

FEDERAL REPUBLIC  
OF NIGERIA

# TREATMENT GUIDELINES FOR DELIVERY OF CHILD EYE HEALTH SERVICES IN NIGERIA

FEDERAL MINISTRY OF HEALTH, NIGERIA - 2019



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# Foreword

Good vision plays an important role in the physical, mental and social development of children. Poor vision in children can interfere with learning and social adaptation and can lead to permanent visual impairment or blindness if not detected early and treated. Conditions like allergic or infective conjunctivitis, keratitis etc can lead to pain, discomfort and absenteeism from school.

Globally, 1.6m children are blind and approximately twice that number have low vision. Forty-five percent (45%) of these children were blind from avoidable causes and the pattern varies widely between and within countries. Corneal scarring (mainly from Vitamin A deficiency and measles), cataract, retinopathy of prematurity, refractive error (mostly myopia) and low vision were prioritized for control.

Reducing and eliminating unsafe practices, setting standards of care and enabling the effective use of eye care resources for the best possible outcomes for all children of Nigeria is a priority for the Federal Ministry of Health.

This document is aimed at providing guidance for the delivery of quality child eye health services in Nigeria and was put together in line with global best practices. It defines the role of specific interventions in the diagnosis, work up and management of patients. It is a product of rigorous systematic review and contributions of a wide range of stakeholders, technical experts and organizations involved child eye care.

While these guidelines do not dictate the care of a particular patient, they identify and describe generally recommended courses of management and will not take the place of the advice of an eye care provider. The physician must make the ultimate judgement about the propriety of the care of a particular patient in light of his/ her presentation.

I therefore endorse this document as a guide for the provision of eye care services for the paediatric population of Nigeria.



**A. M. Abdullahi**  
Permanent Secretary  
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# Abbreviations

CCEHiN	Comprehensive Child Eye Health in Nigeria programme
CEH	Child Eye Health
CMV	Cytomegalovirus
D	Dioptres
DPT	Diphtheria, Pertussis, Tuberculosis vaccine
EPI	Expanded Programme on Immunization
EUA	Examination under anaesthesia
FB	Foreign body
HbS	Haemoglobin S
HE	Health education
HEM	Harmful Eye Medicines
HepB	Hepatitis B
HiB	Haemophilus influenza type B vaccine
HIV	Human Immunodeficiency Virus
IECs	Information, Education and Communication materials
IM	Intramuscular
IOP	Intraocular pressure
IV	Intravenous
LVD	Low vision devices
m/c/s	Microscopy, culture and sensitivity

NHIS	National Health Insurance Scheme
NSAIDs	Non-steroidal anti-inflammatory drugs
ROP	Retinopathy of Prematurity
SiB	Seeing is believing
TB	Tuberculosis
TCA	To Come Again
TF	Trachoma follicular
TI	Trachoma intense
TORCHES	Toxoplasmosis, Rubella, Cytomegalovirus, Herpes simplex, Syphilis
TT	Trachoma trichiasis surgery
WHO	World Health Organisation

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# Introduction



## **Treatment Guidelines for Delivery of Child Eye Health Services in Nigeria**

This guideline deals with common eye diseases which occur in children in our environment. The eye conditions have been arranged in related topics and are each the subject of an individual monograph, which follows a standard format. For each condition there is a title/description, causes/risk factors, symptoms and signs (how the patient presents) and management by level of care i.e. Home, community primary, secondary and tertiary levels.

These diseases have been dealt with in sections beginning with pediatric cataract, childhood glaucoma and amblyopia which are important causes of blindness in children. The next group of diseases are the various inflammatory and infective conditions which affect the eyes of children. This is followed by a section on various possible injuries to the eyes, then refractive errors and low vision which are a major cause of visual impairment and blindness in children. A selection of diseases which include retinoblastoma, strabismus, vitamin A deficiency, measles, retinopathy of

prematurity and sickle cell and the eye are also discussed. Complications arising from harmful eye practices, has been extensively dealt with.

Each disease condition has been discussed under the following headings: description of the disease, causes and risk factors, symptoms and signs, and management of the disease at the primary secondary and tertiary levels. These are explained as follows:

### **Title/description**

A brief description of the condition follows the title.

### **Causes / Risk factors**

Listed here are the pathologic organisms, circumstances, or conditions for transmission of the disease. Any predisposing factor is also stated in this part of the monograph.

### **Signs and Symptoms** (How does a patient present?)

Listed here are the main signs and symptoms that characterise the disease or condition. Where relevant, complications which may result from the condition (usually in a serious or chronic form) are stated.

### **Management**

The therapeutic and other patient management measures necessary to deal satisfactorily with the particular condition are stated in a logical sequence of steps. These measures may or may not involve prescribing specifically indicated medications.

The last section deals with pertinent topics such as prescription of lenses in children, management of low vision, rehabilitation of the blind child, optical management of corneal opacity and steps in the management of trauma in children. A summary of care for the various conditions is outlined for ease of reference.

### **Eye Care Worker**

An eye care worker is any health worker involved in delivery of eye care services. This includes clinical workers such as ophthalmic assistants, ophthalmic nurses, clinical officers, optometrists and ophthalmologists and non-clinical workers such as the ophthalmic technicians and social worker/counsellor. These workers serve at the primary, secondary and tertiary levels as follows:

#### **Primary Level**

basic ophthalmic services like diagnosis of common eye conditions and provision of simple eye medications are carried out mainly by ophthalmic assistants, the community health care workers, nurses working in immunization clinics and clinical officers.

#### **Secondary Level**

refers to centres where an ophthalmologist and other eye care workers are based (usually referral hospitals). At these centres, more elaborate diagnosis of eye conditions with advanced equipment are carried out, treatments for common eye conditions are performed including refraction, dispensing of spectacles and minor procedures in children.

#### **Tertiary Level**

These are centres with a comprehensive child eye care team headed by a paediatric ophthalmologist. They have more advanced diagnostic and treatment facilities and are referred to as child eye tertiary facilities (CETF).



# Guidelines on Management of Paediatric Eye Conditions

## 1. Paediatric cataract



- Unknown in some cases
- Maternal factors- exposure to irradiation, maternal ingestion of drugs such as oral prednisolone during pregnancy

### Signs and symptoms

- Parents/caregiver may notice poor vision
- Child may bump into objects because of poor vision
- Older children may complain of poor vision
- Poor performance in school
- A white pupil (leukocoria)
- Squint
- “Dancing eyes” (nystagmus)

### Management

#### Primary level

- This is an ophthalmic emergency. Recognition and immediate referral of all children with above features to the secondary/tertiary level.

#### Secondary / tertiary level

History should include:

- Age at onset of cataract
- Duration of cataract
- History of trauma
- Any old photograph of child if available
- Family history of childhood cataract
- Pregnancy, delivery and neonatal history
- Maternal drug history
- Developmental milestones

### Examination

#### General examination

This should be done preferably by a paediatrician to assess the child's fitness for general anaesthesia.

### Description

Cataract is the opacity of the natural lens in the eye. Cataracts in children may interfere with the normal development of vision resulting in lazy eye (amblyopia). Therefore, it requires urgent management compared to cataract in adults.

### Causes / Risk factors

- Intrauterine infections-TORCHES
- Trauma
- Hereditary-Familial cataracts
- Genetic disorders-Down syndrome
- Metabolic diseases e.g. Diabetes, Galactosemia

The evaluation should include the general health of the child and check for the presence of cardiac abnormalities.

### Eye Examination

- Visual acuity assessment
- Pen torch examination of the anterior segment of the eye
- Portable slit lamp examination to examine the anterior segment e.g. lens opacity, microcornea
- Dilated fundus examination of the eye
- Examine for microphthalmos, nystagmus and squint
- Tonometry

### Investigations

B-Scan ultrasonography, to assess the vitreous and retina in dense cataracts and to rule out retinoblastoma

Laboratory investigations to identify cause

### Pre-Operative and examination under anaesthesia checklist

- Consent for surgery
- Anaesthetist's review
- Ocular biometry (on table)-keratometry (measurement of corneal curvature), A-scan, horizontal diameter of the cornea, tonometry, gonioscopy
- Topical antibiotics, cycloplegic, anti-inflammatory drugs, systemic antibiotic and oral steroid

### Treatment

- The treatment for visually significant cataract in children is surgery usually performed under general anaesthesia as early as one month of age.

### Surgical procedures

- The surgical technique for paediatric cataract is lens washout with primary posterior capsulotomy and anterior vitrectomy in younger children (up to 6 years).
- Intra ocular lens should be implanted in all children who are one year old and above in whom corneal

diameter is > 10.5mm.

- It is recommended that children with bilateral cataracts should have each eye operated separately (putting into consideration the facility and patient factors). This should be done within a week.

### Prophylaxis against infection

- For all patients topical 5% povidone iodine should be instilled in the fornices and left for at least 3 minutes before surgery.
- For all patients intracameral antibiotics should be administered immediately after surgery e.g. Cefuroxime, moxifloxacin etc. Intracameral antibiotics must be preservative free.

