RANZCO

The Royal Australian
and New Zealand
College of Ophthalmologists

Paediatric Ophthalmology Curriculum Standard

September 2014

Table of Contents

Purpose

The Paediatric Ophthalmology Clinical Performance Standard covers the specific knowledge, processes, skills and competencies required for the diagnosis and treatment of corneal and external eye conditions.

Paediatric Ophthalmology is a very exciting area of the specialty which will challenge and reward you. In the teaching hospital, you will often see children with eye disorders that are part of a systemic illness or syndrome. This provides intellectually stimulating practice and the opportunity to interact with other specialist practitioners as you try to improve your patients' lives.

Expect culture shock: it takes time to become comfortable dealing with children who are often uncooperative. With practice, you should become very proficient at examining children and enjoy the experience (and the fun of interacting with them).You will need to learn to deal effectively not only with the patient, but with the extended family. This is real doctoring work. The challenges are great but the rewards are very satisfying because you can make a difference in a child's life where the benefits will long outlast you. You will get out what you put in, so try and examine as many children as possible so you become proficient and then move on to mastery in this subject area.

References

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

Paediatric Ophthalmology Reading

- Wilson, M.E., Saunders, R.A. & Trivedi, R.H. (eds) 2009, *Pediatric ophthalmology: current thought and practical guide*, Springer-Verlag, Berlin. (this book can be read in a term - also available as an ebook)

- Hoyt, C.S. & Taylor, D. 2013, *Pediatric ophthalmology and strabismus,* 4th edn, Elsevier Saunders. (this is a good brook to browse, in order to reinforce your learning)

- Wright, K.W. & Strube ,Y.N.J. 2012, *Pediatric ophthalmology and strabismus,* 3rd edn, Oxford University Press, New York, NY. (standard reference)

Additional Reading

- Brodsky, M.C. 2010, *Pediatric neuro-ophthalmology*, Springer, New York, NY. (ebook - <http://public.eblib.com/EBLPublic/PublicView.do?ptiID=571112>)

- Levin, A.L. & Wilson, W.W. (eds) 2007, *Atlas of paediatric ophthalmology and strabismus*, Lippincott Williams and Wilkins, Philadelphia, PA. (really good for a quick browse)

- Lorenz, B., & Moore, A. 2011, *Pediatric ophthalmology, neuro-ophthalmology, genetics*, Springer, Berlin. (contains excellent clinician-focussed reviews especially on ROP, oncology, electrophysiology)

- Schiefer, U., Wilhelm, H., & Hart, W.M., 2007, *Clinical neuro-ophthalmology: a practical guide*, Springer, Berlin. (Chapter 7 has a very good summary of the origins of

the electrophysiological responses and tables summarizing the characteristic changes seen in a wide variety of clinical conditions.)

- Traboulsi, E.I. 2012, *Genetic diseases of the eye*, 2nd edn, Oxford University Press, New York, NY. (a great reference text for syndromes)

- webvision.med.utah.edu – this website has very comprehensive coverage of the technical aspects of electrophysiological testing of the visual system, with some details of the changes seen in clinical practice.

- Association of International Glaucoma Societies 2013, '9th consensus statement on childhood glaucoma – preliminary report, June 18, 2013'. (accessible via RANZCO'sMoodle learning management system)

Journal Articles

- American Academy of Pediatrics, 2013, 'Policy statement: Screening examination of premature infants for retinopathy of prematurity', *Pediatrics*, vol. 131, no. 1, pp. 189-195. (accessible via RANZCO'sMoodle learning management system)

- Fierson, W.M. 2013, 'Screening examination of premature infants for retinopathy of prematurity', *Pediatrics,* vol. 131, pp. 189-95.

- Lambert, S.R., DuBois L., Lynn M.J., Drews-Botsch C., Hartmann E.E., Freedman S.F., Buckley E.G., Plager D.A. & Wilson M.E. 2014, 'Comparison of contact lens and intraocular lens correction of monocular aphakia during infancy: A randomized clinical trial of HOTV optotype acuity at age 4.5 years and clinical findings at age 5 years', *JAMA Ophthalmology*, vol. 132, no. 6, pp. 676-682.

- International Committee for the Classification of Retinopathy of Prematurity 2005,'The international classification of retinopathy of prematurity revisited', *Arch Ophthalmol*., vol. 123, no. 7, pp. 991-9.

- The Royal College of Ophthalmologists, 2013, 'Abusive head trauma and the eye in infancy', pp. 1-106, The Royal College of Ophthalmologists, London. (accessible via the College's Moodle learning management system)

Advanced Reading

- Heckenlively, J.R. & Arden, G.B., 2006, *Principles and practice of clinical electrophysiology of vision*, MIT Press, Cambridge, MA. (reference text of visual electrophysiology, with original references)

It is recommended that reading also be supplemented with appropriate articles from current and relevant peer-reviewed journals. This may include the use of online resources made available by The College and recommended third parties, such as telemedicine.orbis.org (in particular, a source of e-resources including e-books and videos).

Best Practice Standards

Guidelines produced by The Royal College of Ophthalmologists (RCOphth) have been placed on the RANZCO learning management system. RANZCO expresses its gratitude to RCOphth for its permission to do so.

