Clinical Ophthalmic Pharmacology and Emergency Medicine (COPEM) Curriculum Standard

Basic Training

Purpose
A thorough knowledge of ocular pharmacology, as well as of the management of medical and ocular emergencies, is essential for an ophthalmic trainee 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.

The Trainee needs to acquire the knowledge and skills contained in the COPEM standard after selection and as a prerequisite to the RANZCO ‘Eye-Camp’ Induction.

This knowledge will be further developed in practice during the two years of basic training, as a foundation for more advanced learning in the sub-specialty areas across the subsequent three years of their training. The COPEM Curriculum falls under the Foundation Knowledge and Skills Curriculum Domain.

By the end of Advanced training, trainees will:

- FKS 1: Develop, apply, and maintain the relevant knowledge base and critical understanding of theoretical and practical clinical sciences, pharmacology, and pathology underpinning the practice of clinical ophthalmology.

Trainees continue to develop and apply their learning of pharmacology as they study the subspecialities curriculum across Advanced Training.

Structure
Eight overall subject learning outcomes are outlined in this document. Also outlined are 12 corresponding educational content areas, which include specific application to sub-specialty areas, with their associated learning outcomes and performance criteria.

- COPEM 1 General Pharmacology Principles
- COPEM 2 Diagnostic Drugs
- COPEM 3 Cornea and External Eye Disease
- COPEM 4 Glaucoma
- COPEM 5 Ocular Inflammation
- COPEM 6 Paediatrics
- COPEM 7 Vitreoretinal
- COPEM 8 Anaesthetics and Perioperative Management
- COPEM 9 Cataract
- COPEM 10 Ocular Effects of Non-Ocular Therapeutic Substances
- COPEM 11 Medical Emergencies
- COPEM 12 Ocular Emergencies

Learning outcomes are statements of what trainees are expected to know, understand, and do, while performance criteria specify the level of performance required to demonstrate achievement of the learning outcome.

Teaching and Learning
Trainees must complete the COPEM online learning modules and associated assessments on the official Subject Learning Site. These modules integrate chapter readings from the American Academy of Ophthalmology (AAO) Basic Science Course, which trainees purchase through the AAO Academy Store. The modules also include multiple-choice questions and clinical scenarios. Knowledge and skills related to the management of ocular emergencies (Element 12) are essential to ensure patient safety. As a guide to the Trainee, it is estimated that 70 hours of preparation are required for successful completion of the core COPEM RANZCO Modules (40 for modules 1-10 and 30 hours for modules 11 &12).

In addition to an online learning component, there is an additional workshop on the presentation of ocular emergencies included in the RANZCO face-to-face induction.

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

Assessment
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 the induction. COPEM Module 2 must be passed before the end of the first three months of commencing 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%.

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Learning Outcomes and Performance Criteria

Trainees should be able to:

LO1 Describe the considerations associated with drug administration and delivery at an ocular and systemic level.

LO2 Recognise the indications, contraindications, adverse reactions, interactions, and toxicology of agents used to aid in the diagnosis of eye disease.

LO3 Characterise the mode of action, pharmacokinetics, duration of action and administration of ocular and systemic therapies used to treat eye disease and disorders, and recognise the indications, contraindications, adverse reactions, interactions, and toxicology of these agents.

LO4 Characterise the mode of action, pharmacokinetics, duration of action and administration of anaesthetic agents and recognise indications, contraindications, adverse reactions, interactions, and toxicology of these agents.

LO5 Characterise the mode of action, pharmacokinetics, duration and administration, indications and contraindications and ocular effects of non-ocular therapeutic substances.

LO6 Diagnose and manage life threatening medical events and ocular emergencies.

LO7 Critically apply knowledge of pharmacology to the practice of ophthalmology, appropriate to induction stage.

COPEM 1 General Pharmacology Principles

1.1 Describe the considerations associated with drug administration and delivery at an ocular and systemic level:

- pharmacokinetics
- the 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

2.1 Recognise the indications, contraindications, adverse reactions, interactions, and toxicology of agents used to aid in the diagnosis of eye disease.

- Intravenous dyes (fluorescein and indocyanine green)
- Topical stains (fluorescein and lissamine green)
- Mydriatic and cycloplegic drugs

Reference

AAO: BCSC
Fundamentals and Principles of Ophthalmology: Pharmacologic Principles
Other
Sheth (2007)
Sethi, Naik & Gupta (2016)
COPEM 3: Cornea and External Eye Disease

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.

3.2 Recognise the indications, contraindications, adverse reactions, interactions, and toxicology of agents used to treat corneal and external eye diseases including:

- Antibiotics:
  - 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

Reference

AAO: BCSC
External Disease and Cornea: 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 Descemetocele, Corneal Perforation and Corneal Edema).

Fundamentals and Principles of Ophthalmology: Ocular pharmacotherapeutics

Update on General Medicine: Infectious Disease

Other
Fung, Tran, Lim et al. (2020)

Online edition of MIMS
AAO: BCSC
Glaucoma

COPEM 4: Glaucoma

4.1 Characterise the mode of action, pharmacokinetics, duration of action and administration of therapies used to treat glaucoma.

4.2 Recognise the indications, contraindications, adverse reactions, interactions, and toxicology of therapeutics used to treat glaucoma:

- Adrenergic agonists
- Beta blockers
- Carbonic anhydrase inhibitors – oral and topical
- Cholinergics / anticholinergics
- Miotics
- Prostaglandins and prostaglandin analogues
- Hyperosmotic agents
- Antifibrosis agents
COPEM 5: Ocular Inflammation

5.1 Characterise the mode of action, pharmacokinetics, duration, and administration of therapeutics used in treatment of inflammatory eye disease.