### Post-Operative Care

1. Inflammation: This should be prevented by subconjunctival injection of depomedrol or triamcinolone immediately after surgery.
2. Topical steroid- should be administered postoperatively for at least 6 times a day
3. Topical antibiotics should be administered post operatively. The frequency depends on the case.
4. Topical cycloplegic drops e.g. Atropine, homatropine or cyclopentolate eyedrops should be administered from the first post-operative day to prevent pupillary abnormalities due to adhesion formation.
5. Surgery is immediately followed by spectacle prescription and amblyopia therapy. First refraction is done at the one month postoperatively and every 3 months thereafter.
6. In younger children, spectacles are prescribed for near, while in school going children executive (preferably) bifocal spectacles with near add are prescribed after correcting for distance.
7. Children less than one year who did not have intraocular lens implanted should be given aphakic lenses or contact lens.
8. Patching/occlusion therapy in case of lazy eyes (amblyopia).

**TREATMENT GUIDELINES**

DELIVERY OF CHILD EYE HEALTH SERVICES IN NIGERIA

- 9. Intraocular pressure check during follow up visits to detect intraocular pressure rise as seen in glaucoma following congenital cataract surgery
- 10. Ocular ultrasound (A and B-scan) 6 monthly to detect posterior segment complications such as retinal detachment and axial length changes.
- 11. Counselling of parents and caregivers on the importance of post-operative care of the child and life-long follow up.

**Table 1 Post-Operative Follow up Protocol**

Paediatric Cataract lens wash out	First post- operative visit	Second visit	Third visit	Subsequent	Remarks
	One week after discharge	One month after 1st visit	One month after 2nd visit	Every three months	
<b>Lensectomy + posterior capsulotomy + anterior vitrectomy</b>	Fundoscopy Refraction Steroid antibiotics Atropine drop Reinforce counselling TCA 1/12	Fundoscopy Refraction + spectacle Steroid antibiotics Amblyopia treatment Intraocular pressure check Reinforce counselling TCA 1/12	Fundoscopy Refraction + spectacle Amblyopia treatment Intraocular pressure check Reinforce counselling TCA 1/12	Fundoscopy Refraction + spectacle Amblyopia treatment Intraocular pressure check Ocular B-scan 6 monthly TCA 3/12 or 6/12	Under 6 years: subsequent visit every 3/12. Above 6 years: subsequent visits every 6/12

## 2. Childhood glaucoma



### Description

Childhood glaucoma could be congenital, developmental or secondary to paediatric cataract surgery or injury to the eye. In glaucoma there is damage to the optic nerve of the eye, which leads to gradual loss of the peripheral field of vision and sometimes blindness. The damage is usually associated with an abnormally high pressure inside the eye.

### Signs and symptoms

- In children, glaucoma can either be present at birth, or it can develop during childhood. It can be associated with other congenital ocular and systemic conditions (Sturge Weber syndrome, Lowes syndrome).
- It can affect one or both eyes.
- The child presents with big eyes also called Buphthalmos (ox 'big eyes').
- The condition may be painful, and the child can be distressed.

- Loss of vision may be obvious.
- Light often makes the eyes more uncomfortable, and the child will try to avoid bright light (photophobia).
- The eyes may be watery, but there is no discharge or corneal ulceration.
- Careful examination of the cornea may show that it is larger than it should be, and the cornea may be cloudy (hazy).
- The pupil may react slowly.
- The child will need to have the intraocular pressure checked in clinic with age appropriate tonometer to exclude a raised intraocular pressure
- The child will also need examination under anaesthesia, to measure the refraction, horizontal diameter of the cornea, look out for cupping of the optic nerve head and sometimes axial length with A-scan.

### Management

#### Primary level

- Identify, counsel and refer suspicious cases

#### Secondary level

- Identify, counsel and refer suspicious cases
- Commence topical and/or oral anti-glaucoma drugs if available
- Refer to a centre with Glaucoma specialist or Paediatric Ophthalmologist

#### Tertiary level

- Surgery is required and is the definitive treatment to control the intraocular pressure and is effective by allowing aqueous fluid to drain more freely from the eye.
- Refractive error correction
- Monitoring of intraocular pressure and amblyopia
- Consistent follow up with the ophthalmologist
- Low vision provision, counseling and visual rehabilitation

### 3. Amblyopia



#### Description

Amblyopia is a condition where there is poor vision in one or both eyes due to disruption of normal visual development. It commonly occurs in children and has several causes.

#### Causes/ Risk factors

- Squint (strabismus)
- Anisometropia (unequal refractive error between the two eyes)
- High refractive error that is uncorrected- high hyperopia, high myopia
- Presence of cataract, ptosis, corneal opacity, childhood glaucoma

#### Signs and symptoms

The vision in one or both eyes is less than normal and does not improve with spectacles

#### Management

All children should be screened in their preschool years for amblyopia or its risk factors, as well as for ocular diseases that may have serious consequences, such as

retinoblastoma and cataracts. It remains the responsibility of the child's paediatrician to ensure that these tests are performed by the most qualified personnel.

#### Primary level

- Eye examination with a pen torch and a red reflex test should be done, where manpower is available, for all children who are born in the health centres, and for all out-of-facility deliveries who attend immunization clinic. (See annex VI for red reflex test)
- Any child with abnormal red reflex should be referred to the secondary facility.

#### Secondary level

- All children should be refracted and those with refractive error should be given spectacles as appropriate (refer to guidelines for prescription of spectacles in children).
- If vision does not improve with spectacles, refer to tertiary level of care.
- Other causes of abnormal red reflex and poor vision such as cataract, retinoblastoma, and corneal opacity should be referred to the tertiary level.

#### Tertiary level

- These children are to be seen by the ophthalmologist.
- Children with cataract will need cataract surgery.
- Those with squint (strabismus) need to be investigated to exclude intraocular malignancy.
- In the absence of malignancy, the child will need to be refracted and given spectacles.
- If there is still a deviation, it can be corrected with surgery.
- Definitive treatment of amblyopia should be administered
- Options for management of amblyopia include occlusion therapy, atropine penalisation, surgery for strabismus and vision therapy.
- Treatment should be tailored to the specific features and needs of individual patients.



**Table 2** Suggested timing of vision screening for children

Age	Screening Guideline
Newborn to 3 months	<ul style="list-style-type: none"> <li>• A complete examination of the skin and external eye structures including the conjunctiva, cornea, iris, and pupils.</li> <li>• An inspection of the red reflex to rule out lenticular opacities, strabismus or major posterior eye disease.</li> <li>• Failure of visualization or abnormalities of the reflex are indications for an urgent referral to an ophthalmologist.</li> <li>• High-risk new-borns (at risk of retinopathy of prematurity and family histories of hereditary ocular diseases) should be examined by an ophthalmologist.</li> </ul>
6 to 12 months	<ul style="list-style-type: none"> <li>• Conduct examination as above.</li> <li>• Ocular alignment should be observed to detect strabismus. The corneal light reflex should be central and the cover-uncover test for strabismus should be normal.</li> <li>• Ability to fixate and follow a target (object) is assessed.</li> </ul>
3 to 5 years	<ul style="list-style-type: none"> <li>• Conduct examination as above.</li> <li>• Visual acuity testing should be performed with an age- appropriate tool.</li> </ul>
6 to 18 years	<ul style="list-style-type: none"> <li>• Screen as above whenever routine health examinations are conducted.</li> <li>• Examine whenever complaints occur.</li> </ul>

## 4. Endophthalmitis



### Description

This is severe inflammation involving both the anterior and posterior segments of the eye.

### Causes

- Traumatic -from direct inoculation of microorganisms
- Endogenous -from distant infection like septicaemia, endocarditis
- Use of harmful eye medicine
- Non-infective
- Post-operative- early (less than 6 weeks after surgery) and late (6 or more weeks after the surgery)

Typically, postoperative endophthalmitis is caused by the perioperative introduction of microbial organisms into the eye either from the patient's normal conjunctival and skin flora or from contaminated instruments. Once organisms gain access to the vitreous cavity, overwhelming inflammation is likely to occur, making rapid recognition, diagnosis, and treatment critical in optimizing final treatment outcomes.

### Signs and symptoms

- Decreased vision
- Bacterial endophthalmitis usually presents acutely with pain, redness, discharge, and lid swelling.
- Fungal endophthalmitis presents less acutely with blurred vision, pain, and decreased visual acuity.
- Permanent loss of vision is a common complication of endophthalmitis.

### Management

#### Primary level

- Identify suspected cases and refer immediately
- Educate mother on the need for urgent specialist evaluation

#### Secondary level

- Proper examination of the eye with pen torch, binocular loupe or slit lamp biomicroscope is necessary
- Proper diagnosis/ identification of cases and referral to the ophthalmologist for specialized care.
- Follow up

#### Tertiary level

- Detailed history on the cause and duration of endophthalmitis
- A complete examination of the anterior and posterior segment of the eye using a slit lamp biomicroscope and ophthalmoscope
- Treatment (medical and surgical) and follow up

### Investigation

- Vitreous tap for gram stain, culture (blood, Sabouraud and chocolate agars) and sensitivity analysis

### Treatment

- Treatment should be instituted within an hour of presentation, especially in severe cases.