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

PO1 PAEDIATRIC EYE EXAMINATION		
This element covers the processes for observing, prompting and recording a general medical and ocular and history, as well as performing and interpreting a range of eye examinations, in preparation for diagnosis and treatment of paediatric eye conditions. *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.*		
LEARNING OUTCOMES	**LEVEL OF MASTERY**	**PERFORMANCE CRITERIA**
1.1 Obtain a general and ocular history from parents	***	1.1.1 Demonstrate capacity to build rapport with parents / carers and the child 1.1.2 During history taking, provide prompts or questioning to elicit the following: • what problem promoted the referral? • do the parents feel there is a problem with the child's vision? • is the child otherwise healthy? • were there pre- or peri-natal problems? • what has the child's general developmental history been? • have the various visual development milestones been achieved? • family history and genetic pedigree • draw a pedigree, if required
1.2 Assess visual acuity	***	1.2.1 Undertake tests appropriate for the child's age and condition 1.2.2 Infants / pre-verbal children: • nystagmus • quality of fixation with large and small objects • preferential looking • smiling • involuntary movements • vestibulo-ocular reflex 1.2.3 Toddlers: • 100s and 1000s and Smarties • Lea symbols • fixation • 10 prism dioptre base down test or 20 prism dioptre base out

		1.2.4 Pre-school: • Sheridan-Gardner test • stereopsis (limitations of testing) • Kay pictures 1.2.5 Primary school: • STYCAR letters • Snellen visual acuity chart
1.3 Assess visual fields	***	1.3.1 Undertake confrontational testing for visual fields using behavioural techniques 1.3.2 Identify field defects and infer anatomical location of defect
1.4 Assess colour vision	***	1.4.1 Colour vision testing appropriate for age: • Ishihara pseudo-isochromatic plates (winding lines or numbers)
1.5 Assess ocular motility	***	1.5.1 Observe motility and detect abnormal responses using tests suitable for the age of the child: • cover tests: including cover-uncover, alternate, prism-alternate, simultaneous prism • Krimsky test • supranuclear reflexes (doll's head) • Bruckner reflex test • Hirschberg test • 4 dioptre prism base out test • ductions and versions in the nine standard positions of gaze • eye alignment in right and left forced head tilt • record findings using standard notation
1.6 Assess binocular function	***	1.6.1 Test binocular function by undertaking tests appropriate for the child's age and condition: • Worth 4 dot • Lang and Frisby (< 5 years) • Titmus fly, Randot stereopsis (5 to 8 years)

		• Bagolini glasses and synoptophore (> 8 years) • fusional amplitudes
1.7 Undertake ocular examination	***	1.7.1 Examine the ocular adnexa to detect: • pseudo-strabismus • ptosis • pseudoptosis • lid, orbit and globe developmental abnormalities • evidence of facial asymmetry or craniosynostosis
1.8 Undertake pupil examination	***	1.8.1 Detect abnormalities on pupil examination, including: • pupil shape • iris colour • direct and consensual light reflexes • paradoxical pupil reaction • anisocoria
1.9 Assess intraocular pressure (IOP)	***	1.9.1 Use suitable testing techniques (including examination under anaesthesia) to measure IOP and determine whether normal or abnormal: • iCare Tonometer (any age) • Tonopen • Perkins tonometer (< 12 months) • Goldmann tonometer
1.10 Examine the eye	***	1.10.1 Perform slit lamp examination (including portable slit lamp) to detect: • anterior segment abnormalities • iris transillumination • cataract type / size / position 1.10.2 Use indirect ophthalmoscope to detect abnormalities in the retina or optic nerve (e.g. hypoplasia) 1.10.3 Perform cycloplegic refraction
	**	1.10.4 Perform dynamic retinoscopy

PO2 AMBLYOPIA

This element covers the processes for identifying and managing amblyopia using refractive, non-surgical and surgical treatments.

LEARNING OUTCOMES	LEVEL OF MASTERY	PERFORMANCE CRITERIA
2.1 Assess the aetiology of amblyopia	***	2.1.1 Identify unilateral and bilateral amblyopia 2.1.2 Apply knowledge of anatomy of visual cortex and retina
2.2 Diagnose amblyopia	***	2.2.1 Test visual acuity and interpret result 2.2.2 Conduct and interpret binocular fixation test (infants)
2.3 Manage amblyopia	***	2.3.1 Follow hospital/practice protocols to obtain informed consent from the parent / guardian 2.3.2 Select appropriate treatment, with reference to evidence-based standards, that may include: • implementation of an occlusion program appropriate to the causative condition and circumstances of patient • correction of refractive errors • use of atropine, and management of associated risk • patching protocols • removal of obstacles to vision, e.g. cataracts
	*	2.3.3 Assessment and review of emerging treatments such as modulators of neurotransmitter release

PO3 RETINOBLASTOMA (Rb)

This element covers the processes for recognising, treating and counselling paediatric patients with retinoblastoma.

LEARNING OUTCOMES	LEVEL OF MASTERY	PERFORMANCE CRITERIA
3.1 Recognise potential cases of retinoblastoma	***	3.1.1 Identify common presentations of retinoblastoma, including the significance of leukocoria 3.1.2 Differentiate retinoblastoma from the following: • tumours other than retinoblastoma • Coats disease • persistent fetal vasculature • cataract • retinopathy of prematurity • toxocariasis • retinochoroidal coloboma • uveitis • vitreous haemorrhage • retinal dysplasia • retinal detachment • myelinated nerve fibres • pseudoleukocoria, resulting from off-axis photos 3.1.3 Demonstrate ability to identify retinoblastoma, and the differential diagnoses, and choose the appropriate management techniques
3.2 Undertake investigation of potential retinoblastoma	***	3.2.1 Order examinations including: • magnetic resonance imaging (MRI) • lumbar puncture • bone marrow aspiration • B-scan ultrasound 3.2.2 Examine other family members 3.2.3 Understand the basic genetics of retinoblastoma (e.g. Knudson two-hit hypothesis) and its implications 3.2.4 Understand role of mutation testing for retinoblastoma 3.2.5 Recognise histopathological features of retinoblastoma

