



RANZCO

The Royal Australian
and New Zealand
College of Ophthalmologists

Cataract Curriculum Standard

September 2014

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Purpose

The Cataract Clinical Performance Standard covers the knowledge, processes, skills and competencies required for the diagnosis and treatment of cataract: the leading cause of avoidable blindness worldwide.

References

In addition to the core texts, the following references are recommended:

Core Cataract Reading

In addition to the core texts, the following references are recommended:

- Seibel, B.S. 2005, *Phacodynamics: mastering the tools and techniques of phacoemulsification surgery*, SLACK, Thorofare, NJ.
- Barry, P., Seal, D.V., Gettinby, G., Lees, F., Peterson, M., Revie, C.W. 2006, 'ESCRS study of prophylaxis of postoperative endophthalmitis after cataract surgery', *J. Cataract Refract. Surg.*, vol. 32, pp. 407–410.
- Reading should be supplemented with appropriate articles and video resources from:
 - relevant ophthalmic journal articles;
 - American Academy of Ophthalmology *Focal Points*;
 - American Academy of Ophthalmology *One Network* (http://www.aao.org/education/prod_access.cfm); and
 - *Video Journal of Cataract and Refractive Surgery* (<http://eyetube.net/portals/robert-osher/>, accessed 21 August 2013)

Additional Reading

- Gerstenblith, A.T. & Rabinowits, M.P. 2012, *The Wills eye manual: office and emergency room diagnosis and treatment of eye disease*, 6th edn, Wolters Kluwer/Lippincott Williams & Wilkins, Philadelphia, PA.

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

Level of Mastery

For each learning outcome, the level of mastery to be attained by the trainee at the end of training is indicated as follows:

***	Core knowledge of which trainees must be able to demonstrate understanding Skills and procedures that trainees must be able to perform autonomously
**	Knowledge of which trainees must have a good practical understanding Skills and procedures with which trainees should have assisted, and of which have good practical knowledge
*	Knowledge, skills and procedures of which trainees must have some understanding

Learning outcomes and performance criteria

CT1 GENERAL MEDICAL AND OCULAR HISTORY RELEVANT TO CATARACT		
<p><i>This element covers the processes for observing, promoting and recording a general medical and ocular history in preparation for diagnosis and treatment of cataract.</i></p> <p><i>The trainee is expected to have obtained and recorded a general medical and ocular history (including family history) as outlined in the Ophthalmic Basic Competency and Knowledge (OBCK) standard.</i></p>		
LEARNING OUTCOMES	LEVEL OF MASTERY	PERFORMANCE CRITERIA
1.1 Obtain details of ocular history	***	1.1.1 Identify risk factors that may have relevance for primary and secondary cataract 1.1.2 Identify history of conditions that could increase risk of cataract surgical complications
1.2 Obtain an ocular family history	***	1.2.1 Identify risk factors that may have relevance for primary and secondary cataract
1.3 Identify general illnesses and medications that may have an impact on ocular disease or its treatment	***	1.3.1 Discuss the impact of any given medication or general illnesses on cataract formation 1.3.2 Identify cataract risk factors arising from general history 1.3.3 Identify factors predictive of life expectancy of patient in considering course of management

CT2 PERFORM EYE EXAMINATIONS APPROPRIATE FOR CATARACT

This element covers the performance and interpretation of a range of eye examinations relating to cataract. It also covers the demonstration of judgement in selecting the appropriate examinations for particular patients.

The practitioner is expected to have performed eye examinations as outlined in the Ophthalmic Basic Competency and Knowledge (OBCK) standard.

LEARNING OUTCOMES	LEVEL OF MASTERY	PERFORMANCE CRITERIA
2.1 Undertake an external ocular examination	***	2.1.1 From the inspection of the general appearance of the eye and adnexa, interpret the relevance of any signs that may be found 2.1.2 Identify features or signs that indicate an increased risk of cataract surgical complications
2.2 Measure visual acuity	***	2.2.1 Accurately perform, record and interpret the results of the following examinations: <ul style="list-style-type: none"> • visual acuity including refraction and pin hole acuity • refraction of the fellow eye • assessment of the likely outcome for visual acuity following cataract surgery • discussion of likely outcomes with patient
2.3 Undertake ocular examinations appropriate to the diagnosis or external eye and corneal diseases	***	2.3.1 Accurately perform, record and interpret the results of these examinations and identify their relevance to the diagnosis of external eye and corneal disease: <ul style="list-style-type: none"> • pupillary reactions • colour vision testing and contrast sensitivity
2.4 Perform a slit lamp examination of the anterior segment and adnexa	***	2.4.1 Correctly perform, record and interpret the results of anterior segment and adnexa examinations, as applied to cataract