- Therefore all patients suspected with endophthalmitis should be referred to an ophthalmologist immediately for proper diagnosis and treatment.
- The patient with severe endophthalmitis should be admitted and treated aggressively with topical, periocular and intravitreal injections of antibiotic like vancomycin, intravenous antibiotics such as ceftriaxone/cefuroxime and atropine eye drop to relieve pain.

### **Prevention**

- Avoid use of harmful eye medications
- A mandatory step to reduce bacteria in the wound area is to apply povidone iodine 5% in the conjunctival sac for a minimum of three minutes prior to surgery (ECRS 2013), and 10% povidone iodine painting of the periocular skin.

## 5. Conjunctivitis



### Description

Inflammation of the conjunctiva of the eye.

#### Causes / Risk factors

- Infection: bacterial, viral or chlamydial
- Trauma: mechanical, chemical, foreign bodies
- Allergy

#### Signs and symptoms

- Foreign body sensation
- Itching
- Burning sensation
- Photophobia (if cornea involved)
- Hyperemia (redness)
- Tearing
- Exudation/discharge
- Pseudoptosis
- Chemosis
- Papillary hypertrophy (papillae)
- Follicles
- Pseudomembranes and membranes
- Preauricular lymphadenopathy

### 5.1 Infective Conjunctivitis

#### Presentation

- Discomfort or foreign body sensation
- Watery discharge (virus)
- Purulent discharge (bacteria)
- Visual acuity is normal
- Redness (usually both eyes, but may start/ be worse in one, usually reddest at outer edge of eye)
- There may be swelling of lids or conjunctiva (chemosis)

#### Management

##### Primary level

- Apply antibiotic eye drop two or three hourly
- Use eye ointment such as tetracycline 1% or Chloramphenicol 1% at bed time
- Do not pad the eye
- Refer if there are signs of complications such as corneal ulceration (cloudiness of the cornea, poor vision, photophobia) and when patient is not responding after 5 days of treatment

##### Secondary level

##### Examination

- A slit lamp biomicroscopic examination where available, or pen torch examination with binocular loupe of the anterior segment of the eye is essential.
- This should also include fluorescein staining of the cornea to rule out corneal ulcerations/keratitis.

##### Investigations

- Take a swab of discharge for gram stain, culture and sensitivity

##### Treatment

- Apply antibiotic eye drops chloramphenicol or gentamicin or ciprofloxacin two or three hourly.
- Tetracycline ointment 1% or chloramphenicol eye ointment 1% at bed time
- Change treatment as indicated by results of culture and sensitivity where possible.

- Treatment should be continued for at least 7-10 days.
- Do not pad the eye

**Note:** Gonococcal conjunctivitis should be treated aggressively and in line with syndromic management of Sexually Transmitted Infections (STIs). (See treatment of conjunctivitis of the new born).

#### Tertiary level

- As in secondary
- Investigate and manage complications

## 5.2. Allergic /Vernal Conjunctivitis

### Description

- Acute allergic conjunctivitis is a common condition caused by an acute reaction of the conjunctiva to an environmental irritant, usually pollen or smoke or dust. It is typically seen in younger children.
- Signs and symptoms
  - Intense itching
  - Mucoïd discharge
  - Brownish coloration of the conjunctiva
  - Hyperpigmented lids
  - Tarsal papillae
  - Plaques
  - Shield ulcers
  - Corneal microerosions
  - Pseudogerotoxon
  - Superior limbic keratoconjunctivitis

### Management

#### Primary level

- Antihistamines such as antistin naphazoline eye drop and loratidine tablet
- Use non-steroidal anti-inflammatory (NSAIDs) eye drops where available and affordable.
- Mast cell stabilizers like sodium cromogylcate, lodoxamide, olopatadine.

#### Secondary level

- As in primary

**Note:** Use of steroid eye drops such as betamethasone, dexamethasone and hydrocortisone should be limited

to prescriptions from the secondary or tertiary facility and for short durations of time for fear of unwanted complications such as glaucoma and cataract.

#### Tertiary level

- As in secondary
- Investigate and manage complications

### Prevention of Conjunctivitis

- Personal hygiene; daily face washing
- Avoid irritants and allergens

**Note:** For management of trauma, refer to section on ocular and adnexae injuries and foreign body



## 5.3. Conjunctivitis of the Newborn (Ophthalmia neonatorum)

### Description

- This is inflammation of the conjunctiva within the first month of life characterised by discharge from the eyes. It is the most common infection in neonates, occurring in up to 10%. It is identified as a specific entity distinct from conjunctivitis in older infants because it is often the result of infection transmitted from mother to infant during delivery. Notification of neonatal conjunctivitis to the local public health authority is a statutory requirement in many countries.



**Causes**

- Infections: Usually due to exposure of the neonate to potentially virulent infections in the mother's birth canal or from lack of good asepsis during delivery
- Bacterial e.g. Gonococci onset 24-48 hours after birth, Chlamydia trachomatis serotypes D-K, staphylococcus onset 2-7 days after birth
- Viral e.g. herpes simplex
- Fungal e.g. Candida
- Chemical conjunctivitis (onset day one) e.g. silver nitrate, concentrated povidone iodine eye drops

**Note:** Gonococcal conjunctivitis is potentially blinding. It presents with copious purulent discharge from the eye(s) and may cause corneal perforation within 24 hours of onset.

**Signs and symptoms**

- Redness of one or both eyes
- Swelling of the eye lids
- Purulent or watery (if viral) discharge
- Excessive production of tears (lacrimation)
- If not treated early will result in scar formation or perforation of the cornea, either of which will lead to blindness.

**Management**

**Primary level**

**Baby**

- Frequent cleaning with saline.
- Swabbing of new born's eye with 1-2.5% povidone iodine

- Tear substitutes (for chemical conjunctivitis)
- Regular application of the topical eye drops- Gentamicin, chloramphenicol half hourly
- Apply tetracycline eye ointment 1% every 6 hours
- Systemic treatment (in suspected case of gonococcal conjunctivitis) - single dose of IM ceftriaxone 25mg/kg-50mg/kg stat maximum 125mg.
- If gonococcal conjunctivitis is suspected, start prompt treatment and refer to tertiary
- Also refer when cornea is involved or if patient is not responding to treatment after 5 days
- Follow up is essential

**Secondary level**

**History**

- Detailed history to identify cause

**Examination**

- A portable slit lamp biomicroscopic examination where available, or pen torch examination with binocular loupe of the anterior segment of the eye is essential. This should also include fluorescein staining of the cornea to rule out corneal ulceration/keratitis.

**Investigation**

Swab m/c/s

- Gram stain of the conjunctival discharge (pus)
- Culture and sensitivity of the conjunctival discharge (pus)

**Treatment:**

Baby

Ocular treatment

- Irrigation with saline if severe. Extreme caution should be taken to prevent pus spurting on the nurse's face and body.
- Topical application of eye drops; Gentamicin, Chloramphenicol and Ciprofloxacin
- Tetracycline Eye Ointment or erythromycin ointment

**Systemic treatment** (In suspected case of gonococcal conjunctivitis)

- Single dose of IM ceftriaxone: 25mg/kg-50mg/kg stat maximum 125mg
- Then syrup azithromycin 20mg/kg daily for 3 days

**Note:** Chlamydial organisms are commonly associated with

other systemic infections such as pneumonia or Respiratory Tract Infection. Always take precaution whenever examining the patients. Use gloves and wash hands after examinations.

**Note:** Infection with herpes simplex may be associated with other conditions such as skin vesicles and features of encephalitis, and should be regarded as a systemic condition. Herpes simplex infection is treated with high-dose intravenous aciclovir under paediatric specialist care. Early diagnosis and treatment of encephalitis may be life-saving or prevent serious neurological disability. Topical aciclovir may be considered in addition.

- Follow up is important

#### **Tertiary level**

- As in secondary level
- Management of complications such as corneal ulcers and perforation is important in preventing severe visual loss or blindness.

#### **Prevention and prophylaxis**

- void use of silver nitrate
- Aseptic (clean) delivery
- Prophylactic treatment of all neonates soon after delivery: wipe the eyes of the new born with sterile gauze immediately after birth then apply tetracycline eye ointment 1% single dose to both eyes or erythromycin ointment 0.5% or use 2.5% povidone iodine drops.
- Good antenatal care with screening and treatment of mother for genital or urinary tract infections, and spouse.

#### **Parents**

Father/Mother if infected: Start treatment and refer.  
Tab Cefixime 400mg stat or IM Ceftriaxone 1g stat, then Oral doxycycline 100mg 12 hourly for 7 days. If mother is pregnant, give oral erythromycin 500mg 6 hourly for 7 days.

Advice on sex during the puerperal period. It is important to emphasize that puerperal sex be avoided. Barrier methods should be used if sex must occur.

## 6. Keratitis/Corneal Ulcer



### Description

This refers to inflammation of the cornea which can progress to ulceration.

### Causes

- Infection: bacterial, viral (herpes simplex) or fungal and protozoal (acanthamoeba)
- Trauma: chemical, foreign bodies, contact lens use
- Exposure from inadequate lid closure due to facial nerve palsy, poor Bell's phenomenon (eye ball does not turn upward when the eyelids are closed)

### Signs and symptoms

The condition is often unilateral.

