



RANZCO

The Royal Australian
and New Zealand
College of Ophthalmologists

Refractive Surgery Curriculum Standard

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Purpose

The Refractive Surgery Clinical Performance Standard describes the knowledge, processes, skills and competencies that the trainee should master for the surgical treatment of refractive disorders.

The trainee is expected to become familiar with the techniques of refractive surgery, the preoperative assessment and postoperative course of the routine case, and complications of the procedures. The trainee is not required to achieve the level of expertise required of an independent sub-specialist in this area.

References

Core Refractive Surgery Reading

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

- American Academy of Ophthalmology, *Focal points: clinical modules for ophthalmologists*, American Academy of Ophthalmology, San Francisco, CA — issues dedicated to PRK and LASIK, for example:
 - *Focal Points 2008 Module: Wavefront-Guided LASIK*
(Product Number: 0202397V, Media Type: eBook, Online)
 - *Understanding Lasik and Wavefront Online*
(Product Number: 050130V, Media Type: Video)
 - *Focal Points 2007 Module: Refractive Lens Exchange*
(Product Number: 0202390V, Media Type: eBook, Online)
 - *Focal Points 2010 Module: Innovations in Advanced Surface Laser Refractive Surgery*
(Product Number: 0202422V, Media Type: eBook, Online)

Additional Reading

- Barsam, A. & Allan, B.D. 2012, 'Meta-analysis of randomized controlled trials comparing excimer laser and phakic intraocular lenses for myopia between 6.0 and 20.0 diopters', *Cornea*, 31, 454-61.
(Cochrane Database Syst Rev. 2012 Jan 18; 1: CD007679, doi: 10.1002/14651858.CD007679.pub3.)
- Farid, M. & Steinert, R.F. 2009, 'Patient selection for monovision laser refractive surgery', *Current Opinion in Ophthalmology*, vol. 20, no. 4, pp.251-4.
- ONE network: 'Introduction to refractive surgery for residents' series, 2012.
<http://www.aao.org/education/prod_access.cfm>
- Solomon, K.D., Fernández de Castro, L.E., Sandoval, H.P., Biber, J.M., Groat, B., Neff, K.D., Ying, M.S., French, J.W., Donnenfeld, E.D., & Lindstrom, R.L. (Joint LASIK Study Task Force) 2009, 'LASIK world literature review: quality of life and patient satisfaction', *Ophthalmology*, vol. 116, no. 4, pp. 691-701
- Sutton G.L. & Kim, P. 2010, 'Laser in situ keratomileusis in 2010 - a review', *Clinical & Experimental Ophthalmology*, vol. 38, pp. 192-210.

- Vajpayee, R.B, *et al.* 2004, *Step by step LASIK*, Taylor & Francis, London & New York, NY.

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

RS1 GENERAL MEDICAL AND OCULAR HISTORY RELEVANT TO REFRACTIVE ERRORS		
<p><i>This element covers the processes for observing, promoting and recording an general medical and ocular history as the preliminary preparation for diagnosing refractive errors and correcting them using refractive surgery.</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
<p>1.1 Identify general medical conditions (including congenital/hereditary and acquired conditions) that may have relevance for the diagnosis or surgical treatment of refractive error</p>	<p>**</p>	<p>1.1.1 Ascertain and record relevant current and past history of illnesses, surgical history, family history, diseases, allergies and medications/substances that may have an impact on the diagnosis or surgical treatment of refractive error, or on the outcome of refractive surgery</p>
<p>1.2 Identify details of ocular history that may affect surgical treatment of refractive error</p>	<p>**</p>	<p>1.2.1 Ascertain and record previous history and outcomes</p> <p>1.2.2 Identify risk factors that may have relevance for laser refractive surgery</p> <p>1.2.3 Recognise key features and patterns of symptoms/history that may assist in indicating or contraindicating particular refractive surgery modalities</p>
<p>1.3 Identify details of specific history in relation to refractive surgery</p>	<p>**</p>	<p>1.3.1 Use questioning to elicit necessary information concerning:</p> <ul style="list-style-type: none"> • history of contact lens usage • refractive stability • need for presbyopic correction • need for prisms in spectacles • patient's reasons for wanting refractive surgery • impact of patient's ocular condition on daily living activities including driving • impact of proposed refractive surgery on patient's occupation

1.4 Identify details of family ocular history	**	1.4.1 Given any hereditary ocular diseases indicate potential impacts for laser refractive surgery 1.4.2 Identify risk factors that may have relevance for corneal disease or glaucoma
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RS2 PERFORM EYE EXAMINATIONS RELEVANT TO REFRACTIVE SURGERY

This element covers the performance and interpretation of a range of eye examinations associated with the ocular surface, the anterior and posterior segments and the adnexa applicable to refractive surgery. It also covers the demonstration of judgement in selecting the appropriate examinations for particular patients.

