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# RANZCO

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The Royal Australian  
and New Zealand  
College of Ophthalmologists

## Ocular Motility Curriculum Standard

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September 2014

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## Purpose

The Ocular Motility Clinical Performance Standard indicates the learning outcomes, performance criteria and competencies required of a trainee in this sub-specialty area. It provides a framework for distilling guided study and clinical exposure into a knowledge and skill base necessary to correctly diagnose and manage ocular motility and related disorders for best patient outcome.

Disorders of ocular motility make up a substantial proportion of paediatric practice and the correct diagnosis and management of these disorders is vital to ensuring life-long optimal binocular function. In addition, disorders of ocular alignment occurring in adult life can cause significant morbidity.

## References

### Ocular Motility Reading

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

- Wilson, M.E., Saunders, R.A. & Trivedi, R.H. (eds) 2009, *Pediatric ophthalmology: current thought and practical guide*, Springer-Verlag, Berlin.
- Hoyt, C.S. & Taylor, D. 2013, *Pediatric ophthalmology and strabismus*, 4th edn, Elsevier Saunders. (Section 6)
- Vivian, A.J. & Morris, R.J. 1993, 'Diagrammatic representation of strabismus', *Eye*, vol. 7, pp. 565-571.

### Additional Reading

- The Royal College of Ophthalmologists, 2012, *Guidelines for the management of strabismus in childhood*, pp. 1-40, The Royal College of Ophthalmologists, London. (accessible via RANZCO's Moodle learning management system).
- Plager, D.A., & Buckley, E.G. 2004, *Strabismus surgery basic and advanced strategies*, Oxford University Press, Oxford, in cooperation with the American Academy of Ophthalmology.
- Ansons, M.A. & Davis, H. 2003, *Diagnosis and management of ocular motility disorders*, 4th edn, Wiley-Blackwell.
- Ferris, J.D. & Davies, P.E.J. 2007, *Surgical techniques in ophthalmology series: strabismus surgery*, Elsevier.
- Helveston, E.M. 1993, *Surgical management of strabismus: an atlas of strabismus surgery*, 4th edn, Mosby, St Louis, MO., accessed 21 March 2014. <[http://telemedicine.orbis.org/bins/content\\_page.asp?cid=1-2161](http://telemedicine.orbis.org/bins/content_page.asp?cid=1-2161)>.
- von Noorden, G.K. & Campos, E.C. 2002, *Binocular vision and ocular motility: theory and management of strabismus*, 6th edn, Mosby, St Louis, MO., accessed 21 March 2014. <[http://telemedicine.orbis.org/bins/content\\_page.asp?cid=1-2193](http://telemedicine.orbis.org/bins/content_page.asp?cid=1-2193)>
- Wright, K.W. & Strube, Y.N.J. 2012, *Pediatric ophthalmology and strabismus*, 3rd edn, Oxford University Press, New York, NY. (Parts IV and V)

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 RANZCO and recommended third parties, such as <http://telemedicine.orbis.org> (in particular, a source of e-resources including e-books, and strabismus surgery 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.

One Network Guidelines: Preferred practice pattern – esotropia and exotropia

Accessed 21 November 2013

<<http://one.aao.org/preferred-practice-pattern/esotropia-exotropia-ppp--september-2012>>

## Level of Mastery

For each learning outcome, the level of mastery to be attained by the trainees 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

<b>OM1 MEDICAL AND OCULAR HISTORY RELEVANT TO OCULAR MOTILITY CONDITIONS</b>		
<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 ocular motility conditions.</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
<b>1.1 Determine and record any past and current topical, local and systemic therapies used to treat the eyes, including herbal and alternative medicines</b>	<b>***</b>	1.1.1 Identify risk factors that may have relevance for primary and secondary ocular motility disorders
<b>1.2 Obtain details of ocular history especially duration of misalignment, diplopia, previous strabismus surgery and/or amblyopia management, ocular or orbital trauma</b>	<b>***</b>	1.2.1 Identify risk factors that may have relevance for primary and secondary ocular motility disorders
<b>1.3 Obtain an ocular family history</b>	<b>***</b>	1.3.1 Ascertain family history of strabismus in particular
<b>1.4 Accurately record patient's past and current illness, operations, injuries and medication</b>	<b>***</b>	1.4.1 Ascertain current and past history of illnesses, diseases and medications, surgery and anaesthetic reactions, and their outcomes, that may be relevant to ocular motility disorders and their management. Consider especially: <ul style="list-style-type: none"> <li>• neurological disease</li> <li>• thyroid disease</li> <li>• myasthenia gravis</li> </ul>

