



RANZCO

The Royal Australian
and New Zealand
College of Ophthalmologists

Glaucoma Curriculum Standard

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Purpose

The Glaucoma Clinical Performance Standard covers the specific knowledge, processes, skills and competencies required for the diagnosis and treatment of glaucoma.

Neglected glaucoma remains a blinding disease. The ophthalmologist has traditionally been the practitioner best able to diagnose and manage the condition.

Glaucoma is usually said to make up roughly one third of the consultation case load of the general ophthalmologist. Since the current Australian National Health and Medical Research Council (NHMRC) guidelines¹ state that the ophthalmologist shall provide oversight on all glaucoma management decisions, trainee experience in all complexities of the disease and its management are essential.

This standard reflects the trans-Tasman requirements of the College education process, and is intended to enable the newly-qualified ophthalmologist to provide competent, comprehensive glaucoma care, including laser and surgical treatments for glaucoma and the ability to differentiate glaucoma from other optic neuropathies and causes of visual field defects.

References

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

Glaucoma Reading

- National Health and Medical Research Council, 2010, *NHMRC Guidelines for the screening, prognosis, diagnosis, management and prevention of glaucoma*, Canberra, ACT.
- Shaarawy, T., Sherwood, M.B., Hitchings, R.A. & Crowston, J.G. 2009, *Glaucoma*, Saunders/Elsevier, Philadelphia, PA.
- South East Asia Glaucoma Interest Group (SEAGIG) 2008, *Asia Pacific Glaucoma Guidelines*, 2nd edn, SEAGIG, Sydney.

Additional Reading

- American Academy of Ophthalmology *Focal Points*
- Appropriate articles from relevant ophthalmic journals, including those reporting on the following:
 - Ocular Hypertension Treatment Study (OHTS)
 - Collaborative Normal Tension Glaucoma Trial (CNTGT)
 - Collaborative Initial Glaucoma Treatment study (CIGTS)
 - Early Manifest Glaucoma Trial (EMGT)
 - Advanced Glaucoma Intervention Study (AGIS)
 - Tube versus Trabeculectomy Study (TVT)
- Kahook, M.Y., Schuman, J.S., Epstein, D.L., & Chandler, P.A. 2013, *Chandler and Grant's glaucoma*, SLACK, Thorofare, NJ.

¹ National Health and Medical Research Council, 2010, *NHMRC Guidelines for the screening, prognosis, diagnosis, management and prevention of glaucoma*, Canberra, ACT.

- Ritch, R., Shields, M.B. & Krupin, T. 1996, *The glaucomas*, 2nd edn; Mosby, St Louis, MO.
- Stamper, R.L., Lieberman, M.F. & Drake, M.V. 2009, *Becker-Shaffer's diagnosis and therapy of the glaucomas*, 8th edn, Mosby/Elsevier, Edinburgh.
- Alward, W.L.M. & Longmuir, R.A. 2008, *Color atlas of gonioscopy*, 2nd edn; American Academy of Ophthalmology, San Francisco, CA.

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 by 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

GL1 GENERAL MEDICAL AND OCULAR HISTORY RELEVANT TO GLAUCOMA		
<p><i>This element covers the processes for observing, prompting and recording a general medical and ocular history in preparation for diagnosis and treatment of glaucoma.</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 Competencies and Knowledge (OBCK) standard.</i></p>		
LEARNING OUTCOMES	LEVEL OF MASTERY	PERFORMANCE CRITERIA
1.1 Obtain details of past ocular history	***	1.1.1 Identify risk factors that may have relevance for primary and secondary glaucoma
1.2 Obtain an ocular family history	***	1.2.1 Identify risk factors that may have relevance for primary and secondary glaucoma
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 medications or general illnesses on glaucoma 1.3.2 Identify risk factors arising from general history for glaucoma