<p>2.5 Obtain intra-ocular pressure (IOP) readings</p>	<p>***</p>	<p>2.5.1 Obtain an accurate IOP reading, understand the limitation of the technique used and identify its relevance to diagnosing a cataract and its treatment</p> <p>2.5.2 Correctly use tonometers based on indentation and applanation principles (including Goldmann, Tonopen and iCare tonometers)</p>
<p>2.6 Perform gonioscopy to detect angle abnormalities and zonular abnormalities</p>	<p>***</p>	<p>2.6.1 Assess characteristics of the anterior chamber angle and related structures</p> <p>2.6.2 Assess the anterior chamber angle for risk of closure</p> <p>2.6.3 Assess the safety of pupil dilatation for the purposes of preoperative assessment of the eye</p>
<p>2.7 Undertake a posterior segment examination of the vitreous, optic nerve head, macula, retina including its periphery through a dilated pupil unless dilatation is contraindicated</p>	<p>***</p>	<p>2.7.1 Accurately report the characteristics and clinical significance of posterior segment findings, particularly those of the optic nerve head, macula and retinal periphery</p>
<p>2.8 Undertake a posterior segment examination of the vitreous, optic nerve head, macula, retina including its periphery</p>	<p>***</p>	<p>2.8.1 Given a variety of general presentations (e.g. diabetes, hypertension) identify the relevance, if any, to cataract and potential management</p>
<p>2.9 Test visual fields</p>	<p>***</p>	<p>2.9.1 Examine visual fields using confrontation</p> <p>2.9.2 Perform and interpret a static perimetry test</p> <p>2.9.3 Interpret data for automated fields</p> <p>2.9.4 Identify typical field defects in glaucoma as well as diseases mimicking it and recognise any progression over time</p>

<p>2.10 Perform ancillary tests to further assist in the diagnosis or documentation of cataract where appropriate</p>	<p>***</p>	<p>2.10.1 Perform accurate ocular biometry to assess corneal curvature (keratometry) anterior chamber depth, lens thickness and axial length</p> <p>2.10.2 Select and apply appropriate IOL power calculation formula individualised to the patient's biometry and intra ocular lens to determine predicted outcomes for cataract surgery</p> <p>2.10.3 Modify formulae individualised to the eye and intraocular lens for patients who have had refractive surgery.</p> <p>2.10.4 Modify formulae individualised to the eye and intraocular lens for patients who may benefit from toric intraocular lenses</p> <p>2.10.5 Modify formulae individualised to the eye and intraocular lens for patients who may benefit from multifocal or accommodating intraocular lenses</p> <p>2.10.6 Ensure an understanding on the part of the patient of the effect of anisometropia if monovision is considered</p> <p>2.10.7 Interpret corneal topography</p> <p>2.10.8 Perform and interpret B scan ultrasonography</p>
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<p>2.11 Select and perform, or refer, for relevant investigations that pertain to visual loss and are indicated by history and examination</p>	<p>***</p>	<p>2.11.1 Perform and interpret fluorescein angiography</p> <p>2.11.2 Interpret electro-physiological examinations</p> <p>2.11.3 Interpret MRI scans</p> <p>2.11.4 Interpret blood analysis including:</p> <ul style="list-style-type: none"> • blood glucose / HbA1c • INR <p>2.11.5 Cataract associated with other ocular disease:</p> <ul style="list-style-type: none"> • glaucoma • corneal pathology • uveitis • post vitrectomy • post refractive surgery
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CT3 CHARACTERISE CATARACT

This element covers the classification of types of cataract.

The trainee must perform this work with total autonomy and responsibility for accuracy and completeness.