## OM2 PERFORM EYE EXAMINATIONS AND TESTS APPROPRIATE FOR OCULAR MOTILITY CONDITIONS

*This element covers the performance and interpretation of a range of eye examinations and tests associated with ocular motility. It also covers the demonstration of judgement in selecting the appropriate examinations and tests for particular patients.*

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

LEARNING OUTCOMES	LEVEL OF MASTERY	PERFORMANCE CRITERIA
<p><b>2.1 Identify and describe the general appearance of the patient, the eye and adnexa through an external inspection</b></p>	<p>***</p>	<p>2.1.1 From an external ocular inspection and facial appearance, interpret the relevance of any signs that may be found</p> <p>2.1.2 Including abnormal head posture and markers of potentially associated general conditions e.g. craniofacial disorders</p> <p>2.1.3 Lid position for ptosis and Marcus Gunn jaw wink</p> <p>2.1.4 Look for scarring to indicate past strabismus surgery</p> <p>2.1.5 Assess the nature and power of any spectacle correction, including any incorporated or temporary prism, and understand the effect these may have on the motility examination</p>
<p><b>2.2 Undertake the following examinations:</b></p> <ul style="list-style-type: none"> <li>– visual acuity</li> <li>– subjective and cycloplegic refraction</li> <li>– pupillary reactions</li> <li>– sensory evaluation</li> <li>– motor evaluation</li> <li>– neurological assessment</li> <li>– nystagmus assessment</li> </ul> <p>(more detail on sensory testing modalities can be found in the context section of the standard)</p>	<p>***</p>	<p>2.2.1 Perform, record and interpret the results of these examinations accurately, and note their relevance to the diagnosis of ocular motility disorders</p> <p>2.2.2 Perform tests to characterise binocular function including the determination of the presence of sensory fusion, level of stereopsis, and nature of normal/abnormal retinal correspondence</p> <p>2.2.3 Perform tests to determine the risk of diplopia following any planned surgery</p> <p>2.2.4 Quantify muscle under/over action using standard notation e.g. +4 to -4</p>

		<p>2.2.5 Record ocular motility findings diagrammatically using standard notation</p> <p>2.2.6 Perform forced duction (and) generation testing as appropriate</p> <p>2.2.7 Interpret and incorporate information from orthoptic reports, including Hess Chart and binocular field of single vision (BSV)</p>
<b>2.3 Perform a slit lamp examination of the anterior segment and adnexa</b>	<b>***</b>	2.3.1 Perform, and interpret the results of, anterior segment and adnexa examinations correctly, as applied to ocular motility disorders
<b>2.4 Perform and interpret intraocular pressure (IOP) measurements</b>	<b>***</b>	2.4.1 Obtain accurate IOP readings, demonstrating an appreciation of the relationship between IOP and restrictive and inflammatory ocular myopathies
<b>2.5 Undertake a posterior segment examination of the vitreous, optic nerve head, macula and retina (including periphery)</b>	<b>***</b>	<p>2.5.1 Report accurately the characteristics and clinical significance of posterior segment findings relevant to binocular function and ocular alignment</p> <p>2.5.2 Assess fundus torsion</p>
<b>2.6 Perform a general medical examination relevant to ophthalmology, if appropriate</b>	<b>***</b>	2.6.1 Given a variety of general presentations, identify the relevance, if any, to ocular motility disorders and their potential management
<b>2.7 Understand the relevance of various in-office tests to the management of strabismus</b>	<b>***</b>	<p>2.7.1 Demonstrate appreciation of how the results of tests such as binocular visual fields measurement can affect the management of strabismus</p> <p>2.7.2 Understand the role of the orthoptist in diagnosis and management of strabismus</p>