- The eye may be painful/painless
- Redness
- Tearing
- Poor vision
- Fear of light (photophobia)
- The cornea is cloudy

### Management

#### Primary level

- Educate on case identification and referral

#### Secondary level

- Identification of cases
- Stain with fluorescein to determine the type where the facilities are available otherwise refer to tertiary centres

#### Tertiary level

##### History

- Detailed history to determine duration, cause
- Systemic review

##### Examination

- Visual acuity is usually reduced
- All patients suspected of having keratitis should undergo corneal staining with fluorescein dye to demonstrate the extent and pattern of the epithelial loss.

##### Investigations

Pus swab +/- corneal scrapping for

- Gram stain
- Culture and sensitivity

##### Treatment

- Explain the seriousness of the condition to the patient
- Treat the specific cause.

##### Antibacterial

- Ciprofloxacin or moxifloxacin eye drops 1-2 hourly for at least 10-14 days.
- Subconjunctival antibiotic injection gentamycin 20mg or ceftazidime 100mg alternate doses for 3 days
- Apply tetracycline eye ointment 1% or chloramphenicol 1% eye ointment at bed time

##### Antiviral

- Acyclovir eye ointment 3% 5 times a day for 10-14 days for Herpes Simplex / viral keratitis

##### Antifungal agents

- Natamycin suspension, Voriconazole eye drops 2 hourly for at least 2-4 weeks.



### **Supportive treatments**

- Atropine 1% eye drop twice a day to relieve pain.
- Vitamin A capsules for children.
- Admission may be necessary. Admission is mandatory in young children, one eyed patients, non-improvement in 72 hours of treatment, large ulcers more than 4mm in diameter, associated ocular complications like hypopyon / scleritis.
- Surgery may be necessary when ulcer refuses to heal and the cornea may perforate i.e. conjunctival flap and tarsorrhaphy
- Debridement (chemical/ mechanical)
- The use of topical corticosteroids in patients with infective keratitis is contraindicated.

## 7. Orbital Cellulitis



### Description

Orbital cellulitis is a sudden acute inflammation of the tissues behind the orbital septum in the eyelid. It is a life- and a sight- threatening condition. Thus, it is regarded as an ocular emergency.

### Causes

Children- most common cause is post sinus infection by *Haemophilus influenzae*

### Risk factors

- Sinus infection
- Tooth extraction
- Orbital trauma
- Preceding preseptal cellulitis
- Local spread from adjacent dacryocystitis, mid-facial or dental infection
- Spread through the blood from distant sites of infection e.g. urinary tract infection
- Infection following retinal, lacrimal or orbital surgery

### Signs and symptoms

- Painful swelling of the eye (protrusion of the eyeball)
- Pain in the eye especially on eye movements
- Decreased vision
- Fever and headache
- Restricted ocular motility

### Investigations

- Sinus x-ray to exclude sinusitis
- B-scan ocular ultrasound to exclude tumors
- Blood tests- Full blood count, blood culture
- Orbito-cranial CT scan to rule out intracranial extension of infection and complications such as brain abscess, meningitis, cavernous sinus thrombosis

### Management

#### Primary level

- Prompt recognition and urgent referral to the ophthalmologist

#### Secondary level

- Good history taking and examination very essential
- Admission
- Intravenous antibiotics- IV ceftriaxone, IV metronidazole and IV gentamycin
- Monitor optic nerve function 4 hourly (visual acuity, colour vision, pupillary reactions, light brightness sensitivity)
- Look out for signs of progression to cavernous sinus thrombosis
- Refer if there is a need for surgical intervention

#### Tertiary level

- Same as secondary level
- Surgical intervention if there is an orbital abscess, under general anaesthesia if cannot be done under local anaesthesia
- There may be a need for surgical intervention by the neurosurgeon if there is a cerebral abscess.

**Prevention**

- Prompt treatment of sinus and dental infections by the ENT surgeon and dentist respectively.
- Complete immunization schedule for children, more especially Hib (Haemophilus influenza type B) vaccine (included in the pentavalent DPT/HepB/Hib vaccine)

## 8. Preseptal Cellulitis



### Secondary level

- Treat with topical antibiotic eye drop and oral antibiotics
- Admission and intravenous antibiotics may be indicated in severe cases

### Tertiary level

- As in secondary level
- Orbital and sinus x-rays or CT scan if symptoms do not resolve or worsen

### Description

This is an infection of the tissues in front of the orbital septum. It can rapidly progress to orbital cellulitis.

### Causes

- Skin trauma such as laceration or insect bites.
- Spread of local infection, such as from an sty, dacryocystitis or sinusitis
- From distant infection of the upper respiratory tract or middle ear by spread through the blood.

### Signs and symptoms

- Pain and swelling of the eyelid
- The visual acuity is unaffected
- There is no protrusion of the eyeball
- The pupillary reaction and eye movements are normal

### Management

#### Primary level

- Identify and refer to secondary level

## 9. STYE (Hordeolum)



- Advise on warm eye compress
- Remove eye lash if loose
- Refer if does not resolve after 5 days of treatment

### Secondary level

- Same as primary level

### Tertiary level

- Same as secondary level
- Further investigations to exclude other infections of the eyelids such as blepharitis

### Description

A localized infection of the hair follicle of the eyelids

### Causes

Staphylococcus aureus

### Clinical features

- Itching in the early stages
- Swelling, pain and tenderness
- Pus formation
- May rupture spontaneously

### Management

#### Primary level

- Usually, the stye will heal spontaneously.
- Avoid rubbing eye as this might spread the infection.
- Identify child with painful eyelid swelling
- Treat with topical antibiotic eye ointment- tetracycline 1% 2-4 times daily until 2 days after symptoms have disappeared

## 10. Trachoma



### Description

A chronic infection of the conjunctiva. The stage commonly found in children is the trachoma follicular and the trachoma intense which are the active forms of the disease.

### Causes

Infection by *Chlamydia trachomatis* sero-types A-C (a very small gram- negative bacterium)

### Clinical features

In early stages

- Redness of the eye
- Follicles (pale rice-like swellings) on the conjunctiva
- Mucopurulent discharge
- In severe cases, there may be swelling of the eyelid, pain and sensitivity to light when the cornea is involved
- It occurs in both eyes

In later stages

- With repeated infection there is scar formation on the eyelids (tarsal plate) causing the upper eyelid to

turn inwards (entropion) and causing the eyelashes to scratch the cornea (trichiasis) which can lead to corneal ulcer if untreated

### Management

#### Primary level

- Community diagnosis of trachoma is essential to establish whether the disease is of public health importance in that community.
- If a community is found to have trachoma of public health proportion then the SAFE strategy should be the appropriate approach.

**S** = Surgery for entropion- Bilamellar lid rotation, Trabut procedure (part of treatment)

**A** = Antibiotics –Azithromycin (part of treatment)

**F** = Face washing (part of prevention)

**E** = Education and environment improvement (part of prevention)

#### Antibiotic treatment

- A single dose of Azithromycin tablets (20mg/kg for children) or apply tetracycline eye ointment 1% twice daily for 4-6 weeks (until the infection/ inflammation has subsided)
- Refer to higher level of care if there is any complication

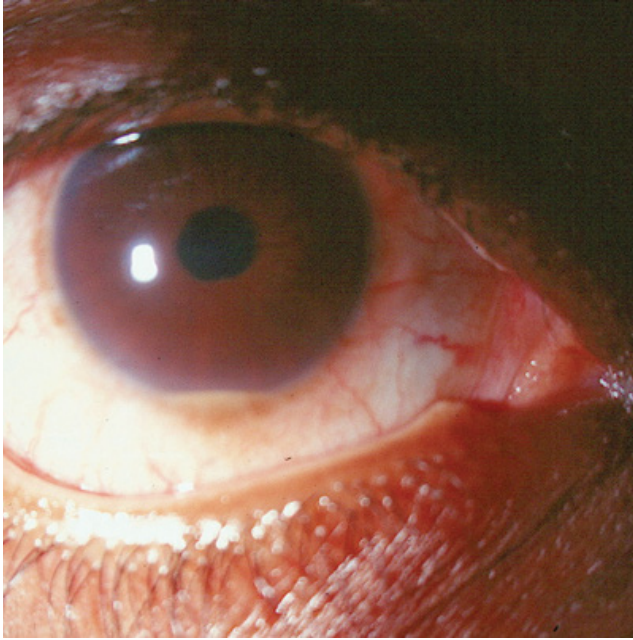
#### Secondary level

- Same as primary level

#### Tertiary level

- As for primary level

## 11. Uveitis



### Description

An inflammation of the middle layer of the eye (uvea i.e. the iris + the ciliary body + the choroid). Anterior uveitis involves the iris and ciliary body while posterior uveitis involves the choroid.

### Causes

- Trauma
- Herpes simplex
- TB
- HIV
- CMV (cytomegalovirus)
- Toxoplasmosis
- Leprosy
- Autoimmune disease

### Anterior Uveitis

#### Signs and symptoms

- Pain
- Photophobia
- Redness of the eye
- Ciliary injection

- Poor vision
- Pupil small and irregular
- Keratitic precipitates
- Cells and flare in the anterior chamber

### Investigation

The investigation of uveitis is broad and requires a high index of suspicion.