5.2 Recognise the indications, contraindications, adverse reactions, interactions, and toxicology of therapeutics used to treat inflammatory eye disease.

- Corticosteroids
  - Topical
  - Periocular
  - Intraocular
  - Systemic
- NSAIDs
- Immunosuppressive therapy
- Mydriatics
- Cycloplegics
- Biological response modifiers, e.g., etanercept, infliximab.

COPEM 6: Paediatrics

6.1 Characterise the mode of action, pharmacokinetics, duration, and administration of therapeutics in paediatric treatment.

6.2 Recognise the indications, contraindications, adverse reactions, interactions, and toxicology of therapeutics used for ocular medication of paediatric patients, including:

- Cycloplegic agents
- Anti-glaucoma medication
- Ocular anti-inflammatory agents
- Oral antibiotics
- Considerations for general anaesthesia
- Analgesia
- Antihistamines
- Oral beta blockers
- Botulinum toxin

COPEM 7: Vitreoretinal

7.1 Characterise the mode of action, pharmacokinetics, duration of action and administration of therapies used to treat vitreoretinal disorders.

7.2 Characterise the mode of action, pharmacokinetics, duration of action and administration of therapies used to treat vitreoretinal disorders.

- Antibiotics
- Antifungals
- Antivirals
- Anti-vascular endothelial growth factor (anti-VEGF) therapy for retinal disease

Reference

AAO: BCSC
Fundamentals and Principles of Ophthalmology

Intraocular Inflammation and Uveitis: Clinical Approach to Uveitis

Other
Fung, Tran, Lim et al. (2020)

Monthly Index for Medical Specialties [MIMS] Online

AAO: BCSC
Pediatric Ophthalmology and Strabismus: Diagnostic Techniques for Strabismus and Amblyopia (Cycloplegic Refraction)

Update on General Medicine: Infectious Disease

Other:
MIMS Online

AAO: BCSC
Retina and Vitreous: Diagnostic Approach to Retinal Disease; Retinal Vascular Disease; Focal and Diffuse Choroidal and Retinal Inflammation; Retinal Degenerations Associated with Systemic Disease.

Update on General Medicine: Infectious Disease Cycloplegic agents
COPEM 8: Anaesthetics and Perioperative Management

8.1 Characterise the mode of action, pharmacokinetics, duration of action and administration of anaesthetic agents.

8.2 Recognise the indications, contraindications, adverse reactions, interactions, and toxicology of anaesthetic agents.

- Topical anaesthetic agents:
  - Oxybupivacaine
  - Tetracaine
  - Proparacaine
  - Lignocaine

- Peri-ocular anaesthetic agents:
  - Ropivacaine
  - Bupivacaine
  - Lignocaine (Lidocaine)

- Hyaluronidase
- Intraocular lignocaine
- Anaesthetic and peri-anaesthetic medications
- Anaesthetic considerations for ophthalmic surgery
- Anticoagulants and systemic prophylactic antibiotics in surgery

Reference

AAO: BCSC
Update on General Medicine: Cerebrovascular Disease; Hematologic Disorders; Rheumatic Disorders; Perioperative Management in Ocular Surgery.

Update on General Medicine: Medical Emergencies (Toxic Reactions to Local Anesthetics and Other Agents); Perioperative Management in Ocular Surgery.


Other
Antibiotic Reference Group (2014)
Clinical Excellence Commission (2018)
Fleisher et al. (2014)
Longmore, Wilkinson, Davidson & Faulkes (2017)

On-line edition of MIMS

COPEM 9: Cataract

9.1 Characterise the mode of action, pharmacokinetics, duration of action and administration of ocular and systemic therapies used to treat cataracts:

- 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
COPEM 10: Ocular Effects of Non-Ocular Therapeutic Substances

10.1 Characterise the mode of action, pharmacokinetics, duration and administration, indications and contraindications and ocular effects of non-ocular therapeutic substances:

- 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

11.1 Diagnose and manage life threatening medical events:

- Cardiopulmonary arrest
- Anaphylaxis
- Asthma
- Seizures
- Hypoxia
- Shock
- Vasovagal response
- Diabetic emergencies

Reference

AAO: BCSC
Update on General Medicine: Medical Emergencies

Other
Miguel, Henriques, Azevedo & Pereira (2014)
Moorthy, Moorthy & Cunningham (2018)

The New Zealand Resuscitation Council (http://www.nzrc.org.nz/)

Longmore, Wilkinson, Davidson & Faulkes (2017)
COPEM 12: Ocular Emergencies

12.1 Recognise potential life-threatening presentations
• Correctly identify each of the following:
  – 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.

12.2 Recognise and manage vision threatening emergencies (including referral) for conditions including:
  – 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)

12.3 Recognise and manage important post-procedural complications:
• Pain
• Infection
• Elevated intra-ocular pressure (IOP)
• Wound complications
• Altered vision

12.4 Diagnose acute red eye conditions
• Demonstrate the application of differential diagnosis of common conditions including:
  – Blepharitis
  – Dry eyes
  – Conjunctivitis (bacterial, non-bacterial)
  – Sub-conjunctival haematoma
  – Epikeratitis / scleritis
  – Corneal epithelial defects
  – Keratitis
  – Acute IOP elevation
  – Acute anterior uveitis
  – Allergy

Reference
Gerstenblith & Rabinowitz (2012)
References


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)


The New Zealand Resuscitation Council (http://www.nzrc.org.nz/).


Recommended reading for COPEM Element 12: Ocular Emergencies)


Acknowledgements

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Document History

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