<p><b>2.8 Instigate relevant ancillary investigations that may assist in the diagnosis and management of ocular motility disorders</b></p>	<p><b>***</b></p>	<p>2.8.1 Appropriately order investigations including:</p> <ul style="list-style-type: none"> <li>• blood tests for associated conditions such as thyroid disease, myasthenia gravis, temporal arteritis and atherosclerotic disease</li> <li>• imaging including ultrasound, CT, MRI/MRA</li> </ul>
	<p><b>**</b></p>	<p>2.8.2 Appropriately order EMG studies</p>

## OM3 CHARACTERISE OCULAR MOTILITY CONDITIONS

*This element covers the classification of types of ocular motility conditions and the use of differential diagnosis.*

*The following groups are not necessarily independent or mutually exclusive but give a framework for reference. To characterise ocular motility conditions, it is important to first exclude local ocular causes and systemic causes. Characterisation should concentrate on the gross ocular motility condition rather than minor deviations.*

*Understanding of the role of the orthoptist and the interpretation of orthoptic reports in characterising ocular motility conditions is included in this element.*

LEARNING OUTCOMES	LEVEL OF MASTERY	PERFORMANCE CRITERIA
<p><b>3.1 Characterise comitant eso-deviations</b></p>	<p>***</p>	<p>3.1.1 Identify and characterize esotropia, including:</p> <ul style="list-style-type: none"> <li>• infantile (congenital) esotropia</li> <li>• accommodative esotropia – refractive /non-refractive, fully and partial</li> <li>• non-accommodative esotropia – acquired esotropia and secondary to other pathology</li> <li>• consecutive esotropia</li> <li>• pseudo-esotropia</li> <li>• esophoria</li> <li>• cyclical esotropia</li> <li>• microtropia</li> </ul>
<p><b>3.2 Characterise comitant exo-deviations</b></p>	<p>***</p>	<p>3.2.1 Identify and characterise exotropia, including:</p> <ul style="list-style-type: none"> <li>• intermittent exotropia</li> <li>• constant acquired exotropia</li> <li>• convergence insufficiency</li> <li>• constant acquired secondary to other pathology</li> <li>• consecutive exotropia</li> <li>• infantile (congenital) exotropia</li> <li>• pseudo-exotropia</li> <li>• exophoria</li> </ul>

<p><b>3.3 Characterise vertical deviations</b></p>	<p>***</p>	<p>3.3.1 Identify and characterise ocular motility conditions causing vertical strabismus, including:</p> <ul style="list-style-type: none"> <li>• hypertropia</li> <li>• hypotropia</li> <li>• elevation in adduction and inferior oblique muscle overaction</li> <li>• depression in adduction and superior oblique muscle overaction</li> <li>• dissociated vertical deviation</li> <li>• A and V patterns</li> <li>• vertical muscle malfunction associated with other strabismus entities</li> <li>• monocular elevation deficiency (double elevator palsy)</li> </ul>
<p><b>3.4 Characterise neurological disorders resulting in disturbances in ocular motility</b></p>	<p>***</p>	<p>3.4.1 Identify and characterise ocular motility conditions caused by neurological disorders, including:</p> <ul style="list-style-type: none"> <li>• cranial nerve pareses: III, IV and VI nerve palsy</li> <li>• myasthenia gravis</li> <li>• progressive external ophthalmoplegia</li> <li>• internuclear ophthalmoplegia</li> <li>• congenital ocular motor apraxia</li> <li>• brain stem associated ocular motility disorders</li> <li>• sensory and cortical deprivation</li> <li>• Parinaud syndrome</li> <li>• convergence spasm</li> </ul>
<p><b>3.5 Characterise restrictive ocular motility disorders</b></p>	<p>***</p>	<p>3.5.1 Identify and characterise ocular motility conditions due to restriction, including:</p> <ul style="list-style-type: none"> <li>• thyroid eye disease</li> <li>• trauma</li> <li>• fat adherence syndrome</li> </ul>