**Note.** Diagnosis of uveitis requires expertise and can only be confirmed by slit lamp examination.

### Treatment

- Topical steroids
- Periocular steroids may be used in severe anterior uveitis
- Atropine eye drops to relieve pain

### Posterior Uveitis

#### Signs and symptoms

- Poor vision
- Cells in the vitreous

### Treatment

- Treat the primary condition if any
- Topical, periocular and systemic steroids
- Cyclopegic-Atropine 1% eye drop to relieve pain in anterior uveitis

## 12. Chalazion



### Secondary level

- Same as primary level

### Tertiary level

- As for secondary level
- Further investigations such as fasting blood sugar as well as biopsy and histology of mass if it reoccurs

### Description

This is a painless chronic swelling of the eye lid which is due to retention of the secretions in the meibomian gland. It can appear in both eye lids.

### Signs and symptoms

- Gradually increasing painless swelling of the eyelid
- It may sometimes be large enough to press on the cornea and induce astigmatism and cause blurring of vision

### Management

#### Primary level

- It may resolve without treatment.
- Warm compress
- For those that do not resolve, surgery (incision and curettage) may be required.
- Refer to ophthalmologists if after conservative treatment the swelling does not resolve or it reoccurs within a short time



## 13. Foreign Body (FB) in the Eye



### Treatment

#### Primary level

- If foreign body is superficial i.e. conjunctival, subtarsal FBs
- Wash the eye in a bowl containing plenty of clean water or saline
- Evert the upper eyelid to inspect subtarsal conjunctiva
- Make a thin “finger” of moistened cotton wool, move the eyelid out of the way and gently remove the FB
- Administer prophylactic topical antibiotics
- If attempt at removal of foreign body fails, pad the eye with gauze and refer the patient immediately to a higher level of care
- If foreign body is embedded in cornea, pad the eye with gauze and refer the patient immediately to a higher level of care

#### Secondary or tertiary level

- Instil a local anaesthetic
- Perform a careful eye examination using a loupe or slit lamp
- Remember to evert the upper eyelids to check for subtarsal foreign body
- Remove the foreign body using cotton bud or forceps or the bevel of a 25G (orange) needle
- In young children, removal of foreign body may require sedation or general anaesthesia

### Description

Foreign bodies in the eye may cause a lot of discomfort or even very severe pain to the individual affected. Most times they enter the eye accidentally but may be personally inflicted in children and mentally challenged individuals.

### Causes

Solids e.g. dust, insects, metal or wood particles, vegetative matter or any small object.

### Signs and symptoms

- Foreign body sensation
- May be severe pain
- Tearing
- Redness
- FB may or may not be visible

### Management

#### History

Find out the circumstance and the nature of the foreign body. Any first aid or treatment given (including harmful eye practices).

## 14. Ocular and Adnexa Injuries



### Description

An injury to the eye may result in vision loss. It is important to recognize serious eye injuries and give appropriate treatment or refer immediately.

Eye injuries may take the form of:

- Blunt injury from a blunt object like a ball or a fist
- A penetrating or perforating injury from a sharp object like a knife, high velocity projectiles from explosives and hammering of metal objects
- Exposure to chemicals
- Thermal injuries

### 14.1. Blunt Injuries

A blunt object striking the eye, depending on the severity of the force, may result in minor or severe injury to the eye. Different structures of the eye may be involved.

### A. Blunt injuries to the lid, cornea and the conjunctiva

#### Signs and symptoms

- Blunt trauma may result in eyelid swelling and subcutaneous bleeding.
- The degree of swelling may be mild to severe.
- There may be corneal abrasions, conjunctival swelling and sub conjunctival haemorrhages.

#### Management

##### History

The time of injury, cause of injury, circumstances surrounding the injury and any first aid/treatment provided including use of harmful eye medications should be explored

#### Treatment

##### Primary level

- Pad the affected eye with gauze
- Give a pain reliever
- Refer to an ophthalmologist

##### Secondary or tertiary level

- Obtain history
- Detailed eye examination under magnification
- Do the necessary investigations
- If an ophthalmologist is available, administer definitive treatment of the injury
- Check for complications and refer to the tertiary level
- If there is no ophthalmologist, refer to the tertiary level

##### Tertiary level

- Perform a detailed eye examination under magnification
- Do the necessary investigations
- Definitive treatment of the injury

### 14.2. Penetrating Eye Injuries

Penetrating eye injuries are common in children and result from injury by sharp objects such as pencils, pens, broomstick, hooks and pieces of broken bottle. Injuries

tend to occur during unsupervised play.

#### A. Eyelids Injuries

A cut involving the eyelids may injure the lacrimal system if located in the medial aspect of the lid. A cut involving the lid margin needs to be repaired under magnification so that the margin is well approximated otherwise if not well repaired it will heal with a defect in the lid.

#### B. Corneal and Scleral lacerations

All lacerations of the cornea and sclera are serious injuries and may lead to blindness.

#### Management

##### Primary level

- Apply an eye shield or gauze to protect the eye
- Give a pain reliever
- Refer the patient immediately to an Ophthalmologist.

##### Secondary or tertiary level

- The treatment of corneal / scleral lacerations is immediate repair with sutures under an operating microscope

### 14.3. Chemical Injuries to the Eye

Various chemicals may injure the eye when they come into contact with the eyes or face. Acids and Alkaline products will cause serious injuries to the lids, cornea and conjunctivae.

#### Signs and symptoms

- Exposure to chemicals affects all the exposed mucous membranes. (The eyes, nasal mucosae and mouth and throat).
- There will be stinging sensation and copious tearing.
- Alkaline products (like lime and mortar) may affect the inner layers of the eye resulting in glaucoma and iritis.

#### Management

##### Primary level

- On exposure to acid or chemical products the eyes should be immediately irrigated with copious amounts of water as a first aid treatment.
- On arrival at a health facility, irrigation should be continued with normal saline to wash out the entire chemical.
- After irrigation of the eye, apply an antibiotic

ointment (chloramphenicol or tetracycline eye ointment) and pad the eye with gauze and refer to an ophthalmologist immediately.

- Tear gas injury is usually short lived and does not usually require treatment.

##### Secondary/ Tertiary level

- Manage based on clinical findings

### 14.4. Thermal injury to the eye

#### Description

A burn is an injury to the eye caused by exposure to heat, cold, electricity, chemicals, friction or radiation. Most burns are due to heat from hot liquids, solids or fire.

Thermal injury to the eye could result from open fire, scald from boiling water, kerosene explosion, domestic accident or child falling into fire.

#### Management of thermal burns

##### Primary level

- Refer child to the Ophthalmologist.

##### Secondary/Tertiary level

- Topical antibiotic-Dermazine cream for skin
- Systemic antibiotics in severe cases
- Do not pad the eye –use sulfratuelle vaseline gauze
- Allow a firm scab develop
- Severe burns cause secondary skin contractures which need skin grafting later
- If the eyelid does not cover the cornea at rest, skin graft is needed as an emergency. Partial thickness skin grafting is effective because of good blood supply to the lid even if there's some infection in the burnt tissue

## 15. Hyphema



### Description

This is the accumulation of blood i.e. red blood cells in the anterior chamber of the eye. It is often associated with eye injury but may also occur spontaneously.

### Causes/risk factors

- Blunt trauma to the eye
- Penetrating eye injury
- May be a complication of eye surgery
- Risk factors for spontaneous hyphaema include: rubeosis iridis (presence of abnormal new vessels in the iris) from chronic uveitis, intraocular tumours e.g. Retinoblastoma, blood malignancies e.g. leukaemia, hemophilia and use of blood thinning medications e.g. Warfarin

### Signs and symptoms

- History of trauma to the eye or recent eye surgery
- Redness of the eye
- Pain and photophobia
- Poor vision
- Blood in the anterior chamber (large hyphaema can be readily seen using a pen torch, but microhyphaema

- would require slit-lamp examination for diagnosis)
- Intraocular pressure (IOP) may be elevated
- There is a risk of re-bleeding especially within the first 5 days after the injury

### Management

#### Primary level

Give pain relief (avoid NSAIDs), pad the eye with gauze and refer to ophthalmologist immediately

#### Secondary level

- A. If ophthalmologist is not available:
  - Give pain relief (avoid NSAIDs), pad the eye with gauze and refer to ophthalmologist immediately
- B. If ophthalmologist available:
  - Admit and nurse in head up position
  - Check haemoglobin genotype (Children with sickle cell disease or trait have a higher risk of blindness following hyphema)
  - Administer topical steroids and atropine eye drops
  - If IOP is elevated administer topical and systemic IOP lowering medications (avoid acetazolamide in patients with sickle cell disease or trait)
  - Surgical intervention is indicated if IOP is not controlled despite medical therapy i.e. IOP  $\geq$  50 mmHg for 5 days or  $\geq$  35 mmHg for 7 days. In patients with sickle cell disease or trait, IOP  $>$  25mmHg for more 24 hours requires urgent surgical intervention
  - Options for surgical intervention include anterior chamber paracentesis, anterior chamber washout, and clot evacuation.
  - Refer for early identification and expert management of complications and associated ocular injuries e.g. pupil block, endothelial staining, amblyopia, secondary glaucoma, vitreous haemorrhage, retinal detachment

#### Tertiary level

Definitive management of hyphema, associated eye injuries and/or complication

## 16. Low Vision



### Description

A person with low vision is one who has impairment of visual functioning even after treatment and/ or standard refractive correction, and has a best corrected visual acuity of less than 6/18 but better than light perception, or a visual field of less than 10° from the point of fixation, but who uses, or is potentially able to use, vision for the planning or execution of a task.

