



RANZCO

The Royal Australian
and New Zealand
College of Ophthalmologists

Clinical Ophthalmic Pharmacology and Emergency Medicine (COPEM) Curriculum Standard

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Purpose

A thorough knowledge of ocular pharmacology, as well as of the management of medical and ocular emergencies, is essential for an ophthalmic trainee – in order to manage ophthalmology patients safely.

This curriculum standard specifies the learning and knowledge required for the management of medical and ocular emergencies and the safe use of topical and systemic medications relevant to the management of ophthalmology patients.

Structure

This standard comprises two modules.

- **COPEM Module 1:** educational elements 1 to 11, with their associated learning outcomes and performance criteria
- **COPEM Module 2:** educational element 12 (ocular emergencies), with its associated learning outcomes and performance criteria.

References

Recommended reading for COPEM Module 1

- Ahmed M and Foster S (2006). *Steroid Therapy for Ocular Inflammatory Disease*. Focal Points: Vol XXIV (7), Section 7 of 12. American Academy of Ophthalmology
- American Academy of Ophthalmology: Basic and Clinical Sciences Course (AAO: BCSC) (*NOT limited exclusively to Pharmacology section – please use the standard to guide your learning*)
- Antibiotic Expert Group. *Therapeutic guidelines: antibiotic*. Version 14. Melbourne: Therapeutic Guidelines Limited; 2010
- Fleisher LA, Beckman JA, Brown KA, Calkins H, Chaikof EL, Fleischmann KE, Freeman WK, Froehlich JB, Kasper EK, Kersten JR, Riegel B and Robb JF. *ACC/AHA 2007 Guidelines on Perioperative Cardiovascular Evaluation and Care for Noncardiac Surgery: Executive Summary*. *Circulation* 2007; 116: 1971–1996. [*Study only pages 1983 to 1986*]
- Longmore M, Wilkinson I, Davidson E and Foulkes A (2010). *Oxford Handbook of Clinical Medicine*. 8th Edition. Oxford: Oxford University Press
- McGhee CNJ, Dean S and Danesh-Meyer H (2002). *Locally Administered Ocular Corticosteroids: Benefits and Risks*. *Drug Safety* 2002;25(1):33–55
- Product information for individual drugs available in MIMS (on-line)
- Santaella RM and Fraunfelder FW (2007). *Ocular Adverse Effects Associated with Systemic Medications: Recognition and Management*. *Drugs* 2007; 67 (1): 75-93 Adis Data Information BV

- Sheth BP (2007). *Drugs and Pregnancy*. Focal Points: Vol XXV (7), Section 1 of 3. American Academy of Ophthalmology
- Study Guide: *Ocular side-effects of new and emerging systemic drugs (on Moodle)*
- The New Zealand Resuscitation Council (<http://www.nzrc.org.nz/>).
- Yeh S and Suhler EB (2012). *Biologic Response Modifiers in the Treatment of Uveitis*. Focal Points: Vol XXX (8), Module 2 of 3. American Academy of Ophthalmology

Several of these readings are available for download from the College Learning Management System, Moodle.

Recommended reading for COPEM Module 2 (Ocular Emergencies)

- Gerstenblith AT and Rabinowitz MP (2012). *The Wills Eye Manual: Office and Emergency Room Diagnosis and Treatment of Eye Disease (Rhee, The Wills Eye Manual)*. 6th edition; Lippincott Williams & Wilkins
- *Eye Emergency Manual: An Illustrated Guide*, 2nd Edition (accessible at http://www.aci.health.nsw.gov.au/_data/assets/pdf_file/0013/155011/eye_manual.pdf)

It is recommended that reading also be supplemented with appropriate articles from current and relevant peer-reviewed journals.

Teaching and Learning

The Trainee needs to gain the basic knowledge contained in this standard prior to commencing training as an ophthalmologist. This knowledge can be further developed during the two years of basic training, as a foundation for more advanced learning in the subsequent three years of their training.

Knowledge and skills related to the management of ocular emergencies must be attained within the first three months of training, to help ensure patient safety.

