA 1.4</td>
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<tr>
<td>Midline and paramedian approaches to neuraxial blockade</td>
<td>High</td>
<td>BT_RA 1.17</td>
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<tr>
<td>Anatomy of peripheral venous system</td>
<td>Mod</td>
<td>BT_GS 1.70</td>
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<tr>
<td>Anatomy of the great veins</td>
<td>Mod</td>
<td>BT_GS 1.72</td>
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<tr>
<td>Anatomy of peripheral arteries</td>
<td>Mod</td>
<td>BT_GS 1.74</td>
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<tr>
<td>Anatomy of sensory pathways</td>
<td>Mod</td>
<td>BT_PM 1.1</td>
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<td>Anatomy of the major arteries and veins</td>
<td>Mod</td>
<td>BT_PO 1.42</td>
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<tr>
<td>Dermatomes</td>
<td>Mod</td>
<td>BT_RA 1.5</td>
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<tr>
<td>Anatomy relevant to vascular access in resuscitation</td>
<td>Mod</td>
<td>BT_RT 1.20</td>
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<tr>
<td>Anatomy relevant to drainage of the pleural space</td>
<td>Mod</td>
<td>BT_RT 1.22</td>
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<tr>
<td>Anatomy of the cerebral and spinal cord circulation</td>
<td>Mod</td>
<td>BT_RT 1.23</td>
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<tr>
<td>Airway changes in pregnancy</td>
<td>Mod</td>
<td>SS_OB 1.6</td>
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<tr>
<td>Neuraxial changes in pregnancy</td>
<td>Mod</td>
<td>SS_OB 1.7</td>
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<tr>
<td>Anatomy and physiology of pain in labour and childbirth</td>
<td>Mod</td>
<td>SS_OB 1.8</td>
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<tr>
<td>Anatomy of the autonomic nervous system</td>
<td>Low</td>
<td>BT_PM 1.2</td>
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<tr>
<td>Myotomes</td>
<td>Low</td>
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<tr>
<td>Anatomy relevant to the drainage of pericardial fluid</td>
<td>Low</td>
<td>BT_RT 1.21</td>
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</tbody>
</table>

Usual number of MCQs - 3

Spoor and Kiff Ch 6 pretty much covers it. For the detailed approach, and some excellent applied procedural anatomy, read Ellis’s Anatomy for Anaesthetists 9e.
EQUIPMENT AND SAFETY

Equipment for airway management  High  IT_AM 1.6
Principles and safety of nerve stimulation  High  BT_RA 1.9
Mandatory safety requirements for anaesthetic machines  High  BT_SQ 1.3
Microshock and macroshock  High  BT_SQ 1.7
Scavenging and hazards of anaesthetic gas pollution  High  BT_SQ 1.9
Supply of medical gases  High  BT_SQ 1.10
Medical suction  High  BT_SQ 1.11
Vapourisers  High  BT_SQ 1.12
Breathing systems  High  BT_SQ 1.13
Systems for delivery of supplemental oxygen  High  BT_SQ 1.14
CO2 absorbers  High  BT_SQ 1.15
Safety of methods for maintaining body temperature  High  BT_SQ 1.17
Surgical diathermy  High  BT_SQ 1.18
Principles and safety of ultrasound imaging  Mod  BT_RA 1.8
Fires and explosions in the operating suite  Mod  BT_SQ 1.18
Level 1 anaesthesia machine check  Mod  BT_SQ 1.16
Cleaning and/or treatment of resuable equipment  Low  IT_SQ 1.5
Lasers  Low  BT_SQ 1.19

Usual number of MCQs - 6

Any of the equipment texts should do. Note that there are different standards in different countries. There is sadly no Australian/New Zealand-specific text since Russell’s Anaesthetic Equipment went out of print. I think Magee and Tooley is better than the other texts available online through the library. There’s a lot in Miller 8e and a surprisingly large amount in Spoor and Kiff (mostly in Ch 2). Professional document PS54 covers the mandatory safety requirements for anaesthetic machines, PS31 covers the indications for a Level 1 machine check and PS28 covers the standards for cleaning and disinfection.
### INTEGRATED / MISCELLANEOUS

<table>
<thead>
<tr>
<th>Topic</th>
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<th>LO Code</th>
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<tbody>
<tr>
<td>Pneumoperitoneum</td>
<td>High</td>
<td>IT GS 1.8</td>
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<tr>
<td>Physiology of patient positions</td>
<td>High</td>
<td>IT GS 1.9</td>
</tr>
<tr>
<td>Respiratory effects of anaesthesia and patient positioning</td>
<td>High</td>
<td>BT AM 1.4</td>
</tr>
<tr>
<td>Choice of agents for anaesthesia</td>
<td>High</td>
<td>BT GS 1.46</td>
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<tr>
<td>Synergism between anaesthetic agents, opioids and regional blockade</td>
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<td>BT GS 1.53</td>
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<tr>
<td>Intravenous and inhalational induction</td>
<td>High</td>
<td>BT GS 1.57</td>
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<tr>
<td>Respiratory effects of anaesthesia</td>
<td>High</td>
<td>BT GS 1.60</td>
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<tr>
<td>Anaesthetic agents and regional circulation</td>
<td>Mod</td>
<td>BT GS 1.48</td>
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<tr>
<td>Dealing with changing surgical stimulus</td>
<td>Mod</td>
<td>BT GS 1.54</td>
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<tr>
<td>Diagnostic tests</td>
<td>Mod</td>
<td>BT PO 1.2</td>
</tr>
<tr>
<td>Pharmacology of illicit drugs</td>
<td>Mod</td>
<td>BT PO 1.3a</td>
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<tr>
<td>Motherhood statement</td>
<td>Low</td>
<td>AR ME 1.3</td>
</tr>
<tr>
<td>Knowledge and understanding of procedures and technical skills</td>
<td>Low</td>
<td>AR ME 2.2</td>
</tr>
<tr>
<td>Procedure catch-all statement</td>
<td>Low</td>
<td>AR ME 3.2</td>
</tr>
<tr>
<td>Basic pharmacology of drugs used in anaesthesia</td>
<td>Low</td>
<td>IT GS 1.1</td>
</tr>
<tr>
<td>Immune, haematological and endocrine effects of anaesthesia</td>
<td>Low</td>
<td>BT GS 1.61</td>
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<tr>
<td>Outline the pharmacology of radiological contrast agents</td>
<td>Low</td>
<td>BT SQ 1.20</td>
</tr>
<tr>
<td>Pharmacology of herbal medicines</td>
<td>Low</td>
<td>BT PO 1.4a</td>
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</tbody>
</table>

Usual number of MCQs - 6

A mixed bag of stuff. The AR_ME LO's are just bureaucratic catch-all statements to obviate the need to include hundreds of LOs in the "Medical Expert role in practice" in the Training Program Curriculum. IT GS 1.1 is covered elsewhere! Spoor and Kiff is good on patient positioning (4.2), pneumoperitoneum (4.17), choice of agents and inhalational induction (3.2), and diagnostic tests (p571). Respiratory effects of anaesthesia is well-covered in Nunn 8e Ch 20. Synergism is tricky. You need to know a bit about isobolograms and response surfaces, as well as the clinical implications of giving regional and general anaesthesia simultaneously. Effects of drugs on regional circulation is part of the pharmacology of those drugs. Changing surgical depth is really FEX. Illicit drugs and herbal medicines are covered in general pharmacology books like Katzung 13e Ch 32 and 65 although their specific effects relevant to anaesthesia and surgery are not well-covered. There is a link to anaesthetic articles on illicit drugs [here](#) and on herbal medicines [here](#).

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