LEARNING OUTCOMES	LEVEL OF MASTERY	PERFORMANCE CRITERIA
3.1 Characterise risk factors for cataract	***	3.1.1 Be aware of risk factors for cataract, and assess whether advice on modifying risk factors will be of utility to the patient
3.2 Characterise cataract according to their morphology	***	3.2.1 Describe the morphology and assess the severity of cataract 3.2.2 Be familiar with and able to use cataract classification systems such as LOCS III, that assess nuclear, cortical and posterior subcapsular cataract separately
3.3 Characterise cataract and lens abnormalities according to their aetiology	***	3.3.1 Identify age-related cataract 3.3.2 Identify cataract originating from genetic, metabolic and systemic disorders 3.3.3 Identify and diagnose cataract arising from pre-natal maternal infection 3.3.4 Identify cataract\ originating from developmental ocular abnormalities 3.3.5 Identify trauma induced cataract 3.3.6 Identify cataract arising secondary to posterior segment surgery 3.3.7 Identify drug-induced cataract 3.3.8 Identify cataract that are idiopathic

<p>3.4 Characterise lens-related abnormalities and other ocular conditions having impact on the management of cataract</p>	<p>***</p>	<p>3.4.1 Identify lens-related conditions:</p> <ul style="list-style-type: none"> • pseudoexfoliation • lens-induced inflammation • phacodonesis • posterior polar cataract <p>3.4.2 Identify other ocular conditions:</p> <ul style="list-style-type: none"> • corneal opacity, endothelial pathology • shallow anterior chamber, elevated IOP • previous vitrectomy, retinal detachment • refractive state with particular regard to ocular dimensions - high myopia and high hypermetropia, nanophthalmos and astigmatism
<p>3.5 Consider differential diagnoses</p>	<p>***</p>	<p>3.5.1 Differentiate cataract from:</p> <ul style="list-style-type: none"> • anterior segment pathology • vitreous pathology • retinal pathology • understand the differential diagnosis of leukocoria

CT4 DEVELOP AND IMPLEMENT A CATARACT MANAGEMENT PLAN

This element covers the management of cataract using observation, medical therapies and surgery including postoperative care.

The trainee must adhere to the standards of practice, in particular those regarding informed consent and clinical record-keeping, described in the Ophthalmic Basic Competencies and Knowledge (OBCK) standard.

LEARNING OUTCOMES	LEVEL OF MASTERY	PERFORMANCE CRITERIA
4.1 Determine and document in medical records a management plan for each patient	<p style="text-align: center;">***</p>	<p>4.1.1 Integrate information from the history and examination to determine likely prognosis and possible management options</p> <p>4.1.2 Maintain legible records in accepted format of the proposed management plan and the briefing of the patient</p>
4.2 Educate the patient about the condition and obtain agreement on a management plan	<p style="text-align: center;">***</p>	<p>4.2.1 Explain the nature of the patient's cataract</p> <p>4.2.2 Explain clearly the options including observation, refractive correction in early cataract and cataract surgery, and the potential consequences. Include discussion of lifestyle factors including visual criteria for driving, in the decision as to whether to proceed to surgery. If cataract directly threatens vision, such as lens induced inflammation, advise patient</p> <p>4.2.3 Discuss the limitations of current IOLs and limited predictability of IOL selection. Be aware of the effect of previous refractive surgery on IOL selection. Discuss with patient proposed surgical technique, IOL style and power</p> <p>4.2.4 Determine the impact of co-existing diseases (including but not limited to macular degeneration, glaucoma and diabetic retinopathy) the potential outcomes and explain to the patient. Discuss expected outcome with patient to enable them to make an informed decision</p> <p>4.2.5 Understand the concept of informed consent</p>