		3.2.6 Understand staging / classification: • international classification for intraocular retinoblastoma ABCDE • TNM
3.3 Apply appropriate treatment	**	3.3.1 Follow hospital/practice protocols to obtain informed consent from the parent / guardian 3.3.2 Evaluate and select appropriate treatment, including: • chemoreduction and chemotherapy (systemic and local) • laser treatment • cryotherapy • radiation – plaques – external beam • consider potential risks associated with chemotherapy and radiotherapy • awareness and discussion of intravitreal and intra-arterial chemotherapy (melphalan) • understanding of current management by team including oncologist, geneticist 3.3.3 Enucleation: • understand effect of enucleation on the growth of the immature orbit • understand moulding of a socket and ocular prosthesis basics
3.4 Counsel parents/carers and child	**	3.4.1 Provide prognosis, including: • risk of mortality • secondary tumour potential • morbidity due to treatment 3.4.2 Provide preliminary genetic counselling to family 3.4.3 Refer family to clinical geneticist 3.4.4 Follow up for patient and other family members

PO4 UVEITIS

This element covers the processes for identifying and managing uveitis of the anterior, intermediate and posterior segments.

LEARNING OUTCOMES	LEVEL OF MASTERY	PERFORMANCE CRITERIA
4.1 Assess factors associated with onset of anterior uveitis	***	4.1.1 Identify risk factors from patient history: • juvenile idiopathic arthritis • juvenile rheumatoid arthritis • family history • gender • age at onset of arthritis • positive antinuclear antibodies (ANA) test (esp. in females) • negative rheumatoid factor • trauma • sarcoidosis • herpes • Kawasaki disease • systemic disease • extra-ocular manifestations of immune disease
4.2 Identify clinical signs / complications of anterior uveitis	***	4.2.1 Diagnose signs of uveitis: • anterior chamber cells and flare • keratic precipitates • posterior synechiae • band keratopathy • cataract • hypotony • glaucoma • cystoid macular oedema
4.3 Monitor at risk children	***	4.3.1 Know recommended follow up intervals 4.3.2 Identify evidence of improvement or deterioration in the patient and revise management plan accordingly 4.3.3 Understand the use of OCT in management

4.4 Assess factors associated with presentation of intermediate uveitis	***	4.4.1 Identify risk factors from patient history: • family history • multiple sclerosis • sarcoidosis • inflammatory bowel disease • Lyme disease • toxocariasis • amyloidosis • systemic viral infections
4.5 Identify clinical signs of intermediate uveitis	***	4.5.1 Identify indicators of intermediate uveitis: • cells in vitreous • snowballs • snowbanking • cystoid macular oedema • posterior sub-capsular cataract • glaucoma • optic nerve swelling • retinal vasculitis
4.6 Assess factors associated with presentation of posterior uveitis	***	4.6.1 Identify source of posterior uveitis: • toxoplasmosis • toxocariasis • posterior pole granuloma • other parasitic infections, e.g. presumed ocular histoplasmosis syndrome (POHS) • Vogt Koyanagi-Harada syndrome (VKH) • differentiate pars planitis from other entities
4.7 Identify clinical signs of posterior uveitis	***	4.7.1 Identify chorioretinitis / vitritis / vasculitis 4.7.2 Make differential diagnosis of causes of macular star 4.7.3 Identify optic neuritis: • macular oedema • vitreous opacities 4.7.4 Differentiate: • toxoplasmosis • toxocariasis • VKH / sympathetic • endogenous endophthalmitis

4.8 Undertake relevant investigations for uveitis	***	4.8.1 Select, initiate and assess the results from the appropriate investigations for uveitis: • full blood count • urea/electrolytes/LFTs • ESR/C-reactive protein • anti-nuclear factor • rheumatoid factor • angiotensin-converting enzyme (ACE) • human leukocyte antigen (HLA) status • toxocara antibodies • toxoplasmosis antibodies • syphilis screening • Mantoux test / Quantiferon Gold • HIV serology • aqueous and vitreous sampling • diagnostic imaging (CXR)
4.9 Implement appropriate management	***	4.9.1 Follow hospital/practice protocols to obtain informed consent from the parent / guardian 4.9.2 Evaluate and select appropriate treatment, including: • topical steroids • systemic or peri-ocular steroids • mydriatics • treatment for band keratopathy • treatment for cataracts • non-steroidal anti-inflammatory drugs • referral to rheumatologist/ immunologist 4.9.3 Monitor patient for side effects of treatment, including: • glaucoma • side-effects of systemic treatment
	**	4.9.4 Evaluate and select appropriate systemic treatment including: • steroids • immunosuppressants • cryotherapy • biological agents

4.10 Counsel carers and child	***	4.10.1 Provide prognosis for vision 4.10.2 Provide or recommend follow up for patient and other family members, where appropriate

PO5 PAEDIATRIC GLAUCOMA

This element covers the processes for identifying, diagnosing and managing paediatric glaucoma using either surgical or non-surgical treatment.