<b>3.6 Characterise other specific strabismus syndromes and entities</b>	<b>***</b>	3.6.1 Congenital cranial disinnervation syndromes <ul style="list-style-type: none"> <li>• Duane syndrome</li> <li>• Mobius syndrome</li> <li>• congenital fibrosis of the extraocular muscles</li> </ul> 3.6.2 Brown syndrome
	<b>**</b>	3.6.3 Myopic strabismus fixus
<b>3.7 Characterise nystagmus</b>	<b>***</b>	3.7.1 Identify nystagmus that may be associated with strabismus, including: <ul style="list-style-type: none"> <li>• infantile nystagmus syndrome (includes congenital idiopathic nystagmus, sensory deprivation nystagmus)</li> <li>• fusion maldevelopment nystagmus (formerly latent nystagmus)</li> <li>• nystagmus blockage syndrome</li> <li>• spasmus nutans</li> <li>• visual deprivation (e.g. cataract)</li> </ul>

## OM4 DEVELOP AND IMPLEMENT A MANAGEMENT PLAN FOR OCULAR MOTILITY CONDITIONS

*This element covers the management of ocular motility conditions using observation, medical therapies and surgery, including postoperative care.*

*Timing for intervention and implementing management plans can be critical depending on clinical diagnosis and the age of the patient.*

*Understanding of the role of the orthoptist and the interpretation of orthoptic reports in developing an overall diagnostic and management plan is included in this element.*

LEARNING OUTCOMES	LEVEL OF MASTERY	PERFORMANCE CRITERIA
<p><b>4.1 Determine and document in medical records a management plan for each individual patient with an indication of estimated time frame</b></p>	<p>***</p>	<p>4.1.1 Integrate information from the history and examination to determine likely prognosis</p> <p>4.1.2 Maintain legible records of examination in accepted format. Document proposed management plan and the briefing of the patient</p> <p>4.1.3 Establish initial management targets</p> <p>4.1.4 Choose appropriate management strategies</p>
<p><b>4.2 Educate the patient on the proposed management plan</b></p>	<p>***</p>	<p>4.2.1 Explain the nature of the patient's ocular motility condition</p> <p>4.2.2 Explain clearly the proposed management plan and its potential consequences</p> <p>4.2.3 Discuss alternative management plans including the consequences of no treatment</p> <p>4.2.4 Obtain and record the patient's informed consent to the management plan</p>
<p><b>4.3 Achieve best possible visual acuity status for the patient</b></p>	<p>***</p>	<p>4.3.1 Refract patient and prescribe corrective spectacles (critical)</p> <p>4.3.2 Treat and monitor amblyopia including standard occlusion, penalisation and pharmacological occlusion</p>

<p><b>4.4 Use observation and non-operative therapies in management</b></p>	<p>***</p>	<p>4.4.1 Measure misalignment at baseline and record using standard format</p> <p>4.4.2 Maintain records that document the progress of the misalignment</p> <p>4.4.3 Refer patient for orthoptic treatment as appropriate</p> <p>4.4.4 Evaluate and monitor progress of refractive treatment of strabismus i.e. either single-vision or bifocal glasses</p> <p>4.4.5 Establish and monitor progress of amblyopia treatment at appropriate time intervals</p> <p>4.4.6 Evaluate the suitability of prisms as a treatment for a particular condition</p>
<p><b>4.5 Apply pharmacological therapies to the management of ocular motility conditions</b></p>	<p>**</p>	<p>4.5.1 Understand the mechanism of action of botulinum toxin</p> <p>4.5.2 Evaluate the patient for and, if indicated:</p> <ul style="list-style-type: none"> <li>• explain risks and obtain informed consent</li> <li>• instigate chemodeneration treatment using botulinum toxin</li> </ul>
<p><b>4.6 Apply surgery to the treatment strabismus</b></p>	<p>***</p> <p>procedures may fall into category ** or * as indicated</p>	<p>4.6.1 Obtain informed consent, counsel patient on the surgical procedure and postoperative care</p> <p>4.6.2 Assess if suitable for adjustable sutures</p> <p>4.6.3 Assess risk of anterior segment ischaemia</p> <p>4.6.4 Perform surgery for 'weakening' muscles, including:</p> <ul style="list-style-type: none"> <li>• recession</li> <li>• inferior oblique myectomy</li> <li>• tenotomy *</li> <li>• marginal myotomy *</li> <li>• tendon spacers for SO surgery*</li> </ul>