### Causes

- Congenital
- Hereditary
- Acquired
  
- Congenital (e.g. prenatal or postnatal trauma, genetic or developmental abnormalities)
- Hereditary (e.g. albinism, retinitis pigmentosa or Stargardt's macular degeneration)
- Acquired conditions (e.g. ocular infection or disease,

trauma, age-related changes, or systemic disease, albinism)

### Signs and symptoms

- Loss of the ability to read standard-sized print
- Inability or limitation with respect to mobility and driving
- Difficulty performing activities of daily living
- Inability to recognise faces or familiar people or communicate with people, see the board

### Management

#### History

##### Primary level

Determine

1. If the patient's diagnosis has been confirmed by an ophthalmologist
2. If the standard refractive, medical and surgical treatment have been given to the patient
3. The onset of the low vision
4. The cause of the low vision
5. If there are activity limitations/challenges
6. The patient's needs or goals

#### Examination

Visual Acuity (unaided and aided)

1. For distance and near
2. Use the logMAR chart or appropriate chart for the mental age of the child

Refraction

1. Objective refraction (static retinoscopy and/or autorefraction)
2. Cycloplegic retinoscopy (under 10 years)
3. Subjective refraction

Colour vision testing

1. Contrast sensitivity
2. Glare testing
3. Ocular motility

Binocular Vision Assessment

Visual Field Assessment (type of field depends on the mental age of patient)

1. Confrontation visual field

2. Hand held disc perimetry
3. Bjerrum tangent screen
4. Automated visual field analyzer

**Ocular Health Assessment**

1. External Examination
2. Slit lamp biomicroscopy
3. Tonometry
4. Central and peripheral fundus examination

**Supplemental Testing**

Additional testing may be indicated by the presence of a specific disease or condition, a patient complaint, educational or work-related needs, or other unexplained findings. These include

- Visually Evoked Potential (VEP)
- Electroretinogram (ERG)
- Electro-oculogram (EOG)

**Treatment**

Treatment depends on the patient's needs.

In managing the patient's visual impairment, the clinician may choose to provide the low vision rehabilitative care, or to co-manage or refer the patient to a low vision specialist who has advanced training or clinical experience with vision rehabilitation. Patients should receive training on the use of devices.

**Low vision devices (LVD)****Optical devices**

1. Patients with Reduced Visual Acuity
  - i. Near vision
    - Spectacle mounted reading lenses
    - Hand magnifiers
    - Stand magnifiers
    - Electronic devices (CCTV/video magnifiers)
  - ii. Distance vision
    - Telescopes
    - Electronic devices
2. Central Visual Field Defects
  - Eccentric viewing training
3. Peripheral Visual Field Defects
  - Prisms
  - Mirrors
  - Reverse Telescopes and Minus lenses

4. Reduced Contrast Sensitivity
  - Illumination

5. Glare Sensitivity Filters

**Non-optical Devices**

- Large prints
- Writing aids
- Reading stands/book stand
- Typoscopes
- Auditory aids
- Reading guides with highlighters

**Additional Services**

- i. Education services
- ii. Orientation and mobility services
- iii. Counselling services (psychiatric, psychological and social work)
- iv. Occupational therapy
- v. Genetic counselling

## 17. Refractive Errors



### Description

Refractive error refers to the inability of images to be focused properly on the retina. The common refractive errors in children are long sightedness, short sightedness and astigmatism.

#### 17.1. Hyperopia

Hyperopia, also termed hypermetropia, long-sightedness or far-sightedness, is a common refractive error in children. Clinically hyperopia can be physiological (axial or refractive) or pathological (mal-development, anatomical or pharmaceutically induced) in nature.

#### Classification (by degree of refractive error)

- Low hyperopia consists of an error of  $<+2.00$  diopters (D).
- Moderate hyperopia includes a range of error from  $+2.25$  to  $+5.00$  D.
- High hyperopia consists of an error  $> +5.00$  D.

#### Causes

- Axial etiology (length of the eye, small eyes)

- Refractive etiology (power of the eye)
- Trauma
- Paralysis of accommodation

#### Signs and symptoms

- Blurred vision
- Asthenopia (eye strain, headaches, etc)
- Accommodative dysfunction
- Binocular dysfunction
- Amblyopia (Lazy eye)
- strabismus (Squint/crossed eye)

#### Examination

- Visual Acuity (distance, near and pinhole)
- Refraction
  1. Objective refraction (Static retinoscopy and/or Autorefraction)
  2. Cycloplegic retinoscopy (children under 10 years)
  3. Subjective refraction
- Ocular motility, Binocular Vision and Accommodation
- Ocular Health assessment (slit lamp and fundus assessments)

#### Management

- Optical Correction/Spectacles/Contact Lenses
- Vision Therapy/Orthoptics
- Refractive Surgery

**Note:** The following should have annual evaluation by the ophthalmologist at the tertiary centre with feedback to the secondary centre from which the referral was made:

- Children with high hyperopia
- Children less than 7 years who have been prescribed a pair of lenses, irrespective of level of refractive error
- Children with special needs or delayed mental development

#### 17.2. Myopia

Myopia, short-sightedness or near-sightedness, is the refractive state of the eye which presents as blurred distance vision. Clinically myopia can be simple (length and power), pathological/degenerative (mal-development or anatomical) in nature, induced or pseudomyopia.

**Classification** (by degree of refractive error)

- Low myopia consists of an error of  $<-3.00$  diopters (D).
- Moderate myopia includes a range of error from  $-3.00$  D to  $-6.00$  D.
- High myopia consists of an error  $> -6.00$  D.

**Causes**

- Axial etiology (length of the eye, big eyeball)
- Refractive etiology (power of the eye)
- Trauma

**Signs and symptoms**

- Blurred distance vision
- Flashes & floaters (high myopia)
- Asthenopia (eyestrain, headaches, etc.) (Pseudomyopia and induced myopia)

**Examination**

- Visual Acuity (distance, pinhole and near)
  1. Visual acuity measurements are age as well as development dependent.
  2. Therefore, the testing should consider the age and development appropriate modification.
- Refraction
  1. Objective refraction (Static retinoscopy and/or Autorefraction)
  2. Cycloplegic retinoscopy (under 10 years)
  3. Subjective refraction
- Ocular motility, Binocular Vision and Accommodation
- Ocular Health assessment (slit lamp and fundus assessments)

**Supplemental Testing**

May be indicated for identifying associated ocular conditions, documenting and for monitoring retinal changes in patients with degenerative myopia

These additional procedures may include:

- Fundus photography
- A- and B-scan ultrasonography
- Visual field testing
- Tests such as fasting blood sugar (e.g., to identify causes of induced myopia especially in sudden onset cases who were previously normal sighted).
- Glare sensitivity
- Glare can cause a reduction in visual acuity. If vision reduces by a factor greater than 1.5, then glare is a

significant problem.

- Colour Vision
- Contrast Sensitivity

**Management**

- Optical Correction
  1. Spectacles
  2. Contact lenses
  3. Vision Therapy/Orthoptics (for pseudomyopia)
  4. Refractive Surgery

**Note:** The following should have annual evaluation by the ophthalmologist at the tertiary centre with feedback to the secondary centre from which the referral was made:

- Children with moderate to high myopia
- Children less than 7 years who have been prescribed a pair of lenses, irrespective of level of refractive error
- Children with special needs or delayed mental development

**17.3 Astigmatism**

**Description**

Astigmatism is a refractive error in which there is no single focus of an image on the retina usually due to the unequal curvature of the cornea.

**Classification** (by degree of refractive error)

- Low astigmatism consists of an error of  $<2.00$  diopters (D).
- High astigmatism consists of errors of  $2.00$  to  $6.00$ D.
- Very high astigmatism consists of errors  $>6.00$  D.

**Astigmatism can also be classified (by orientation) into**

- with-the-rule (when the corneal meridian with the least refractive power is horizontal)
- against-the-rule (when the corneal meridian with the least power is vertical)
- oblique (when the corneal meridian with the least power lies either between  $20$  and  $70$  degrees or between  $110$  and  $160$  degrees)

**Classification with respect to refractive error**

- Simple astigmatism – one image is located on the retina
  1. Simple hyperopic astigmatism – the other image is located behind the retina.
  2. Simple myopic astigmatism – the other image is



- located in front of the retina.
- **Compound astigmatism** – the two images are not located on the retina.
  1. **Compound hyperopic astigmatism** – the two images are located behind the retina.
  2. **Compound myopic astigmatism** – the two images are located in front of the retina.
- **Mixed astigmatism** – one of the images is located in front of the retina while the other is located behind the retina.