The practitioner is expected to have performed preliminary 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 inspection of the eye and adnexa	***	2.1.1 Identify and describe the general appearance of the eye and adnexa 2.1.2 Interpret the relevance of any signs that may be found
2.2 Undertake the following examinations: – visual acuity – pupillary reactions – corneal sensation – cover testing	***	2.2.1 Accurately perform, record and interpret the results of these examinations and note the relevance to the diagnosis of external eye and corneal diseases and abnormalities of ocular motility 2.2.2 Refine subjective refraction 2.2.3 Perform cycloplegic refraction
2.3 Use an anterior segment slit lamp to examine the eyes and adnexa	***	2.3.1 Correctly perform, and interpret the results of, anterior segment and adnexa examination
2.4 Obtain intra-ocular pressure (IOP) readings	***	2.4.1 Obtain an accurate IOP reading, understand the limitation of the technique used
2.5 Perform gonioscopy for angle abnormalities and zonular abnormalities if indicated	***	2.5.1 Assess characteristics of the anterior chamber angle and related structures 2.5.2 Assess the anterior chamber angle for risk of closure
2.6 Undertake a posterior segment examination of the vitreous, optic nerve head, macula, retina including its periphery	***	2.6.1 Accurately report the characteristics and clinical significance of posterior segment findings, particularly those of the optic nerve head, macula and retinal periphery

<p>2.7 Perform a general medical examination relevant to ophthalmology if appropriate</p>	<p>**</p>	<p>2.7.1 Given a variety of general presentations (e.g. diabetes, hypertension) identify the relevance, if any, to laser refractive surgery procedures</p>
<p>2.8 Interpret the results of investigations, in preparation for refractive surgery</p>	<p>**</p>	<p>2.8.1 Determine the sequence, and perform and interpret the following investigations:</p> <ul style="list-style-type: none"> • cycloplegic refraction • pupilometry in photopic and scotopic lighting conditions • anterior segment OCT <p>2.8.2 Interpret results of corneal tomography and topography in common corneal conditions, and for the screening of potential refractive surgery patients</p> <p>2.8.3 Determine the sequence and be familiar with the performance and interpretation of the following investigations:</p> <ul style="list-style-type: none"> • wavefront analysis • contrast sensitivity • specular or confocal microscopy • AC depth measurement • colour vision testing

RS3 CHARACTERISE REFRACTIVE SURGERY OPTIONS

This element covers the classification of types of refractive surgery.

The trainee is expected to be able to explain to patients both the surgical techniques and the indications and contraindications for the use of these techniques.

LEARNING OUTCOMES	LEVEL OF MASTERY	PERFORMANCE CRITERIA
3.1 Characterise types of refractive surgery	**	3.1.1 Explain the following corneal refractive surgery procedures: <ul style="list-style-type: none"> • PRK • LASEK • LASIK • incisional keratotomy • corneal inlays 3.1.2 Explain the following intraocular refractive surgery procedures: <ul style="list-style-type: none"> • clear lens extraction • cataract extraction • phakic IOL implantation 3.1.3 Describe options for management of presbyopia: <ul style="list-style-type: none"> • monovision • diffractive and refractive multifocal IOLs • accommodating IOLs • corneal inlays
3.2 Explain the indications and contraindications for refractive surgery	**	3.2.1 Determine suitability of patient for refractive surgery taking into account the following: <ul style="list-style-type: none"> • patient motivation • patient expectation • refractive error • patient age • corneal thickness • corneal shape • anterior chamber depth • condition of lens • posterior segment health • concomitant ocular disease
3.3 Outline medico-legal risk management strategies	**	3.3.1 Counsel patient regarding specific risks and complications and document discussion

RS4 DEVELOP AND IMPLEMENT A MANAGEMENT PLAN FOR PATIENTS WHO HAVE HAD REFRACTIVE SURGERY

This element covers the postoperative management of refractive surgery patients. The trainee is expected to perform preliminary diagnosis and urgent management autonomously, and supplement this with timely referral to a sub-specialist.

LEARNING OUTCOMES	LEVEL OF MASTERY	PERFORMANCE CRITERIA
4.1 Determine and document in medical records a management plan for each patient	**	4.1.1 Integrate information from the history and examination to determine likely prognosis 4.1.2 Maintain legible records in accepted format of the proposed management plan and the briefing of the patient 4.1.3 Choose appropriate management strategies 4.1.4 Establish initial management targets
4.2 Educate the patient	**	4.2.1 Explain the nature of the patients' corneal and/or external eye condition 4.2.2 Explain clearly the proposed management regimen and the potential consequences thereof 4.2.3 Obtain and record the patient's informed consent to the management regimen where appropriate
4.3 Use of observation in the management plan	***	4.3.1 Establish and record appropriate baseline parameters 4.3.2 Maintain documentation that charts the progress of the observations
4.4 Recognise normal recovery	**	4.4.1 Recognise and treat pain and ocular discomfort 4.4.2 Be familiar with the normal rate of recovery following common refractive procedures 4.4.3 Recognise normal ocular appearance following common refractive procedures