Assessment Methods

The learning outcomes in this curriculum standard will be assessed in two modules.

For COPEM Module 1, the Trainee must complete an on-line examination that assesses elements 1–11 of this standard. The COPEM Module 1 exam must be passed after selection and prior to commencement of training.

Questions for these on-line exams will be worded to test knowledge, comprehension, application, analysis and/or synthesis of core knowledge. Clinical scenarios will be utilised when appropriate.

The required pass mark for each of these exams is 75%.

As a guide to the Trainee, the examiners estimate that 40 hours of preparation are required for successful completion of COPEM Module 1, and 30 hours for COPEM Module 2.

Learning outcomes and performance criteria: COPEM Module 1

COPEM 1 GENERAL PHARMACOLOGY PRINCIPLES	
LEARNING OUTCOMES	PERFORMANCE CRITERIA
<p>1.1 Describe the considerations associated with drug administration and delivery at an ocular and systemic level</p> <p><i>AAO: BCSC: Fundamentals and Principles of Ophthalmology – Pharmacologic Principles</i></p> <p><i>Sheth, BP (2007). Drugs and Pregnancy. Focal Points, Section 1 of 3, 2007: Vol XXV (7). American Academy of Ophthalmology</i></p>	<ul style="list-style-type: none"> • Basic considerations of ocular drug delivery systems • Pharmacokinetics <ul style="list-style-type: none"> – Effect of disease on drug disposition – Effect of age on drug disposition – Effect of pregnancy and lactation • Ocular Pharmacodynamics – drug-receptor and non-receptor mediated interactions • Toxicology of ocular drugs • Storage and preservatives

COPEM 2 DIAGNOSTIC DRUGS	
LEARNING OUTCOMES	PERFORMANCE CRITERIA
<p>2.1 Characterise the mode of action, pharmacokinetics, duration of action and administration of agents used to aid in the diagnosis of eye disease</p>	<ul style="list-style-type: none"> • Intravenous dyes <i>(fluorescein and indocyanine green)</i> • Topical stains <i>(fluorescein and lissamine green)</i> • Mydriatic and cycloplegic drugs
<p>2.2 Recognise the indications, contraindications, adverse reactions, interactions and toxicology of agents used to aid in the diagnosis of eye disease</p> <p><i>AAO: BCSC: Fundamentals and Principles of Ophthalmology – Ocular Pharmacotherapeutics</i></p>	

COPEM 3 CORNEA AND EXTERNAL EYE DISEASES	
LEARNING OUTCOMES	PERFORMANCE CRITERIA
<p>3.1 Characterise the mode of action, pharmacokinetics, duration of action and administration of ocular and systemic therapies used to treat corneal and external eye diseases</p>	<ul style="list-style-type: none"> • Antibiotics: <ul style="list-style-type: none"> – Sulphonamides – Aminoglycosides – Penicillins and Cephalosporins – Tetracyclines – Peptide antibiotics, e.g. vancomycin – Chloramphenicol – Fluoroquinolones – Macrolides, e.g. erythromycin • Antiparasitic agents • Antivirals • Antifungals • Therapies for allergy • Corticosteroids and non-steroidal anti-inflammatory drugs (NSAIDs) • Lubricants • Ocular decongestants • Contact lens solutions and materials • Vitamin C for chemical burns • Vitamin A
<p>3.2 Recognise the indications, contraindications, adverse reactions, interactions and toxicology of agents used to treat corneal and external eye diseases</p> <p><i>On-line edition of MIMS</i></p> <p><u>AAO: BCSC:</u> <i>External Disease and Cornea</i></p> <ul style="list-style-type: none"> – Ocular Surface Disease (Dry Eye Syndrome) – Infectious Diseases of the External Eye – Clinical Approach to Depositions and Degenerations of the Conjunctiva, Cornea and Sclera (Drug-Induced Deposition and Pigmentation) – Clinical Approach to Immune-Related Disorders of the External Eye – Surgery of the Ocular Surface (Management of Descemetocoele, Corneal Perforation and Corneal Edema) <p><u>AAO: BCSC:</u> <i>Fundamentals and Principles of Ophthalmology</i></p> <ul style="list-style-type: none"> – Ocular Pharmacotherapeutics <p><u>AAO: BCSC:</u> <i>Update on General Medicine</i></p> <ul style="list-style-type: none"> – Infectious Disease <p><i>McGhee CNJ, Dean S and Danesh-Meyer H (2002). Locally Administered Ocular Corticosteroids: Benefits and Risks. Drug Safety 2002;25(1):33–55</i></p> <p><i>Ahmed M and Foster S (2006). Steroid Therapy for Ocular Inflammatory Disease. Focal Points, Section 7 of 12, 2006: Vol XXIV (7). American Academy of Ophthalmology</i></p>	