### **Causes**

- Unequal curvature of the cornea – anterior or posterior.
- Unequal curvature of the crystalline lens – anterior or posterior

### **Signs and symptoms**

- Blurred /distorted distance and near vision
- Asthenopia (eyestrain, headaches, etc)

### **Examination**

- Visual Acuity (distance, pinhole and near)
- Refraction
- Objective refraction (Static retinoscopy and/or Autorefractometry)
- Keratometry
- Cycloplegic retinoscopy (for children under 10 years)
- Subjective refraction
- Ocular motility, Binocular Vision and Accommodation
- Ocular health assessment (anterior and posterior segment assessment with slit lamp and funduscopy)

### **Management**

- Optical Correction
  1. Spectacles (spherocylindrical lenses)
  2. Contact lenses
- Refractive Surgery

- Management of refractive errors in children should include management of amblyopia.
- Refraction should be carried out by an eye health worker who has been trained to do so.
- It is important that counselling and health education be included in the management of refractive errors so as to improve compliance.

**PRESCRIBING GUIDELINES FOR REFRACTIVE ERROR**  
**See Annexure.**

## 18. Retinoblastoma



### Description

This is a primary cancer of the retina and affects young children mostly under the age of 5 years with over 90% of cases being diagnosed by the third birthday.

### Signs and symptoms

- White pupil (leucocoria)
- Squint
- Redness of the eye
- Swelling of the eye
- Glowing eye in the dark or Cat's eye reflex

### Management

#### Primary level

- Ocular examination by midwives immediately after birth
- Suspected children should be referred to the nearest secondary eye care center

#### Secondary / Tertiary level

##### History:

- Time of onset
- Any treatment received so far

- Family history of the disease (siblings and parents)

### Examination

#### General examination

A general examination of the child should be performed to assess the state of health. Check for regional lymph node enlargements (pre-auricular and sub-mandibular nodes).

#### Eye examination

This should preferably be done under sedation or general anaesthesia for staging of the disease.

### Retinoblastoma staging (International Intraocular Retinoblastoma Classification)

**Group A:** Small tumour (3mm or less) situated away from the macula and optic disc.

**Group B:** Tumours of any size >3mm, tumours of any size near the macula and optic nerve, associated with sub-retinal fluid less than 3mm from the tumour but no sub-retinal seeding.

**Group C:** Discrete local disease with minimal vitreous or sub-retinal seeding

**Group D:** Diffuse or massive disease with significant sub-retinal and vitreous seeding and sub-retinal fluid

**Group E:** Poor prognosis disease; tumour touching the lens, neovascular glaucoma, tumour involving ciliary body, opaque media from haemorrhage, tumour necrosis with aseptic orbital cellulitis or phthisis bulbi.

### Treatment:

There are a number of treatment options available currently for patients with retinoblastoma in Nigeria based on the stage of the disease. Treatment involves a multidisciplinary approach.

1. For small tumours confined to the posterior pole, focal treatments should be preferred. This may take the form of
  - Laser photocoagulation or
  - Cryotherapy
2. Group B and C tumours should be treated with cycles of chemotherapy and later focal treatment.

3. Group D tumours should also primarily be treated with chemotherapy and focal treatment. External beam radiotherapy should be considered as a salvage modality for eyes that have failed chemotherapy and focal therapy.
4. Group E tumours should be treated by immediate enucleation of the involved eye after examination of the fellow eye under anaesthesia and there is no tumour involvement. If bilateral, chemotherapy should be done first.
  - Chemotherapy is based on whether the tumour involves one or both eyes and on the stage.
  - Chemotherapy can be intravenous, intra-arterial or intravitreal.
  - Chemotherapy involves standard VEC protocol and high dose VEC protocol for CNS involvement (VEC-VINCRIStINE, CARBOPLATIN and ETOPOSIDE). The patient is given up to six (6) cycles

#### **Vincristine**

Day 1 (intravenous infusion)

Age < 36 months 0.05mg/kg

Age ≥ 36 months 1.5mg/m<sup>2</sup>

Maximum per dose 2mg

#### **Carboplatin**

Day 1 (intravenous infusion)

Age < 36 months 18.6mg/kg

Age ≥ 36 months 560mg/m<sup>2</sup>

#### **Etoposide (intravenous)**

Day 1 AND Day 2

Age < 36 months 5mg/kg

Age ≥ 36 months 150mg/m<sup>2</sup>

The absolute neutrophil count, platelet count, Haemoglobin level, renal profile and liver function test should be optimal prior to chemotherapy

#### **Screening for retinoblastoma - Recommendations**

1. It is recommended that all infants and children in whom someone has observed a white pupil (either in person or in a photograph) have a full dilated-eye examination including red reflex test within 72 hours by an ophthalmologist, or medical practitioner who is fully aware of the importance of leucocoria as a sign of Retinoblastoma.
2. It is also recommended that any child with strabismus or suspected strabismus be seen by an ophthalmologist.
  - That the red reflex test be applied to any child with strabismus or suspected strabismus.
  - That any child with strabismus or suspected strabismus and an abnormal red reflex should urgently be referred (within 72 hours) to an ophthalmologist.
  - That the child with strabismus or suspected strabismus and an abnormal red reflex be seen at the designated retinoblastoma treatment centres within 72 hours, as an emergency.

**Table 3** Follow up of retinoblastoma cases

1st visit	2nd visit	3rd visit	Later	Remarks
One month after enucleation and/ or completion of chemotherapy. Fit prosthesis after 6 weeks	Every 3 months in the first two years Do Examination Under Anaesthesia (EUA) in the opposite eye or socket to detect new tumour or recurrence until the child is old enough to cooperate for full dilated funduscopy (approx. 3years old)	Every six months. Children with group C & D need longer follow up with EUA. Fundoscopy Refraction + spectacle Amblyopia treatment Intraocular pressure check Reinforce counselling TCA 1/12	Follow up with oncologist for those who had chemotherapy or radiotherapy.	Under 6 years: subsequent visit every 3/12. Above 6years: subsequent visits every 6/12

## 19. Strabismus



### Description

A manifest misalignment of the eyes

### Signs and symptoms

In esotropia, either eye is turned inward. While in exotropia, either eye is constantly or intermittently turned outward.

### Common Types of esotropia

1. Congenital/Infantile esotropia: This manifests by 6 months, and the angle of deviation is usually large.
2. Accommodative esotropia: Convergent misalignment of the eyes associated with activation of the accommodative reflex. The average age of onset is 2.5 years.
3. Neurologic disorders e.g. raised intracranial pressure. Usually associated with nystagmus.
4. Tumours e.g. retinoblastoma

### Management

#### Primary level

- Evaluate visual acuity
- REFER to a higher level of care

#### Secondary level

- Identify the cause
- Refer to a higher level of care
- Follow up the child after therapy (from feedback referral)

#### Tertiary level

- Investigate and treat cause
- Refractive care (for accommodative esotropia)
- Vision therapy
- Surgery
- Orthoptics
- Botulinum injection
- Feedback referral to secondary level

## 20. Vitamin A Deficiency



### Description

Vitamin A deficiency is a common cause of childhood blindness. Vitamin A deficiency is also very important as it is associated with higher infant and childhood mortality rates, particularly associated with measles. Xerophthalmia is the term commonly used to describe an eye showing the clinical features of vitamin A deficiency.

### Signs and symptoms

Vitamin A deficiency can occur for three major reasons:

1. Reduced intake of foods rich in vitamin A
2. Vitamins are not absorbed, usually because of diarrhea
3. Infections, particularly measles where there is an increased need.

Blinding malnutrition is found in the developing countries of the world.

### Risk of developing xerophthalmia

While vitamin A deficiency can occur at any age, the group at risk of blindness is the group of pre-school children, 6 months to 6 years of age.

The typical child at risk of corneal blindness is a child who is one to 3 years old, no longer breast fed, who receives a poor diet and is malnourished, and who has developed measles (or another infection) or is suffering from diarrhea.

Measles is a particular risk factor in many countries and we shall look further at this important subject.

### Signs and symptoms of Xerophthalmia

Sign of xerophthalmia is the dry appearance of both the conjunctiva and the cornea, described as conjunctival and corneal xerosis. Vitamin A deficiency also causes poor night vision due to lack of visual purple in the retina.

The following are the ocular symptoms and signs of vitamin A deficiency (xerophthalmia). The World Health Organization clinical codes are given in brackets.

#### Night blindness (XN)

Vitamin A is needed to replace the rhodopsin (visual purple) of the retina at the back of the eye and this is necessary for night vision. An adult or older child, on questioning, will describe the problem of night blindness but a very small child will not be able to offer this information. Ask the mother if the child bumps into objects in the evening.

#### Conjunctival xerosis (XIA)

Vitamin A is required for the production of secretions on the surface of the eye. This dry appearance together with xerosis of the corneal epithelium gives the condition its name, xerophthalmia. There is damage to the cells that produce secretions which moisten the surface of the eye.