LEARNING OUTCOMES	LEVEL OF MASTERY	PERFORMANCE CRITERIA
5.1 Identify clinical signs of paediatric glaucoma	***	5.1.1 Classification of childhood glaucoma as per CGRN (WGA Consensus meeting; see reading list): • primary congenital glaucoma • juvenile open angle glaucoma • glaucoma associated with non-acquired ocular conditions • glaucoma associated with non-acquired systemic conditions • glaucoma associated with acquired conditions • glaucoma associated with cataract surgery 5.1.2 Diagnose signs of congenital glaucoma in infants: • buphthalmos • enlargement / clouding / opacity / oedema of the cornea • photophobia • epiphora • blepharospasm • elevated IOP and optic disc cupping • syndromes – Sturge Weber syndrome – aniridia – neurofibromatosis – Lowe syndrome – Peters anomaly – juvenile xanthogranuloma 5.1.3 Recognize other secondary glaucomas. e.g. uveitic, steroid response 5.1.4 Diagnose indicators of juvenile glaucoma in older children: • visual failure • trauma • syndromes – Sturge Weber syndrome – aniridia – neurofibromatosis – anterior segment dysgenesis

		5.1.5 Make differential diagnoses of the following conditions: *Epiphora* • congenital nasolacrimal duct obstruction • corneal epithelial defect / abrasion • ocular inflammation (uveitis, trauma) *Cloudy Cornea* • corneal dystrophy, esp. congenital hereditary endothelial dystrophy • birth trauma with Descemet's tears • storage disease (mucopolysaccharidosis) • cystinosis • congenital abnormalities • sclerocornea • Peter's anomaly • congenital rubella syndrome • herpetic keratitis *Large eye / Buphthalmos* • axial myopia • megalocornea *Optic nerve abnormalities* • optic nerve coloboma • optic atrophy • optic nerve hypoplasia • physiologic optic nerve cupping
5.2 Undertake relevant investigations for glaucoma	***	5.2.1 Perform eye examinations, interpret the results and identify their relevance to the diagnosis of glaucoma 5.2.2 Recognise when examination under anaesthesia is required 5.2.3 Understand the effect of different anaesthetics on IOP measurements 5.2.4 Obtain and interpret results of IOP, corneal diameter, gonioscopy and axial length measurements taken under anaesthetic 5.2.5 Perform OCT, disc photography if feasible

5.3 Develop and implement a management plan	***	5.3.1 Identify the indications and contra-indications of various treatment options: *Medical* • beta blockers • carbonic anhydrase inhibitors • prostaglandin analogues • alpha 2 receptor agonists *Surgical* • goniotomy • trabeculotomy • trabeculectomy • implant surgery • cycloablation 5.3.2 Consult as appropriate with other paediatric specialists and geneticist 5.3.3 Determine a management plan appropriate for the age and condition of the patient 5.3.4 Explain proposed management plan to patient / parent / guardian / carer 5.3.5 Follow hospital/practice protocols to obtain informed consent from the parent /guardian 5.3.6 Implement plan observing the following: *Non-surgical* • monitor patient to identify changes in condition or detect side effects of medications and adjust plan as appropriate *Surgical* • choose appropriate procedures • observe the correct steps throughout the operation • anticipate and deal with peri-operative problems • conduct operation to successful conclusion 5.3.7 Undertake post-operative care and check for the potential of short-term or long-term complications 5.3.8 Manage visual rehabilitation

		5.3.9 Provide counselling for parents / carers 5.3.10 Provide ongoing follow-up

PO6 LENS ABNORMALITIES – CATARACTS AND SUBLUXATION OF THE LENS

This element covers the processes for identifying, diagnosing and managing childhood cataracts and subluxation of the lens using surgical and non-surgical treatments.

LEARNING OUTCOMES	LEVEL OF MASTERY	PERFORMANCE CRITERIA
6.1 Assess aetiology of cataract	***	6.1.2 Identify possible aetiology of paediatric cataracts from patient history, ocular examination findings and laboratory studies 6.1.3 Understand the aetiology of bilateral cataracts: • idiopathic • hereditary without systemic disease • autosomal dominant • autosomal recessive • X-linked • genetic, metabolic and systemic disease and syndromes – Down syndrome – Hallermann-Streiff syndrome – Lowe oculocerebrorenal syndrome – Smith-Lemli-Optiz syndrome – galactosaemia – hypoglycaemia – Edward syndrome – Patau syndrome – Alport syndrome – myotonic dystrophy – Fabry disease – hypoparathroidism – pseudo hypoparathyroidism – Conradi syndrome – diabetes mellitus – peroxisomal disorders – Wilson disease • maternal infection – rubella – cytomegalovirus – varicella – toxoplasmosis – herpes simplex continued over…

		• ocular abnormalities – aniridia – anterior segment dysgenesis – microphthalmia – persistent foetal vasculature (formerly persistent hyperplastic primary vitreous - PHPV) – posterior lenticonus 6.1.3 Understand the aetiology of unilateral cataracts: • idiopathic • ocular abnormalities – posterior lenticonus – persistent foetal vasculature – anterior segment dysgenesis – posterior pole tumours • traumatic • intrauterine infection (rubella)
6.2 Classify and describe paediatric cataracts	***	6.2.1 Document the location and morphologic characteristics of cataracts correctly, to establish a specific diagnosis and identify types of cataracts that: a) are unlikely to progress – nuclear – anterior polar – blue dot b) may progress, including – posterior lenticonus – persistent foetal vasculature – lamellar – anterior and posterior subcapsular – oil droplet