GL2 PERFORM EYE EXAMINATIONS APPROPRIATE FOR GLAUCOMA

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

The trainee 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 ocular examinations appropriate for glaucoma	***	2.1.1 Accurately perform and interpret the results of these examinations and identify their relevance to the diagnosis of glaucoma: <ul style="list-style-type: none"> • visual acuity including refraction • pupillary reactions • colour vision testing • light brightness appreciation
2.2 Perform a slit lamp examination of the anterior segment and adnexa	***	2.2.1 Correctly perform and interpret the results of anterior segment and adnexa examinations, as applied to glaucoma. This includes: <ul style="list-style-type: none"> • measurement of intraocular pressure • gonioscopy
2.3 Perform a slit lamp examination of the posterior segment	***	2.3.1 Accurately report the characteristics and clinical significance of posterior segment findings, particularly those of the optic nerve head
2.4 Perform a brief general medical examination relevant to ophthalmology if appropriate	***	2.4.1 Given a variety of general presentations (e.g. diabetes, hypertension) identify the relevance, if any, to glaucoma and its potential management

<p>2.5 Test visual fields</p>	<p>***</p>	<p>2.5.1 Examine visual fields using confrontation</p> <p>2.5.2 Perform and interpret a static perimetry test</p> <p>2.5.3 Interpret a kinetic perimetry test</p> <p>2.5.4 Interpret data for automated fields</p> <p>2.5.5 Identify typical field defects in glaucoma as well as diseases mimicking it</p> <p>2.5.6 Detect progression of field loss and understand significance of rates of progression</p>
<p>2.6 Perform ancillary tests to further assist in the diagnosis or documentation of glaucoma where appropriate</p>	<p>***</p>	<p>2.6.1 Maintain a record of fundus photos including stereo-views of the optic disc</p> <p>2.6.2 Measure corneal thickness</p> <p>2.6.3 Interpret nerve fibre analysis/disc topography</p> <p>2.6.4 Perform ocular biometry to assess anterior chamber depth, lens thickness and axial length</p> <p>2.6.5 Interpret anterior segment imaging</p> <p>2.6.6 Interpret radiological imaging of the brain, optic nerve and adjacent structures</p> <p>2.6.7 Interpret results of carotid artery investigations</p>

GL3 CHARACTERISE GLAUCOMA

This element covers the classification of types of glaucoma and making a working and differential diagnosis.

LEARNING OUTCOMES	LEVEL OF MASTERY	PERFORMANCE CRITERIA
3.1 Characterise risk factors for glaucoma	***	3.1.1 Identify and prioritise risk factors including ocular hypertension and distinguish these from glaucoma
3.2 Characterise primary glaucoma	***	3.2.1 Identify primary open and closed angle glaucomas
3.3 Characterise secondary glaucoma	***	3.3.1 Identify the causes and types of secondary glaucoma
3.4 Characterise congenital and developmental glaucoma	***	3.4.1 Identify congenital glaucoma 3.4.2 Identify glaucoma associated with developmental disorders
3.5 Develop a differential diagnosis	***	3.5.1 Differentiate between glaucoma and other conditions causing visual field loss or optic nerve abnormalities, including congenital abnormalities

GL4 DEVELOP AND IMPLEMENT A GLAUCOMA MANAGEMENT PLAN		
<i>This element covers the management of glaucoma using observation, medical therapies, laser and surgery, including postoperative care.</i>		
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 Choose appropriate management strategies 4.1.3 Establish initial management targets
4.2 Educate the patient on the proposed management regimen	***	4.2.1 Explain the nature of the patient's glaucoma 4.2.2 Explain clearly the proposed management regimen and its potential consequences 4.2.3 Obtain and record the patient's informed consent to the management regimen where necessary
4.3 Understand the impact on glaucoma of systemic conditions and their treatments	***	4.3.1 Identify medical therapies that may exacerbate glaucoma or have an impact on the management thereof 4.3.2 Identify aspects of systemic disease management that may exacerbate glaucoma
4.4 Understand the impact on glaucoma of other ocular diseases and their treatments	***	4.4.1 Consider other ocular diseases and ocular therapies that may have an impact on glaucoma 4.4.2 Formulate variations in the management plan to appropriately treat secondary forms of glaucoma (e.g. uveitic, phakolytic, steroid-related)