		<p>4.6.5 Perform surgery for 'strengthening' muscles, including:</p> <ul style="list-style-type: none"> <li>• resection</li> <li>• advancement</li> <li>• tucking *</li> </ul>
	<p>**</p>	<p>4.6.6 Use adjustable sutures to correct strabismus where appropriate</p> <p>4.6.7 Undertake transposition techniques to correct strabismus</p> <p>4.6.8 Understand vertical rectus muscle techniques for hypotropia and hypertropia</p> <p>4.6.9 Understand Anderson-Kestenbaum techniques to correct head posture in nystagmus</p>
	<p>*</p>	<p>4.6.10 Be aware of procedures to increase foveation time</p>
<p><b>4.7 Undertake intraoperative management of complications</b></p>	<p>***</p>	<p>4.7.1 Identify and manage intraoperative complications, including:</p> <ul style="list-style-type: none"> <li>• perforation of the globe</li> <li>• slipped or lost muscle</li> <li>• right operation on wrong muscle</li> <li>• wrong operation on right muscle</li> <li>• haemorrhage</li> <li>• oculocardiac reflex</li> <li>• corneal abrasion</li> <li>• perforation of fat pad with herniation of contents</li> </ul>
<p><b>4.8 Undertake postoperative management</b></p>	<p>***</p>	<p>4.8.1 Identify and manage postoperative complications, including:</p> <ul style="list-style-type: none"> <li>• vomiting</li> <li>• infection</li> <li>• haemorrhage</li> <li>• granuloma</li> <li>• Tenons prolapse</li> <li>• conjunctival cyst / scarring</li> <li>• anterior segment ischemia</li> <li>• altered eyelid position</li> <li>• diplopia</li> </ul>

<p><b>4.9 Demonstrate correct follow-up management</b></p>	<p><b>***</b></p>	<p>4.9.1 Manage under-correction or over-correction after surgery – both functional and cosmetic aspects</p> <p>4.9.2 Implement a follow-up plan, including:</p> <ul style="list-style-type: none"> <li>• amblyopia management</li> <li>• refraction</li> <li>• postoperative drops</li> </ul>
<p><b>4.10 Demonstrate periodic review and monitoring of management plan</b></p>	<p><b>***</b></p>	<p>4.10.1 Implement appropriate changes to management plan</p> <p>4.10.2 If necessary, patients are referred in a timely manner with a comprehensive case history (oral or written) to other appropriate specialists</p>

## Context

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

- Ophthalmic Science (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

These 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. Infantile esotropia
2. Refractive strabismus
3. Acute III nerve palsy in adults
4. Intermittent exotropia

### Ocular Motility Topic List

- Anatomy, physiology and biochemistry associated with management of ocular motility conditions
  - describe and identify the origin, course, insertion, innervation and action of the extra-ocular muscles including horizontal recti, vertical recti, obliques, levator palpebrae superioris and insertion relationships and trochlear function
  - describe and identify blood supply of the extra-ocular muscles
  - describe and identify the fine structure of extra-ocular muscles including fibre type and proprioceptor apparatus
  - describe and identify Tenon capsule, muscle cone and capsule, inter-muscular septum, 'check ligaments', Lockwood ligament and adipose tissue
  - describe and explain the importance of the extra-ocular muscle pulley system.
  - explain and identify primary, secondary and tertiary action of the extra-ocular muscles, fields of muscle action and changing action with different gaze positions
  - explain the physiology of muscle contraction
  - identify primary position of gaze, arc of contact
  - describe and identify monocular eye movements: ductions
  - describe and identify binocular eye movements: versions and vergences
  - describe supranuclear control systems for eye movements
  - explain the physiology of normal binocular vision: monocular deprivation, abnormalities of binocular vision, diplopia (both physiological and pathological), confusion, suppression, anomalous retinal correspondence and monofixation syndrome

- Describe the characteristics of general diseases with ocular manifestations, or that impact on the diagnosis of ocular motility conditions, such as:
  - metabolic diseases, including thyroid dysfunction and diabetes
  - neurological disorders, including myasthenia gravis, multiple sclerosis and mitochondrial diseases
  - cerebro-vascular diseases, especially aneurysm
- Identify ocular and systemic medications that impact on ocular motility and their local and systemic side effects
- Identify particular eye injuries and accidents that may impact on ocular motility and their long term effects
- Identify 'white eye' blow out fractures and their association with inferior rectus muscle ischaemia
- Identify ophthalmic procedures and their long term effects on ocular motility, for example:
  - peri- and retrobulbar anaesthetics
  - cataract surgery
  - orbital decompression for thyroid ophthalmopathy
  - vitreoretinal surgery
  - refractive surgery
  - glaucoma surgery
  - previous strabismus surgery
  - sinus/endoscopic surgery
  - repair of orbital fracture
- Describe and identify orbital and facial relationships