		<p>4.2.6 Obtain the patient's informed consent to the management regimen, having documented discussion in sufficient detail the expected benefits, outcomes, the process involved and the risks both systemic and ocular</p> <p>4.2.7 Be familiar with standard cataract surgical consent forms http://www.institute.nhs.uk/quality_and_value/high_volume_care/cataract.html</p>
4.3 Consider the impact on the cataract of systemic conditions and their treatments	***	<p>4.3.1 Identify medical therapies that may exacerbate the cataract or have an impact on the management thereof.</p> <p>4.3.2 Understand intraoperative floppy iris syndrome (IFIS) and its management.</p> <p>4.3.3 Identify factors of systemic disease management that may exacerbate the cataract</p>
4.4 Consider intraoperative management of the complex cataract	**	<p>4.4.1 Dilate or constrict the pupil to manage cataract</p> <p>4.4.2 Monitor the efficacy of the medical therapy, identify complications of the therapy and make necessary adjustments to the management regimen</p> <p>4.4.3 Undertake management of risk from existing ocular conditions that may impact on cataract surgery</p>
4.5 Design surgical plan	***	<p>Discuss and select the surgical technique relevant to the capacity of the theatre:</p> <p>4.5.1 phacoemulsification</p>
	**	4.5.2 extra-capsular cataract extraction (ECCE)
	*	4.5.3 intra-capsular cataract extraction (ICCE)

4.6 Provide advice to patients on contemporary surgical treatment options	***	4.6.1 Be aware of and able to discuss with patients contemporary techniques for cataract surgery
4.7 Perform investigations preparatory to surgery	***	4.7.1 Select investigations relevant to the history, the type of anaesthetic and hospital protocols in preparation for surgery
4.8 Undertake preoperative preparation of the patient	***	<p>4.8.1 Immediately prior to surgery utilise a surgical safety checklist, ideally one specifically for cataract surgery. Specifically, identify patient and correct eye and correct IOL for procedure</p> <p>http://www.surgeons.org/media/12661/LST_2009_Surgical_Safety_Check_List_(Australia_and_New_Zealand).pdf</p> <p>www.rcophth.ac.uk/core/core_picker/download.asp?id=375</p> <p>4.8.2 Dilate pupil</p> <p>4.8.3 Select and administer appropriate antibiotic</p> <p>4.8.4 Plan anterior chamber maintenance</p> <p>4.8.5 Assess and manage pupil size</p> <p>4.8.6 Reassess cataract type and density</p> <p>4.8.7 Assess need for capsular staining techniques</p>
4.9 Administer regional anaesthetic	***	4.9.1 Perform regional anaesthesia <ul style="list-style-type: none"> • peribulbar / sub-Tenon block • topical anaesthesia
	**	4.9.2 Retro-bulbar block 4.9.3 Perform facial nerve blocks

<p>4.10 Perform cataract surgery</p>	<p>***</p>	<p>4.10.1 Design wound placement and creation taking into account pre-existing astigmatism</p> <p>4.10.2 Select viscoelastic device suitable for surgical need</p> <p>4.10.3 Maintain anterior chamber with use of viscoelastic device</p> <p>4.10.4 Perform anterior capsulotomy with regard to the intraocular lens to be implanted, pupil size, cataract type and method of nuclear removal</p> <p>4.10.5 Perform adequate hydro-dissection and hydro-delineation to ensure adequate lens mobility within the capsule, when required</p> <p>4.10.6 Perform lens disassembly and removal by desired technique</p> <p>4.10.7 Perform cortical removal and clean up with irrigator-aspirator</p> <p>4.10.8 Modify wound to appropriate lens size and insert lens with and without the use of a viscoelastic device</p> <p>4.10.9 Appropriately rotate toric IOLs to the planned meridian having identified this meridian prior to surgery</p> <p>4.10.10 Remove viscoelastic agent</p> <p>4.10.11 Check wound integrity</p> <p>4.10.12 Suture wound if indicated</p> <p>4.10.13 Perform further incisional surgery to correct pre-existing astigmatism</p> <p>4.10.14 Administer antibiotic and/or anti-inflammatory prophylactic treatment</p>
<p>4.11 Manage intraoperative complications</p>	<p>***</p>	<p>4.11.1 Recognise and manage complications due to anaesthesia</p> <p>4.11.2 Recognise and manage intraoperative complications</p>