6.3 Undertake relevant systemic investigations for paediatric cataracts	***	6.3.1 Be aware of the indications for, select, initiate and assess the results from the appropriate investigations: • ocular physical examination • paediatric physical examination • pathology tests (if indicated) – TORCH titre – syphilis serology – urine (reducing substances and amino acids) – red cell galactokinase and G1P uridyl transferase – calcium and phosphorus – transferrin isoforms (for congenital disorders of glycosylation)
6.4 Implement appropriate management of paediatric cataract	**	6.4.1 Follow hospital/practice protocols to obtain informed consent from the parent / guardian, including informing of the need for long-term surveillance and possible treatment for glaucoma 6.4.2 Assess the risk of amblyopia associated with delaying surgery and risk of glaucoma from early surgery 6.4.3 Consult as appropriate with other paediatric specialists and geneticist 6.4.4 Evaluate and select treatment appropriate for the type and degree of cataract and the visual and general health status of the child and be aware of any precautions associated with the selected treatment 6.4.5 Be aware of age in relation to implantation of intra-ocular lenses (IOLs) into children (reference: IATS) 6.4.6 Prescribe and conduct non-surgical treatments • patching • pupil dilation

		6.4.7 Prescribe and conduct surgical treatment: • lensectomy • vitrectomy • intra-ocular lens implantation • choose appropriate procedures – observe the correct steps throughout the operation – anticipate and deal with peri-operative problems – conduct operation to successful conclusion – undertake post-operative care and check for the potential for short-term or long-term complications 6.4.8 Manage visual rehabilitation including contact lens fitting and management of contact lens related problems 6.4.9 Monitor refractive changes after surgery 6.4.10 Provide counselling for parents/carers 6.4.11 Understand the need for life-long surveillance for glaucoma after infantile cataract surgery
6.5 Assess aetiology of lens subluxation	***	6.5.1 Identify aetiology of subluxation from patient history, ocular examination findings and laboratory studies: *Ocular causes* • autosomal dominant • trauma • aniridia • ectopia lentis et pupillae • idiopathic • coloboma *Systemic syndromes* • Marfan syndrome • homocystinuria • Weill-Marchesani syndrome • sulfite oxidase deficiency * • hyperlysinemia **

6.6 Undertake relevant systemic investigations for lens subluxation	***	6.6.1 Be aware of the indications for, select, initiate and assess the results, including evaluation of significance of subluxation from the appropriate investigations: *Ocular physical examination* • visual acuity • keratometry • retinoscopy / refraction • external ocular examination • anterior segment including measurement of anterior chamber depth and iridocorneal angle • ultrasound • posterior segment *Paediatric physical examination* • assess for possibility of Marfan syndrome *Pathology tests* • urine (amino acids)

6.7 Implement appropriate management of lens subluxation	**	6.7.1 Follow hospital/practice protocols to obtain informed consent from the parent / guardian 6.7.2 Assess the risk of amblyopia associated with delaying surgery 6.7.3 Consult as appropriate other paediatric specialists including geneticist and/or cardiologist 6.7.4 Evaluate and select appropriate treatment and precautions, including: *Non-surgical treatments* • phakic correction • contact lenses *Surgery* • lensectomy / vitrectomy • intra-ocular lens implantation *Choose appropriate procedures* • observe the correct steps throughout the operation • anticipate and deal with peri-operative problems • conduct operation to successful conclusion • undertake postoperative care and check for the potential of short-term or long-term complications 6.7.5 Manage visual rehabilitation 6.7.6 Provide counselling for parents /carers, including understanding contact lens fitting and management of contact lens related problems 6.7.7 Provide long-term follow-up

PO7 PAEDIATRIC RETINAL DISEASES

This element covers the processes for identifying and managing retinal diseases using non-surgical treatments, laser and surgery.

LEARNING OUTCOMES	LEVEL OF MASTERY	PERFORMANCE CRITERIA
7.1 Assess aetiology of paediatric retinal disease	***	7.1.1 Identify aetiology from patient history, ocular examination findings and laboratory studies: • retinopathy of prematurity • Coats disease • Non-accidental injury (know differential diagnosis of retinal haemorrhages) • Stargardt disease • Best disease • retinitis pigmentosa • Leber congenital amaurosis • choroideremia • gyrate atrophy • cone disorders (including rod monochromatism) • congenital stationary night blindness • vitreoretinal dystrophies
7.2 Undertake relevant investigations for retinal diseases	**	7.2.1 Be aware of the indications for, select, initiate and assess the results from the appropriate investigations: • fundus examination • electroretinogram (ERG) • electro-oculogram (EOG) • OCT • fluorescein angiogram • genetic testing • testing for metabolic disease
7.3 Implement appropriate management	**	7.3.1 Review recent advances in treatment of particular diseases (esp. ROP, Rb) before initiating management 7.3.2 Follow hospital/practice protocols to obtain informed consent from the parent / guardian 7.3.3 Apply appropriate follow-up and screening protocols for ROP, Rb

		7.3.4 Consult as appropriate with other paediatric specialists, including geneticist 7.3.5 Evaluate and select appropriate treatment and precautions, including: • non-surgical treatments • laser treatment • cryotherapy • retina / vitreous surgery 7.3.6 Follow visual development 7.3.7 Counselling and support services • provide counselling for parents/carers • understand need for support of parents/carers and child by low vision support agencies