<p>4.5 Understand the role of observation, and incorporate its use into the development of a management plan</p>	<p>***</p>	<p>4.5.1 Establish and record appropriate baseline parameters</p> <p>4.5.2 Maintain documentation that charts the progress of the observations</p>
<p>4.6 Undertake medical management of glaucoma</p>	<p>***</p>	<p>4.6.1 Apply knowledge of the physiology governing aqueous humour production and outflow to the selection of medical therapy</p> <p>4.6.2 Formulate a target intraocular pressure (IOP) range for a given patient</p> <p>4.6.3 Monitor the efficacy of the medical therapy, identify local complications of the therapy and make necessary adjustments to the management regimen</p> <p>4.6.4 Identify the impact of treatment on systemic conditions, identify systemic complications of therapy, and modify the treatment appropriately</p>
<p>4.7 Determine the expected outcome of medical and surgical therapy given the impact of coexisting conditions and explain to the patient</p>	<p>***</p>	<p>4.7.1 Discuss expected outcome with patient to enable them to make an informed decision</p> <p>4.7.2 Describe how glaucoma management might differ for a pregnant or lactating woman or for someone who is trying to become pregnant</p>
<p>4.8 Perform laser therapy for the management of glaucoma</p>	<p>***</p>	<p>4.8.1 Perform laser trabeculoplasty</p> <p>4.8.2 Perform peripheral iridotomy using YAG and/or argon lasers</p> <p>4.8.3 Perform panretinal photocoagulation using a laser</p> <p>4.8.4 Describe the various laser methods of cycloablation and the risks and consequences of these procedures</p> <p>4.8.5 Describe argon laser iridoplasty and the risks and consequences of the procedure</p>

<p>4.9 Perform surgery to lower intra-ocular pressure</p>	<p>***</p>	<p>4.9.1 Counsel patient on the surgical procedure</p> <p>4.9.2 Perform trabeculectomy including the use of antimetabolites and releasable sutures</p> <p>4.9.3 Perform lens / cataract surgery as treatment for angle closure (glaucoma)</p> <p>4.9.4 Perform combined glaucoma and cataract surgery</p> <p>4.9.5 Perform a peripheral iridectomy</p> <p>4.9.6 Describe cyclophotocoagulation and cyclocryotherapy</p> <p>4.9.7 Identify and manage intraoperative complications</p> <p>4.9.8 Describe glaucoma drainage (tube) device insertion and the consequences of the procedure</p> <p>4.9.9 Describe goniotomy, trabeculotomy and the consequences of the procedures</p> <p>4.9.10 Describe the technique and frequency of EUA for follow-up of infantile glaucoma</p> <p>4.9.11 Be aware of newly-described alternatives to trabeculectomy surgery and be familiar with the strengths and weaknesses of these</p>
<p>4.10 Undertake postoperative management</p>	<p>***</p>	<p>4.10.1 Identify and manage postoperative complications</p> <p>4.10.2 Perform sub-conjunctival injection of 5-fluorouracil or steroids</p> <p>4.10.3 Perform suturelysis</p> <p>4.10.4 Place a large contact lens effectively</p> <p>4.10.5 Inject visco-elastic into the anterior chamber</p> <p>4.10.6 Teach patient to perform bleb massage</p>

<p>4.11 Modify postoperative management plan with consideration of incurred complications</p>	<p>***</p>	<p>4.11.1 Alter frequency of assessments, medical and surgical intervention to optimise visual outcome following complications of surgery</p>
<p>4.12 Demonstrate appropriate decision making on referral of patients</p>	<p>***</p>	<p>4.12.1 Patients are referred in a timely manner with a comprehensive case history (oral or written) to the appropriate specialist or a support group</p> <p>4.12.2 Share the management with an appropriate specialist for a patient with shunt surgery or paediatric glaucoma patients</p>
<p>4.13 Plan and undertake follow-up and continuing care</p>	<p>***</p>	<p>4.13.1 Develop an appropriate frequency for assessment of treatment</p> <p>4.13.2 Ascertain health of the bleb, early (leakage, non-functioning) and late problems infection and cystic bleb</p> <p>4.13.3 Manage these problems</p> <p>4.13.4 Identify evidence of progression or deterioration in a glaucoma patient and revise management plan accordingly</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.