<p>4.12 Implement postoperative care</p>	<p>***</p>	<p>4.12.1 Manage corneal exposure</p> <ul style="list-style-type: none"> • eye pad • bandage contact lens • shields • sunglasses <p>4.12.2 Prescribe postoperative therapies as applicable</p> <ul style="list-style-type: none"> • antibiotics • anti inflammatories • ocular hypotensives <p>4.12.3 Arrange adequate supervision of patient including safe transport arrangements and after hours contact with day patients</p>
<p>4.13 Provide follow up and continuing care</p>	<p>***</p>	<p>4.13.1 Develop follow up and continuing care plan with the patient</p> <p>4.13.2 Examine patient in the postoperative period and determine:</p> <ul style="list-style-type: none"> • patient comfort • wound • visual acuity • corneal clarity • a.c. activity and depth • lens position • pupil size and shape • IOP • fundus health • refractive error • patient satisfaction with outcome
<p>4.14 Manage postoperative complications</p>	<p>***</p>	<p>4.14.1 Recognise and manage complications of cataract surgery in the postoperative period. Be aware of the need for urgent intervention and appropriate referral where necessary</p> <p>4.14.2 Assess for posterior capsular opacification and perform YAG laser capsulotomy where indicated after discussion with patient and obtaining informed consent</p> <p>4.14.3 Be familiar with options available for managing unexpected refractive outcomes post IOL implantation</p>

		<p>4.14.4 Be able to manage the dissatisfied patient post cataract surgery, including and awareness of conditions that may limit effectiveness of IOLs designed to ameliorate presbyopic symptoms.</p> <p>4.14.5 Alter frequency of assessments, medical and surgical intervention to optimise visual outcome following complications of surgery</p>
<p>4.15 Audit cataract surgery outcomes</p>	<p>***</p>	<p>4.15.1 Understand the importance of surgical audit, especially in frequently performed procedures such as cataract surgery</p> <p>4.15.2 Understand accepted cataract outcomes, both in developing world and developed world surgery</p> <p>http://www.cehjournal.org/resources/monitoring-cataract-surgical-outcomes/</p> <p>http://www.rcophth.ac.uk/page.asp?section=583&sectionTitle=Cataract+National+Data+Set+for+Adults</p> <p>4.15.3 Undertake a continuing personal audit as part of the Surgical Logbook, including but not limited to intraoperative complications, post op. complications including endophthalmitis, refractive outcomes and patient satisfaction ratings.</p> <p>4.15.4 Calculate a personalized A constant and SIA on own patients</p>

Context

In order to fulfil the clinical performance standards, the trainee must apply the knowledge and skills described in the:

- Ophthalmic Sciences (Anatomy, Clinical Ophthalmic and Emergency Medicine, Optics, Physiology, Clinical Genetics and Microbiology, and Evidence-based Ophthalmic Practice);
- Ophthalmic Basic Competencies and Knowledge (OBCK); and,
- Basics of Ophthalmic Surgery (BOS) curriculum standards.

Clinical practice

The following list is provided to identify the conditions, their causes and sequelae, and the treatment approaches that may be encountered by the trainee in clinical practice. The list is not exhaustive; it is intended as a guide for the use of the trainee when planning his or her learning.

Cataract Topic List

- Ocular medications and their local and systemic side effects
- Eye injuries and accidents and their long term effects
- Ophthalmic procedures and their long term effects
- General diseases with ocular manifestations or that affect the diagnosis and management of cataract
- Medications with ocular effects that affect the diagnosis and management of cataract
- Principles of brief general examination
- Signs of systemic disease
- Ophthalmic instruments specified in the *Basics of Ophthalmic Surgery curriculum standard*
- Performance of and interpretation of findings of external ocular examination
 - orbit
 - eyelids
 - eye movements
- Use of slit lamp and interpretation of findings of examination of:
 - eyelids
 - conjunctiva (bulbar, tarsal and forniceal) including cicatrisation
 - cornea: epithelium, stroma, endothelium
 - anterior chamber: depth, presence of cells/flare
 - iris
 - lens
 - angle structures and grading width
- Performance and interpretation of pupil examination
 - size, colour, shape, reactions