PO8 RETINOPATHY OF PREMATURITY (ROP)		
This element covers the processes for identifying and managing ROP. Indirect ophthalmoscopy in infants is best learnt on nursery rounds as part of ROP screening		
LEARNING OUTCOMES	**LEVEL OF MASTERY**	**PERFORMANCE CRITERIA**
8.1 Understand the pathogenesis and aetiology of ROP	***	8.1.1 Understand the normal development of retinal vasculature 8.1.2 Understand the effect of premature birth and risk factors for ROP 8.1.3 Understand the natural history of ROP
8.2 Undertake relevant investigations for ROP	***	8.2.1 Be familiar with the revised version International Classification of ROP (ICROP) 8.2.2 Be familiar with recommended screening protocols for ROP 8.2.3 Be able to examine premature infant's retina with indirect ophthalmoscope and grade findings 8.2.4 Be able to grade images of premature infant's fundus with signs of ROP using ICROP
	**	8.2.5 Be able to perform digital imaging of premature infant's fundus (e.g. using Retcam)
8.3 Implement appropriate management of ROP	***	8.3.1 Understand importance of timely screening for ROP and timing of follow-up screenings 8.3.2 Understand treatment protocols for ROP e.g. laser and anti-VEGF treatment

PO9 PAEDIATRIC NEURO-OPHTHALMOLOGY

This element covers the processes for identifying and managing optic neuropathies and nystagmus. This list is not exhaustive.

LEARNING OUTCOMES	LEVEL OF MASTERY	PERFORMANCE CRITERIA
9.1 Assess aetiology of neuro-ophthalmic disease	***	9.1.1 Identify optic nerve disease from patient history, ocular examination findings and laboratory studies *Optic nerve abnormalities* • optic nerve hypoplasia • morning glory disc anomaly • optic disc coloboma • optic pit • Aicardi syndrome • hereditary optic neuropathies, including Behr optic atrophy and Leber hereditary optic neuropathy (LHON) • optic neuritis • optic atrophy (including list of causes: unilateral, bilateral, congenital and acquired) • papilloedema and pseudopapilloedema *Nystagmus* • infantile nystagmus syndrome (includes congenital idiopathic nystagmus, sensory deprivation nystagmus) • fusion maldevelopment nystagmus (formerly latent nystagmus) • spasmus mutans • retinal dystrophies • vertical • upbeat • downbeat • ocular dysmetria • ocular flutter • seesaw nystagmus • others

9.2 Undertake relevant systemic investigations for neuro-ophthalmic disorders	***	9.2.1 Be aware of the indications for, select, initiate and assess the results including diagnosis and evaluation of significance of disorders from the appropriate investigations: • ocular physical examination • paediatric physical examination • genetic testing • neuro-imaging • ERG • visual evoked response (VER) • OCT, retinal photography • B scan ultrasound of optic discs • fundus autofluorescence
9.3 Implement appropriate management	***	9.3.1 Follow hospital/practice protocols to obtain informed consent from the parent / guardian 9.3.2 Consult as appropriate with other paediatric specialists, including geneticist 9.3.3 Evaluate and select appropriate treatment and precautions 9.3.4 Manage visual rehabilitation or low vision support 9.3.5 In event of genetic causation, provide counselling for parents 9.3.6 Provide follow-up for patient and other family members where appropriate

PO10 PAEDIATRIC SYSTEMIC DISEASES WITH OCULAR INVOLVEMENT

This element covers the processes for identifying ocular and non-ocular manifestations of systemic diseases with ocular involvement.

LEARNING OUTCOMES	LEVEL OF MASTERY	PERFORMANCE CRITERIA
10.1 Identify the ocular and non-ocular manifestations of the phakomatoses	***	10.1.1 Ability to diagnose: • neurofibromatosis I and II • Sturge-Weber syndrome • Tuberous sclerosis • Von Hippel-Lindau disease • ataxia telangiectasia • racemose haemangioma
10.2 Identify the ocular and non-ocular manifestations of neuro-metabolic disorders	*	10.2.1 Ability to suspect diagnosis: • mucopolysaccharidoses • GM 2 Type 1 gangliosidosis • Fabry disease • Wilson disease • cystinosis
10.3 Identify the ocular and non-ocular manifestations of chromosomal anomalies	***	10.3.1 Apply diagnostic criteria for: • trisomy 21
	**	• trisomy 13
10.4 Identify the ocular and non-ocular manifestations of connective tissue disorders	***	10.4.1 Ability to diagnose: • Marfan syndrome • pseudoxanthoma elasticum • juvenile xanthogranuloma
10.5 Identify the ocular and non-ocular manifestations of albinism	***	10.5.1 Ability to diagnose and distinguish between: • oculocutaneous albinism • ocular albinism
10.6 Identify the ocular and non-ocular manifestations of leukaemia	**	10.6.1 Ability to identify the various ocular manifestations of leukaemia

10.7 Identify the ocular and non-ocular manifestations of congenital infections	**	10.7.1 Ability to identify disease pattern of congenital: • syphilis • toxoplasmosis • cytomegalovirus (CMV) • herpes simplex
10.8 Identify the ocular and non-ocular manifestations of foetal alcohol spectrum disorder	**	10.8.1 Ability to identify manifestations of foetal alcohol spectrum disorder: • optic nerve hypoplasia • ptosis • telecanthus • narrow palpebral fissures • epicanthus • strabismus • high refractive errors • poor acuity • flat philtrum • thin upper lip