COPEM 4 GLAUCOMA	
LEARNING OUTCOMES	PERFORMANCE CRITERIA
<p>4.1 Characterise the mode of action, pharmacokinetics, duration of action and administration of therapies used to treat glaucoma</p>	<ul style="list-style-type: none"> • Adrenergic agonists • Beta blockers • Carbonic anhydrase inhibitors – oral and topical • Cholinergics / anticholinergics • Miotics • Prostaglandins and prostaglandin analogues • Hyperosmotic agents • Antifibrosis agents
<p>4.2 Recognise the indications, contraindications, adverse reactions, interactions and toxicology of therapeutics used to treat glaucoma</p> <p><i>AAO: BCSC: Glaucoma</i></p>	

COPEM 5 OCULAR INFLAMMATION	
LEARNING OUTCOMES	PERFORMANCE CRITERIA
<p>5.1 Characterise the mode of action, pharmacokinetics, duration and administration of therapeutics used in treatment of inflammatory eye disease</p>	<ul style="list-style-type: none"> • Corticosteroids: <ul style="list-style-type: none"> – Topical – Periocular – Intraocular – Systemic • NSAIDs • Immunosuppressive therapy • Mydriatics • Cycloplegics • Biological response modifiers, e.g. etanercept, infliximab
<p>5.2 Recognise the indications, contraindications, adverse reactions, interactions and toxicology of therapeutics used to treat inflammatory eye disease</p> <p><i>AAO: BCSC: Fundamentals and Principles of Ophthalmology</i></p> <p><i>AAO: BCSC: Intraocular Inflammation and Uveitis – Clinical Approach to Uveitis</i></p> <p><i>On-line edition of MIMS</i></p> <p><i>McGhee CNJ, Dean S and Danesh-Meyer H (2002). Locally Administered Ocular Corticosteroids: Benefits and Risks. Drug Safety 2002;25(1):33–55</i></p> <p><i>Ahmed M and Foster S (2006). Steroid Therapy for Ocular Inflammatory Disease. Focal Points, Section 7 of 12, 2006: Vol XXIV (7). American Academy of Ophthalmology</i></p>	

COPEM 6 PAEDIATRICS	
LEARNING OUTCOMES	PERFORMANCE CRITERIA
<p>6.1 Characterise the mode of action, pharmacokinetics, duration and administration of therapeutics in paediatric treatment</p>	<ul style="list-style-type: none"> • Cycloplegic agents • Anti-glaucoma medication • Ocular anti-inflammatory agents • Oral antibiotics • Considerations for general anaesthesia • Analgesia • Antihistamines • Oral beta blockers • Botulinum toxin
<p>6.2 Recognise the indications, contraindications, adverse reactions, interactions and toxicology of therapeutics used for ocular medication of paediatric patients</p> <p><i>On-line edition of MIMS</i></p> <p><u>AAO: BCSC:</u> <i>Update on General Medicine</i> – <i>Infectious Disease</i></p> <p><u>AAO: BCSC:</u> <i>Pediatric Ophthalmology and Strabismus</i> – <i>Diagnostic Techniques for Strabismus and Amblyopia (Cycloplegic Refraction)</i></p>	