- Performance and interpretation of intra-ocular pressure (IOP) measurements
- Performance and interpretation of posterior segment examination
 - optic disc characteristics: colour; cupping; contour; circulation; size; peripapillary atrophy and haemorrhages
 - retina: central (including macula); and peripheral
- Interpretation of visual field examination
 - visual field examination methods, visual field defects, global indices and indices of reliability and serial analyses
- Morphology of cataract
 - nuclear, cortical, capsular, subcapsular, polar, mature, hypermature
- Genetic, metabolic and systemic diseases causing cataract
 - diabetes mellitus
 - Down syndrome
 - hypoparathyroidism
 - Marfan syndrome
 - Weill-Marchesani syndrome
 - Homocystinuria
- Pre-natal maternal infection resulting in cataract
 - rubella
 - cytomegalovirus
 - varicella
 - syphilis
 - toxoplasmosis
 - herpes simplex
- Developmental ocular abnormalities associated with cataract
 - aniridia
 - anterior segment dysgenesis
 - microphthalmia
 - PHPV
 - posterior lenticonus
- Trauma induced cataract
 - contusion
 - electro-magnetic radiation
 - electrocution
 - lightning strike
 - intraocular copper and iron
- Cataract secondary to posterior segment surgery
- Drug-induced cataract including corticosteroids and phenothiazines
- Conditions mimicking cataract including causes of leukocoria
- Investigations in preoperative assessment of patients

- Pharmacology
 - indications, contraindications, side effects, drug interactions, mechanism of action, absorption, duration of effect, metabolism and compliance issues of the following (and appropriate combinations):
 - beta antagonists
 - parasympathomimetics
 - prostaglandin analogues
 - alpha 2 agonists
 - carbonic anhydrase inhibitors
 - adrenergic agonists
 - hyperosmotic agents
 - antibiotics
 - anti-inflammatories: steroidal and non-steroidal
 - local anaesthetics

- Lasers
 - clinical physics or lasers laser safety
 - laser setting
 - indications, contraindications, techniques and complications of the following procedures: YAG capsulotomy
 - YAG iridotomy
 - YAG vitreolysis
 - YAG laser of lens deposits argon laser iridotomy
 - familiarity with excimer laser refractive surgery (basic knowledge)

- Surgical
 - administration of regional anaesthesia including peribulbar block, retrobulbar block, local nerve blocks and topical anaesthesia
 - management of complications of regional anaesthesia
 - maintenance of airway and basic cardiopulmonary resuscitation (CPR)

 - pathology of wound healing

 - indications, contraindications and techniques of the following procedures:
 - phacoemulsification
 - extra-capsular cataract extraction(ECCE)
 - intra-capsular cataract extraction (ICCE)
 - combined cataract glaucoma surgery
 - secondary IOL implantation
 - peripheral iridectomy

 - intra-ocular lens implant (IOL) types:
 - materials, styles, mono and multi focality, accommodating
 - intraoperative complication management including:
 - allergic reactions to drugs
 - perforated globe
 - retro-bulbar haemorrhage
 - sub-conjunctival haemorrhage corneal abrasions
 - brain/stem anaesthesia hyphaema
 - eyelash contamination ocular laceration adnexal laceration
 - wound location and construction small pupil management

- instrumentation including:
 - microscope
 - blades, scissors
 - forceps
 - phacoemulsifiers
 - sutures
 - needles
 - IOL injection devices

- capsulotomy including capsulorhexis
- excessive or inadequate hydro-dissection
- sudden rise in IOP
- sudden change in depth of anterior chamber
- wound burn
- posterior segment perforation dropped fragments
- zonular dehiscence vitreous prolapse
- haemorrhage including suprachoroidal (expulsive) and hyphaema
- IOL misplacement viscoelastic device retention Descemet's membrane detachment

- Postoperative complication management including:
 - raised IOP
 - intra-ocular haemorrhage
 - peri-ocular/orbital haemorrhage
 - wound leak including prolapse, shallow or flat a.c.
 - corneal integrity
 - lens position
 - posterior segment complications
 - excessive inflammation including endophthalmitis
 - retained nuclear fragments
 - cystoid macular oedema
 - exacerbation of diabetic retinopathy
 - exacerbation of ARMD
 - retinal detachment
 - intractable corneal oedema
 - posterior capsular opacification
 - capsular contraction
 - IOL decentralization
 - Uveitis-glaucoma- hyphaema (UGH) syndrome
 - refractive shift
 - epithelial ingrowth
 - wound infection
 - sterile hypopyon
 - late-onset endophthalmitis
 - wound dehiscence
 - upper lid ptosis
 - dry eye
 - excessive glare and entoptic phenomena
 - IOL imperfections
 - inappropriate IOL selection