PO11 THE APPARENTLY BLIND INFANT		
This element covers the processes for evaluating and managing the apparently blind infant.		
LEARNING OUTCOMES	**LEVEL OF MASTERY**	**PERFORMANCE CRITERIA**
11.1 Evaluation of the apparently blind child	***	11.1.1 Obtain details of: • perinatal history • maternal history • family history 11.1.2 Identify visual behaviours suggestive of cerebral vision impairment 11.1.3 Conduct examinations for: • fixation behaviour and nystagmus • cerebral vision impairment • delayed visual maturation
11.2 Undertake relevant investigations for the causes of poor vision in children	***	11.2.1 Conduct relevant examinations, including: • characterise nystagmus • paradoxical pupil reaction • iris transillumination • cataract • refractive error • fundus examination (esp. look for optic nerve hypoplasia, peripheral pigmentary retinopathy, albinotic fundus, macular abnormality) • visual electrophysiology • select appropriate neuro imaging • genetic testing • biochemical testing
11.3 Implement appropriate management	***	11.3.1 Provide or arrange parents/carers counselling and support 11.3.2 Prescribe appropriate glasses - distance or bifocal, with tinted lenses if necessary 11.3.3 Refer to paediatrician if necessary for examination to exclude cerebral palsy, developmental delay, autism 11.3.4 Refer to appropriate support agencies e.g. low vision clinics, Vision Australia

PO12 ACCIDENTAL AND NON-ACCIDENTAL EYE INJURY

This element covers the processes for assessment and investigations of eye injuries. The standard includes the record requirements and reporting of non-accidental injuries (NAI).

LEARNING OUTCOMES	LEVEL OF MASTERY	PERFORMANCE CRITERIA
12.1 Assessment of eye injuries	***	12.1.1 Conduct examination under anaesthetic and removal of foreign bodies 12.1.2 Understand the natural history of birth-related retinal haemorrhages 12.1.3 Review examination results with reference to the index of suspicion of non-accidental injuries: • direct impact – bruising, haemorrhage and laceration, retinal detachment, subluxated lenses • indirect impact – shaking, retinal haemorrhage, optic atrophy 12.1.4 Understand diagnostic significance of traumatic retinoschisis 12.1.5 Understand eye injuries as manifestation of 'Munchausen syndrome by proxy' 12.1.6 Understand urgency of clearing blood from visual pathway in infants before deprivation amblyopia develops
12.2 Investigation of eye injuries	***	12.2.1 Understand differential diagnosis of retinal haemorrhages in infants: • birth trauma • non-accidental injury • significance of retinoschisis • systemic diseases including leukaemia and bleeding disorders • Terson syndrome 12.2.2 Order and interpret results of the following assessments, in collaboration with other medical specialists: • physical assessments, including neuroradiology, skeletal scans • neurological assessment • electrophysiology

		12.2.3 Collect documentation– photographs, diagnosis and classification 12.2.4 Record negative findings as well as positive findings
12.3 Management of eye injuries – accidental	***	12.3.1 Treatment plan to preserve and restore vision 12.3.2 Undertake counselling of patient and parents/carers under supervision, including: • providing core knowledge of injury • precise diagnosis • providing realistic expectations, based on extent of injury 12.3.3 Give parents/carers direction to ancillary services: • education • support groups • self-help groups 12.3.4 Discuss with parents/carers steps in grieving – reactions 12.3.5 Use appropriate language: • age-appropriate, with patients • avoid jargon 12.3.6 Discuss personal coping strategies for child and family, including their interactions with: • other health professionals • peers • families
12.4 Management of eye injuries – non-accidental	***	12.4.1 Know appropriate regional / national laws relating to reporting of child abuse 12.4.2 Consult with appropriate local paediatric child abuse unit 12.4.3 Plan follow up appointments and devise visual prognosis 12.4.4 Plan and commence management of any permanent ocular damage 12.4.5 Manage visual rehabilitation

PO13 LEARNING DISABILITIES		
This element covers the processes for identifying and managing learning disabilities in children.		
LEARNING OUTCOMES	**LEVEL OF MASTERY**	**PERFORMANCE CRITERIA**
13.1 Aetiology of learning disabilities (in absence of neurologic disorder)	***	13.1.1 Identify factors that may be associated with learning disabilities: • environment • culture • physical disabilities • intelligence quotient (IQ) • attention deficit disorder 13.1.2 Recognise evidence (or lack of evidence) of ocular disease causing learning disabilities
13.2 Management of learning disabilities	***	13.2.1 Perform complete eye examination to exclude eye disorders as cause of learning problems – including testing static and dynamic accommodation, convergence, eye movements, refractive errors 13.2.2 Counsel parents/carers on issues 13.2.3 Refer to appropriate assessment agencies/support groups 13.2.4 Discuss lack of proven association of minor ocular abnormalities/ vision therapies with learning disabilities

PO14 VISUAL ELECTROPHYSIOLOGY

This element covers the processes for identifying the application of visual electro-physiology in diagnosis and interpreting the output of electro-physiological tests.

LEARNING OUTCOMES	LEVEL OF MASTERY	PERFORMANCE CRITERIA
14.1 Understand the anatomy and physiology of electrophysiological testing of the visual system	*	14.1.1 Outline the electrical origin of ERG: • a and b waves, oscillatory potentials • photopic and scotopic ERG and the separation of rod and cone responses • pattern ERG • multifocal ERG 14.1.2 Outline the electrical origin of EOG 14.1.3 Outline the electrical origin of VEPs and characteristics of VEP waveforms (amplitude, latency)
14.2 Understand recording techniques and their limitations	*	14.2.1 Demonstrate an awareness of the applicability and limitations of, or with: • ERG (flash, pattern and multifocal), EOG and VEP (flash, pattern, visual acuity estimation, visual field analysis) • VEP maturational changes • the young or unco-operative patient • the malingering patient • the patient with very poor vision • refractive error, media opacity and amblyopia