Glaucoma 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 impact on diagnosis and management of glaucoma, including:
 - atopic diseases
 - respiratory diseases
 - diabetes
 - hypertension / hypotension
 - vascular disease, e.g. carotid stenosis, vascular insufficiency, embolic disease
 - neurological diseases
 - phakomatoses
- Medications with ocular effects that have an impact on glaucoma, such as:
 - corticosteroids: systemic, topical
 - sedatives
 - antidepressants
 - anticholinergics
 - antipsychotics
- Signs of systemic disease
 - performance of and interpretation of findings of external ocular examination:
 - orbit
 - eyelids
 - eye movements
- Use of slit lamp and interpretation of findings on 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
- Ancillary tests
 - interpretation of various methods of nerve fibre analysis
 - neuroimaging including computed tomography (CT) and magnetic resonance imaging (MRI) scans, carotid Doppler studies
- Pathology, aetiology, genetics, epidemiology, clinical manifestations, systemic manifestations, diagnostic criteria and natural history of:
 - primary open angle glaucoma
 - primary closed angle glaucoma with and without pupil block
 - combined mechanism glaucoma
 - normal pressure glaucoma
 - ocular hypertension
 - pseudoexfoliation
 - pigment dispersion
 - neovascular glaucoma
 - uveitic / inflammatory glaucoma
 - lens induced glaucoma
 - trauma induced glaucoma
 - drug induced glaucoma
 - ciliary block glaucoma
 - secondary angle closure glaucoma with and without pupil block
 - combined mechanism secondary glaucoma
 - tumour induced glaucoma
 - iridocorneal endothelial (ICE) syndrome glaucoma
 - glaucoma because of raised episcleral pressure
 - ghost cell glaucoma
 - congenital glaucoma
 - glaucoma associated with developmental disorders
- Differential diagnosis including:
 - congenital anomalies
 - ischaemic optic neuropathy
 - neurological disease
 - retinal disorders
 - compressive optic nerve lesions
 - past transient elevated IOP

- 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

- Laser
 - clinical physics of lasers
 - laser safety
 - laser settings
 - indications, contraindications, techniques and complications of the following procedures:
 - laser trabeculoplasty
 - laser peripheral iridotomy
 - laser panretinal photocoagulation
 - laser iridoplasty
 - cyclophotocoagulation

- 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)
 - Indications, contraindications and techniques of the following procedures:
 - trabeculectomy, including use of anti-metabolites and resealable/adjustable sutures
 - lens extraction as a treatment for angle closure and angle closure glaucoma
 - combined glaucoma cataract surgery
 - peripheral iridectomy
 - reformation of a shallow or flat anterior chamber
 - glaucoma drainage (tube) device insertion
 - goniotomy

- Intraoperative complication management including:
 - conjunctival buttonhole
 - scleral flap disinsertion
 - vitreous loss
 - hyphaema
 - suprachoroidal haemorrhage
 - expulsive haemorrhage
 - Descemet membrane detachment
 - retrobulbar haemorrhage

- Postoperative complication management including:
 - leaking bleb
 - over filtration
 - choroidal detachment
 - pupil block
 - ciliary block/aqueous misdirection/malignant glaucoma
 - bleb failure
 - suprachoroidal haemorrhage
 - flat anterior chamber
 - postoperative infection and inflammation
 - distinguish infectious blebitis and endophthalmitis