COPEM 7 VITREO-RETINAL	
LEARNING OUTCOMES	PERFORMANCE CRITERIA
<p>7.1 Characterise the mode of action, pharmacokinetics, duration of action and administration of therapies used to treat vitreo- retinal disorders</p>	
<p>7.2 Recognise the indications, contraindications, adverse reactions, interactions and toxicology of therapeutics used to treat vitreo-retinal disorders</p> <p><i>On-line edition of MIMS</i></p> <p><u>AAO: BCSC:</u> <i>Retina and Vitreous</i> – Diagnostic Approach to Retinal Disease – Retinal Vascular Disease – Focal and Diffuse Choroidal and Retinal Inflammation – Retinal Degenerations Associated with Systemic Disease</p> <p><u>AAO: BCSC:</u> <i>Update on General Medicine</i> – Infectious Disease</p>	<ul style="list-style-type: none"> • Antibiotics • Antifungals • Antivirals • Anti-vascular endothelial growth factor (anti-VEGF) therapy for retinal disease

COPEM 8 ANAESTHETICS AND PERI-OPERATIVE MANAGEMENT	
LEARNING OUTCOMES	PERFORMANCE CRITERIA
<p>8.1 Characterise the mode of action, pharmacokinetics, duration of action and administration of anaesthetic agents</p> <p><u>AAO: BCSC:</u> <i>Update on General Medicine</i> – Cerebrovascular Disease – Hematologic Disorders – Rheumatic Disorders – Perioperative Management in Ocular Surgery</p> <p><i>Longmore M, Wilkinson I, Davidson E and Foulkes A (2010). Oxford Handbook of Clinical Medicine. 8th Edition. Oxford: Oxford University Press</i></p>	<ul style="list-style-type: none"> • Topical anaesthetic agents: <ul style="list-style-type: none"> – Oxybupivacaine – Tetracaine – Proparacaine – Lignocaine • Peri-ocular anaesthetic agents: <ul style="list-style-type: none"> – Ropivacaine – Bupivacaine – Lignocaine (Lidocaine) • Hyaluronidase • Intraocular lignocaine • Anaesthetic and peri-anaesthetic medications • Anaesthetic considerations for ophthalmic surgery • Anticoagulants and systemic prophylactic antibiotics in surgery
<p>8.2 Recognise the indications, contraindications, adverse reactions, interactions and toxicology of anaesthetic agents</p> <p><u>AAO: BCSC:</u> <i>Update on General Medicine</i> – Medical Emergencies (Toxic Reactions to Local Anesthetics and Other Agents) – Perioperative Management in Ocular Surgery</p> <p><u>AAO: BCSC:</u> <i>Fundamentals and Principles of Ophthalmology</i> – Pharmacologic Principles – Ocular Pharmacotherapeutics</p> <p><i>On-line edition of MIMS</i></p> <p><i>Antibiotic Expert Group. Therapeutic guidelines: antibiotic. Version 14. Melbourne: Therapeutic Guidelines Limited; 2010</i></p> <p><i>Fleisher LA, Beckman JA, Brown KA, Calkins H, Chaikof EL, Fleischmann KE, Freeman WK, Froehlich JB, Kasper EK, Kersten JR, Riegel B and Robb JF. ACC/AHA 2007 Guidelines on Perioperative Cardiovascular Evaluation and Care for Noncardiac Surgery: Executive Summary. Circulation 2007; 116: 1971–1996. [Only pp.1983 –1986]</i></p>	

COPEM 9 CATARACT	
LEARNING OUTCOMES	PERFORMANCE CRITERIA
<p>9.1 Characterise the mode of action, pharmacokinetics, duration of action and administration of ocular and systemic therapies used to treat cataracts</p>	<ul style="list-style-type: none"> • Irrigation solutions • Pre and post operative drops • Antiseptics and disinfectants • Visco-elastic devices • Intracameral acetylcholine in cataract surgery • Potential effects of alpha 1 antagonists in cataract surgery
<p>9.2 Recognise the indications, contraindications, adverse reactions, interactions and toxicology of therapeutics used to treat cataracts</p> <p><i>On-line edition of MIMS</i></p> <p><u>AAO: BCSC:</u> <i>Lens and Cataract</i> – Pathology – Evaluation and Management of Cataracts in Adults – Surgery for Cataract – Complications of Cataract Surgery</p> <p><i>On-line edition of MIMS</i></p>	