### **Sensory evaluation tests**

- Perform and/or interpret sensory evaluation tests, including:
  - visual acuity
    - a knowledge of appropriate tests at various levels of development including forced choice preferential looking (e.g. Teller, Keeler and Cardiff Cards) and distance testing (e.g. Kays, Lea, Sheridan-Gardiner, HOTV Snellen, EDTRS)
    - an understanding of the crowding phenomenon and its relevance to:
      - testing and fixation ability
      - fixation preference assessment (e.g. using cover test / prisms)
      - fixation quality (central, steady, maintained)
- Stereopsis
  - understand and be able to perform age-appropriate testing
    - including the use of Lang, Titmus (including Worth Fly), TNO, Randot tests, Frisby, A/O vectograph slides
  - synoptophore
  - distance stereotests
- Tests for fusion
  - Worth four dot test
  - fusional amplitudes with prism in free space
  - cover tests (also used for motor evaluation)
  - fixation targets

- synoptophore
- Tests for deviation
  - cover-uncover test for manifest deviation
  - alternate cover test for latent deviation
  - simultaneous prism cover test
- Major amblyoscope: synoptophore, troposcope (also used for motor evaluation)
  - measure deviation
  - angle kappa measurement
  - assessing fusion
  - assessing stereopsis
  - assessing retinal correspondence
- Bruckner test (also used for motor evaluation)
- Test for retinal correspondence/suppression
  - afterimage test (Bielschowsky)
  - Bagolini striated glasses
  - four dioptre prism test
- Near point convergence
- Near point accommodation
- Special tests:
  - visually evoked potential
  - electroretinogram
  - photoscreening

### **Motor evaluation**

- Hirschberg test (corneal reflections)
- Krimsky test (prism reflex / prism reflection)
- Prism and cover test
- Maddox rod / Maddox wing
- Assessment of ocular movement
  - duction tests:
    - prisms
    - light reflex displacement
    - dolls eye manoeuvre
    - OKN testing with drum or spinning
    - field of binocular vision using a perimeter
    - forced duction test
  - versions
- Active force generation test
- Fields of fixation
  - binocular single vision

- field of diplopia
- tests for paresis
  - Park 3-step test
  - tangent screens
  - Hess screen
  - Lancaster red/green test
  - saccadic velocities
- Abnormal head posture: identification and causes, including non-neurological ones

### **Binocular Vision Abnormalities**

- Describe the causes and types of amblyopia, including:
  - deviated eye (strabismic)
  - defocused eye (refractive)
  - deprived eye (deprivational)
- Outline the investigation process for amblyopia, including:
  - assessment of visual acuity
  - managing uncooperative patients
- Explain the prognosis of various types of amblyopia
- Define and describe the general characteristics of esophoria and exophoria
- Define and describe the general characteristics of convergence insufficiency
- Describe the natural history of untreated essential infantile esotropia
- Define and describe the general features of essential infantile esotropia, including:
  - apparent reduced abduction
  - cross-fixation
  - pursuit asymmetry
  - dissociated vertical deviation
  - elevation in adduction / inferior oblique overaction
  - convergence blocked nystagmus
- Outline conditions that may be misdiagnosed as essential infantile esotropia, including:
  - broad epicanthal folds (pseudostabismus)
  - VI nerve palsy
  - early onset accommodative esotropia
  - Duane retraction syndrome
  - nystagmus blockage syndrome
  - Moebius syndrome
  - congenital fibrosis syndrome
- Describe how fusion occurs and how patients without fusion function
- Define and describe the general characteristics of acquired esotropia
- Explain the prognosis for acquired esotropia