14.3 Understand the indications for investigation and typical findings	***	14.3.1 Demonstrate a clear understanding of the applicability of electrophysiological testing in the following clinical scenarios: • the infant with nystagmus and/ or poor visual behaviour • suspected albinism • suspected retinal dystrophy or disease e.g. CAR, MAR • monitoring for retinal toxicities, vitamin A deficiency • macular dystrophies and other macular disease • optic nerve disease • cerebral vision loss • unexplained reduced vision • suspected functional visual loss • visual acuity estimation • visual field loss

PO15 FUNCTIONAL VISION IMPAIRMENT		
This element covers the processes for evaluating and managing functional vision impairment.		
LEARNING OUTCOMES	**LEVEL OF MASTERY**	**PERFORMANCE CRITERIA**
15.1 Functional Vision Impairment (Loss) in childhood (*syn.* visual conversion disorder, non-organic vision loss)	***	15.1.1 Understand common presentations of functional vision impairment (FVI) such as uniocular or binocular vision loss, constricted visual fields etc. 15.1.2 Understand difference between FVI (conversion reaction) and malingering 15.1.3 Know tests to distinguish FVI from organic disease especially when testing visual acuity, visual fields, colour vision, pupils and ocular motility 15.1.4 Understand common causative factors e.g. bullying, family stress, various forms of abuse 15.1.5 Consider organic diseases which are often initially misdiagnosed as FYI such as Stargardt disease, Batten disease, cone dystrophy 15.1.6 Understand necessity of excluding organic disease and positively confirming diagnosis of FVI 15.1.7 Understand the necessity for follow up to avoid missing organic disease 15.1.8 Explain FVI to parents / carers and distinguish from malingering; ask about common causative factors 15.1.9 Reassure child and parents / carers about good prognosis

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) curriculum standards;
- 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. ROP
2. Retinoblastoma
3. Paediatric cataract
4. Paediatric glaucoma

Paediatric Ophthalmology Topic List

- Milestones of the embryology of the ocular muscles and visual pathway and their importance to visual acuity:
  - corneal diameters
  - globe size and axial length
  - extra ocular muscles
  - embryology of retina and visual cortex
  - visual development

- Presenting signs, differential diagnosis, treatment procedures and prognosis for retinoblastoma:
  - clinical features and manifestations
  - differential diagnosis
  - inheritance factors
  - pathology and natural history
  - evaluation
  - classification
  - treatment
  - regression patterns
  - prognosis

- Presenting signs, differential diagnosis, treatment procedures and prognosis for childhood uveitis. Clinical feature and diagnosis (and screening protocols where relevant):
  - anterior: Juvenile rheumatoid arthritis (JRA), sarcoidosis, spondyloarthropathies, herpetic iridocyclitis
  - intermediate: clinical features and diagnosis
  - posterior: toxoplasmosis, toxocariasis, VKH syndrome
  - sympathetic ophthalmia: pathology and natural history, evaluation, treatment, prognosis

- Presenting signs, differential diagnosis, treatment procedures and prognosis for paediatric glaucoma:
  - congenital and infantile glaucoma: clinical, investigations, measurement of intraocular pressure, treatment - surgical and non-surgical
  - juvenile glaucoma
  - ocular and systemic conditions associated with glaucoma

- Presenting signs, differential diagnosis, treatment procedures and prognosis for paediatric cataracts and lens subluxation:
  - lens anatomy: morphologic classification, aetiology, evaluation – unilateral and bilateral cataracts
  - management – patching, surgery, aphakia, prognosis

- Presenting signs, differential diagnosis, treatment procedures and prognosis for retinal diseases in children:
  - retinopathy of prematurity: risk factors, pathogenesis, clinical features and grading, screening and examination, treatment
  - Coats disease
  - retinal haemorrhage
  - retinitis pigmentosa
  - cone disorders
  - congenital stationary night blindness
  - vitreoretinal dystrophies

- Presenting signs, differential diagnosis, and prognosis for optic nerve and related disorders in children:
  - optic nerve disorders such as hypoplasia, morning glory disc anomaly, optic disc coloboma, optic pit, Aicardi syndrome, optic neuritis

- Nystagmus: infantile, spasmus mutans, pathology and natural history, evaluation, treatment, prognosis

- Ocular manifestations of systemic disease in children:
  - metabolic disorders, chromosomal anomalies, connective tissue disorders, albinism, leukaemia and congenital infections

- Clinical features and diagnosis of:
  - phakomatoses, congenital toxoplasmosis, congenital syphilis, congenital rubella, congenital CMV and foetal alcohol spectrum disorder

- Presenting signs, differential diagnosis, treatment procedures and prognosis for amblyopia:
  - pathophysiology, common forms of amblyopia, unilateral, form deprivation, strabismic, anisometropic, bilateral, ametropic (including meridional), form deprivation
  - treatment: occlusion techniques including patching, contact lenses and pharmacological, prognosis for treatment
  - outcomes of the various PEDIG studies relating to amblyopia therapy

- Evaluation and management of the apparently blind infant: fixation behaviours, nystagmus, pupil reaction, fundus features

- Application and interpretation of visual electro-physiological tests:
  - electroretinogram (ERG)
  - electrooculogram (EOG)
  - visually evoked cortical potentials, visual evoked response (VEP/VER)

- Presenting signs, differential diagnosis, management and follow-up of functional visual impairment (FVI): common presentations; conversion reaction vs. malingering; distinguishing FVI from organic disease; common causative factors; appropriate follow-up