		<p>4.4.4 Be familiar with appropriate postoperative medications for refractive surgery patients</p> <p>4.4.5 Be familiar with limitations on patient activities following refractive surgery</p> <p>4.4.6 Manage patient expectations following refractive surgery</p>
<p>4.5 Undertake post-operative management</p>	<p>*</p>	<p>Recognise, manage and where necessary provide referral for the following postoperative complications:</p> <p>4.5.1 Corneal</p> <ul style="list-style-type: none"> • keratectasia • non-infective keratitis • infective keratitis • non healing epithelial defect • diffuse lamellar keratitis • dry eye • stromal haze <p>4.5.2 Flap complications</p> <ul style="list-style-type: none"> • displacement • folds • striae • stromal haze • recurrent erosion • irregular astigmatism • abnormal corneal topography • epithelial ingrowth/implantation <p>4.5.3 Functional issues</p> <ul style="list-style-type: none"> • loss of best corrected visual acuity • loss of contrast visual acuity • night vision symptoms • glare/halos/visual distortion • ocular surface discomfort • under and over correction • induced astigmatism • regression of effect • ghosting/monocular diplopia

		<p>4.5.4 Intraocular</p> <ul style="list-style-type: none"> • endophthalmitis • glaucoma • cataract • intra ocular lens displacement • uveitis • endothelial decompensation • retinal complications • optic nerve complications
<p>4.6 Manage other ophthalmic conditions in patients with prior history of refractive surgery</p>	<p style="text-align: center;">**</p>	<p>4.6.1 Impact on cataract surgery</p> <p>4.6.2 Describe techniques of IOL calculation in patients with history of corneal refractive surgery</p> <p>4.6.3 Impact on intraocular pressure measurement and management of glaucoma</p> <p>4.6.4 Impact on retinal examination and visual effects for patients with retinal disease</p> <p>4.6.5 Identification and prevention of dry eye</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.

Conditions deserving special emphasis

The following conditions are of particular importance because of their prevalence and impact on society. It is expected that trainees will have a very detailed knowledge of these conditions.

1. Dry eye syndrome
2. Keratoconus
3. Narrow or occludable angles associated particularly with high hyperopia

Refractive Surgery Topic List

- Systemic diseases with ocular manifestations, or diseases that impact on the diagnosis of external eye or corneal conditions including but not limited to:
 - endocrine and metabolic diseases including but not limited to diabetes
 - allergy
 - autoimmune diseases
 - neurological disease
 - mucocutaneous disorders
 - oncology and chemotherapy
 - chemical and physical insults
 - infectious diseases including, but not limited to, sexually transmitted diseases
 - nutritional diseases and conditions
- Medications with ocular and systemic effects impacting on external eye and corneal diseases including but not limited to:
 - topical medications, their vehicles and preservatives
 - systemic medications including but not limited to psychotropics, rheumatological medications, antiarrhythmics
 - chemotherapeutic agents
- Environmental conditions that impact on external eye and corneal diseases including but not limited to ultra violet light, housing and hygiene conditions

- Ocular medications and their local and systemic side effects
- Eye injuries and their long term effects
- Ophthalmic procedures and their long term effects
- Principles of brief general examination
- Signs of systemic disease
- Performance of and interpretation of findings of external ocular examination including assessment of:
 - Bell phenomenon
 - lagophthalmos
 - corneal sensation
 - tear film break up time
- Cover and alternate cover tests
- Corneal stains
- Schirmer test
- Use of slit lamp and interpretation of findings on examination of:
 - eyelids
 - conjunctiva (bulbar, tarsal and forniceal) including cicatarisation
 - cornea: epithelium, stroma, endothelium
 - anterior chamber: depth, presence of cells/flare iris
 - lens
 - angle structures and grading
- Normal development of refractive errors
- Alternatives to refractive surgery including spectacles, contact lenses, mono vision
- Basic knowledge of PRK, LASEK, LASIK and incision keratotomy
- Comprehension of computerised corneal topography and interpretation of normal and abnormal appearance
- Intra ocular lens designs and locations in the correction of refractive errors: multifocal, toric and phakic IOL
- Techniques of corneal incision surgery including astigmatic keratotomy and limbal relaxing incisions
- Relative indications (including range of refractive error) for treatments:
 - PRK
 - LASIK
 - LASEK
 - phakic intra ocular lenses
 - clear lens extraction
 - corneal inlays

- cataract – refractive techniques
- possible contraindications for treatments
- ocular:
 - HSV
 - ulcerative keratitis
 - keratoconus
 - pellucid marginal degeneration
 - severe dry eye
 - neurotrophias
 - poor lid closure
 - non-infectious blepharitis
 - infectious blepharitis
 - uncontrolled glaucoma
 - optic neuritis
 - diabetic retinopathy
- systemic:
 - collagen vascular diseases
 - drugs: amiodarone, roaccutane
 - keloid scarring
- psychological:
 - severe psychiatric illness
 - unrealistic expectations
- Knowledge of normal postoperative recovery
 - knowledge of common and severe postoperative complications
 - comprehension of patient ocular visual symptoms and possible aetiologies
- Knowledge of regional road traffic authority guidelines/legislation for vision requirements for all categories of motor vehicle licences