- Describe the general features of congenital (infantile) exotropia and its association with neurological problems and syndromes
- Describe the history and aetiology of intermittent exotropia
- Describe consecutive constant exotropia following an esotropia
- Describe the classical features of a superior oblique palsy
- Describe the bilateral oblique palsies and impact on central fusion disruption
- Describe vertical strabismus not arising from superior oblique palsy, including:
  - incomitant vertical strabismus
  - skew deviation
  - Brown syndrome
  - inferior oblique palsy
  - mechanical restriction
  - DVD strabismus
  - Heimann Bielschowsky phenomenon
- Describe the general features of paralytic or paretic strabismus, including:
  - III nerve palsy
  - IV nerve palsy – unilateral and bilateral
  - VI nerve palsy
  - congenital paralysis of ocular muscles
  - acquired traumatic paralysis of ocular muscles
  - understand significance of multiple cranial nerve palsies and discuss possible aetiologies
- Describe and identify the general characteristics of mechanical restrictions, including:
  - Duane syndrome – Huber classification
  - Brown syndrome
  - inferior oblique palsy
  - blowout fractures
  - thyroid ophthalmopathy
  - general fibrosis syndrome
  - Mobius syndrome
  - superior oblique myokymia
  - myasthenia gravis
- Identify and describe the classification of infantile nystagmus syndrome (idiopathic (aka congenital motor nystagmus) and secondary causes (e.g. retinal dystrophies etc.)
- Discuss the importance of the diagnostic null zone
- Discuss the clinical associations and general features of idiopathic infantile nystagmus syndrome (aka motor nystagmus)
- Identify and describe chronic progressive external ophthalmoplegia

### **Management of Ocular Motility Conditions**

- Describe the treatment of exophoria and esophoria

- Describe the treatment for convergence insufficiency
- Describe the treatment of amblyopia using occlusion, including:
  - occlusion programs
  - when and how to stop occlusion
  - penalisation with atropine
  - risks of atropine
  - risk of reversal of amblyopia with excessive patching
- Describe the goals for treatment of infantile esotropia
- Discuss the treatment for essential infantile esotropia, including:
  - glasses
  - occlusion
  - surgery
  - botox chemodenervation
- Discuss the management of patients with cerebral palsy and other neurological problems and strabismus
- Discuss the treatment of:
  - fully accommodative esotropia
  - partially accommodative esotropia
  - monofixation syndrome
  - non-accommodative esotropia
  - high accommodative convergence to accommodation (AC/A) ratio
  - cyclic esotropia
  - occlusion esotropia
- Discuss prism adaptation, bifocals and miotics in treatment of esotropia
- Explain the management, options and goals of treatment in intermittent exotropia, including:
  - observation
  - optical treatment
  - orthoptic treatment
  - surgery
- Describe the treatment goals of intermittent esotropia
- Discuss when it is appropriate to treat pattern strabismus
- Discuss surgical procedures for pattern strabismus
- Discuss surgical correction of vertical strabismus
- Discuss surgical treatment options for and urgency of treatment for paralytic strabismus
- Discuss the goals of treatment and treatment procedures for 3rd and 4th nerve palsy
- Discuss the principles of treatment for:
  - Duane syndrome
  - Brown syndrome

- inferior oblique palsy
- thyroid ophthalmopathy
- Discuss management of acute cases of trauma involving the eye muscles
- Outline and discuss the surgical plan for strabismus surgery
- Describe and discuss the selection of materials and methods for extra-ocular muscular surgery, including:
  - sutures
  - needles
- Discuss and describe indications and contraindications of use of adjustable suture in strabismus surgery (including allergy)
- Describe posterior fixation suture (Faden Operation) and Pulley sutures
- Discuss the management of complications arising from strabismus surgery, including:
  - ocular alignment problems
  - diplopia
  - conjunctival complications
  - mechanical restriction
  - lost/slipped muscle
  - postoperative infection
  - granuloma
  - change in eyelid position
  - perforation of the globe
  - anterior segment ischemia
- Discuss the indications for surgery in patients with nystagmus
- Discuss the treatment options for infantile nystagmus syndrome
- Explain surgery to move the null zone nearer to the primary position (Kestenbaum-Anderson procedure)
- Describe chemodenervation treatment of strabismus using botulinum toxin and risks
- Impact of strabismus (esp. diplopia) on patient's occupation and driving