COPEM 10 OCULAR EFFECTS OF NON-OCULAR THERAPEUTIC SUBSTANCES	
LEARNING OUTCOMES	PERFORMANCE CRITERIA
<p>10.1 Characterise the mode of action, pharmacokinetics, duration and administration, indications and contraindications and ocular effects of non-ocular therapeutic substances</p> <p><u>AAO: BCSC:</u> <i>Update on General Medicine</i> – Medical Emergencies</p> <p><i>Santaella, RM and Fraunfelder FW (2007). Ocular Adverse Effects Associated with Systemic Medications: Recognition and Management. Drugs 2007; 67 (1): 75-93 Adis Data Information BV</i></p> <p><i>Study Guide: Ocular side-effects of new and emerging systemic drugs</i></p>	<ul style="list-style-type: none"> • Corticosteroids • Antibiotics (including anti tuberculosis drugs) • Immunosuppressant agents • Hormone related drugs • Cardiovascular drugs • Antidepressants • Antimalarials • Anti-epileptics • Antipsychotics • Bisphosphonates • Biological response modifiers

COPEM 11 MEDICAL EMERGENCIES	
LEARNING OUTCOMES	PERFORMANCE CRITERIA
<p>11.1 Diagnose and manage life threatening medical events</p> <p><i>The New Zealand Resuscitation Council (http://www.nzrc.org.nz)</i></p> <p><i>Longmore M, Wilkinson I, Davidson E and Foulkes A (2010). Oxford Handbook of Clinical Medicine. 8th Edition. Oxford: Oxford University Press</i></p>	<ul style="list-style-type: none"> • Cardiopulmonary arrest • Anaphylaxis • Asthma • Seizures • Hypoxia • Shock • Vasovagal response • Diabetic emergencies

Learning outcomes and performance criteria: COPEM Module 2

COPEM 12 OCULAR EMERGENCIES

The core reading for this element is the 'Eye Emergency Manual'.

Please consult 'The Wills Eye Manual' for information on ocular emergencies described in this standard which are not covered in the Eye Emergency Manual.

LEARNING OUTCOMES	PERFORMANCE CRITERIA
<p>12.1 Recognise potential life threatening presentations</p>	<ul style="list-style-type: none"> • Correctly identify each of the following: <ul style="list-style-type: none"> – Acutely abnormal pupils – Optic disc oedema – Sudden loss or alteration of vision including visual field defects – Acute third nerve palsy – Acute sixth nerve palsy – Orbital cellulitis – Ocular and orbital malignancies – Common presentations of retinoblastoma including the significance of leukocoria
<p>12.2 Recognise and manage vision threatening emergencies</p>	<ul style="list-style-type: none"> • Recognise and instigate emergency management procedures (including referral) for conditions including: <ul style="list-style-type: none"> – Thermal and chemical injury – Blunt trauma – Penetrating trauma (with or without intraocular or intra-orbital foreign body) – Orbital compartment syndrome – Acute angle closure and other causes of acute intraocular pressure elevation – Central retinal artery occlusion / Amaurosis – Giant Cell Arteritis – Retinal detachment – Corneal infections – Endophthalmitis – Orbital cellulitis – Sudden loss or alteration of vision – Corneal and subtarsal foreign body – Exudative age-related macular degeneration (with symptoms of metamorphopsia)

<p>12.3 Recognise and manage important post-procedural complications</p>	<ul style="list-style-type: none"> • Pain • Infection • Elevated intra-ocular pressure (IOP) • Wound complications • Altered vision
<p>12.4 Diagnose acute red eye conditions</p>	<ul style="list-style-type: none"> • Demonstrate the application of differential diagnosis of common conditions including: <ul style="list-style-type: none"> – Blepharitis – Dry eyes – Conjunctivitis (bacterial, non-bacterial) – Sub-conjunctival haematoma – Epicleritis / scleritis – Corneal epithelial defects – Keratitis – Acute IOP elevation – Acute anterior uveitis – Allergy

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