#### Bitot's spots (XIB)

A Bitot's spot has a typical foamy appearance and is localized on the surface of the conjunctiva. Bitot's spots may be found in both eyes, most often on the temporal conjunctiva. These may appear in children under 5 years but also can persist in older children. The appearance indicates changes in the squamous epithelium of the conjunctiva with underlying xerosis.

**Corneal xerosis (X2)**

The surface of the cornea can have a typical dry appearance

**Corneal ulceration with xerosis (X3A):**

The eye has corneal ulceration with xerosis.

**Keratomalacia (X3B):**

This is the consequence of severe vitamin A deficiency. The onset is often sudden, and the cornea may melt very quickly, even over a few hours (keratomalacia). This development is most often seen in young children.

**Corneal scarring (XS):**

The significant end stage of malnutrition causing eye damage, in a child who survives, is corneal scarring. Corneal scarring often has a marked effect on vision. The anterior part of the eye may bulge forward (anterior staphyloma) or the opposite may occur and the eye shrinks (phthisis).

It is important to realize that not every child who is vitamin A deficient and at risk of blindness will have obvious eye signs. Finding evidence of xerophthalmia in one child will indicate that other children in the same family and community are also vitamin A deficient, even if they have no obvious signs. A child may have just enough vitamin A but have very little reserve in the liver. If a child becomes ill with measles, for example, vitamin A stores in the liver are rapidly used up resulting in acute deficiency. It is this situation that characteristically causes very rapid and severe corneal melting (keratomalacia) which results in blindness.

**Management**

The World Health Organization recommends the following xerophthalmia treatment schedule for children over one year old:

Immediately on diagnosis (Day 1) - 200,000 IU vitamin A orally†

- The following day (Day 2) - 200,000 IU vitamin A orally
- Two weeks later (Week 2) - 200,000 IU vitamin A orally
- † If there is vomiting, an intramuscular injection of 100,000 IU of water soluble vitamin A (not an oil-based preparation) may be used instead of the first oral dose.

If a child is under one year old or, at any age, weighs less than 8 kg: Use half the doses of the regimen given above.

- Immediately on diagnosis (Day 1) - 100,000 IU vitamin A orally
- The following day (Day 2) - 100,000 IU vitamin A orally
- Two weeks later (Week 2) - 100,000 IU vitamin A orally

The third dose of vitamin A in both regimens may be given between one and 4 weeks if follow-up is likely to be uncertain.

A topical antibiotic eye ointment such as tetracycline 1% or chloramphenicol 1%, 3 times daily, is recommended to reduce the possibility of secondary bacterial infection of the eyes.

Carefully apply an eye pad to the eye, making sure the eyelids are closed under the eye pad. Do not press on the eye - there is always the danger of perforation if corneal ulceration is present.

The child should be referred immediately to the eye specialist.

**How to treat a woman of reproductive age who is deficient in vitamin A**

- Women of reproductive age should not receive large doses of vitamin A which are contra-indicated in pregnancy.
- If a woman has night blindness or Bitot's spot she should have a daily dose of 10,000 IU of vitamin A orally for 2 weeks.
- Immediately after the birth of her child a woman may be given 3 doses of vitamin A 200,000 IU, on Day 1, Day 2, and Day 8, to ensure a good supply of vitamin A in her breast milk for the newborn baby.

**Prevention of xerophthalmia**

There are a number of approaches to the prevention of vitamin A deficiency in children.

1. Education in nutrition is required to encourage breast feeding. Colostrum and breast milk contain vitamin A. Weaning foods should be rich in vitamin A, for example, mango or papaya. Dark green leafy vegetables (DGLV) may be given at one year and older.

It is important that the mother herself has an adequate intake of vitamin A.

Give advice regarding which foods have a high content

of vitamin A - for example, spinach, carrots, sweet potatoes and red palm oil. Vitamin A is stored in the liver, and both animal liver and fish liver oils are good sources of vitamin A.

Encourage the planting of small gardens with advice as to which fruits and vegetables should be grown. Examples include mango, papaya, dark green leafy vegetables and carrots.

2. Vitamin A capsules 200,000 IU may be given every 3 to 6 months to children of one to 6 years of age who are at high risk - as a short term measure. Half doses are given to children between 6 and 12 months or if a child weighs less than 8 kg.

Each child with measles infection should have at least one dose of vitamin A 200,000 IU orally even if his or her eyes appear healthy. If there is any evidence of eye involvement, or if the child is known to be at high risk of xerophthalmia, 3 doses should be given on Day 1, Day 2 and after 2 weeks.

Immunization services should be strengthened for increased uptake.

Immediately after her child is born a mother may be given 3 doses of 200,000 IU vitamin A orally on Day 1, Day 2, and Day 8 after delivery. This will help protect the breast-fed infant.

3. Foods may be fortified with vitamin A, for example, by fortifying a widely used food such as sugar.

Remember the importance of public knowledge of the eye condition. Posters may be placed in hospitals, schools and other meeting places. Women and schoolgirls (the mothers of the next generation) especially need education. Teach other health workers. Use radio programs, if available.

School children provide a 'captive' audience. Why not arrange a school drawing competition on the subject of eye health? Ask a well-known person to come and give prizes to the winners of the competition.



## 21. Measles



### Description

Measles is a serious condition, not only because it can cause blindness, but also because it is an important cause of mortality. Both blindness and the death of a child can be prevented by recognizing the condition quickly and treating the child with high doses of vitamin A.

### Signs and symptoms

If a child has measles there is usually photophobia, watering, red eyes, and closer examination may show a superficial punctate keratitis. A few children with measles develop true corneal ulceration and in half of these children both eyes are affected.

It has been found that many children in blind schools have a history of measles infection before they become blind.

### Why does measles cause eye problems?

1. The reserves of vitamin A may be low in the child and measles causes increased use of the remaining vitamin

A. The sick child will have loss of appetite, often with gastro-enteritis. Intake of vitamin A will be reduced, together with the protein required for transport of vitamin A in the body. Thus, acute corneal ulceration and keratomalacia may rapidly occur and blindness result.

2. The fever associated with measles and depression of the activity of the immune system may allow secondary infection by the herpes simplex virus.
3. Because the child's eyes are inflamed and red, the mother may turn to a traditional healer and try a local remedy. These traditional eye medicines (TEM) can be harmful and make the condition worse and even cause blindness.
4. A corneal ulcer may develop in an ill and dehydrated child, who lies with his or her eyes open, which leads to drying of the exposed corneas. Always give a topical antibiotic eye ointment at least 4 times daily during the illness and avoid corneal exposure.

### How can we prevent epidemics of measles?

It is estimated that at least half of the childhood blindness in Africa is related to measles infection. If immunization programmes are carried out on children at nine months of age, or soon after, childhood blindness in many communities would be greatly reduced

The Expanded Programme of Immunization (EPI) of the World Health Organization is increasing immunization services in children. Many programmes give 100,000 IU vitamin A at the time of immunization, which is a good preventive measure.

### How should we manage a child with measles?

1. Give vitamin A 200,000 IU orally at least once.
2. Supportive treatment of the child with measles is necessary to deal with any significant systemic involvement, for example, respiratory infection or gastroenteritis.
3. Instill a topical antibiotic into both eyes at least 4 times each day and avoid corneal exposure.

## TREATMENT GUIDELINES

### DELIVERY OF CHILD EYE HEALTH SERVICES IN NIGERIA

4. If there is any sign of corneal ulceration or if the child is at high risk of vitamin A deficiency, give the regimen of 3 doses of vitamin A as previously described. Children over one year old:  
Day 1: 200,000 IU vitamin A orally\*  
Day 2: 200,000 IU vitamin A orally  
Week 2: 200,000 IU vitamin A orally  
  
\* If there is vomiting, give intramuscular water soluble vitamin A 100,000 IU instead of the first oral dose. Children under one year or less than 8 kg weight should be given half doses of the above regimen.
5. Admission to hospital may be necessary. Many children are very ill with this disease

## 22. Retinopathy of Prematurity



### Description

Retinopathy of prematurity (ROP) is a potentially blinding disease which primarily affects preterm and low birth weight babies. Severe disease can affect up to 8% of premature babies.

Retinopathy of prematurity occurs when the immature, developing retina is exposed to too much or fluctuating levels of oxygen, as occurs when unmonitored or poorly controlled supplemental oxygen is given to premature or low birth weight babies.

The condition, which usually begins 4-6 weeks after birth, irrespective of how premature the baby, is characterized by the development of abnormal blood vessels at the boundary between vascularized, central retina and unvascularized, peripheral retina (Stages 1-3).

This can progress to retinal detachment and blindness (stages 4 and 5), but spontaneous regression also occurs in a high proportion of babies.

### Signs

#### Staging

The following five stages are used to describe the abnormal vascular response at the junction of immature avascular peripheral retina and vascularized posterior retina. Because more than one ROP stage may be present in the same eye, staging for the eye as a whole is determined by the most severe manifestation.

**Stage 1** (demarcation line) is a thin, flat, tortuous, grey-white line running roughly parallel with the ora serrata. It is more prominent in the temporal periphery. There is abnormal branching or 'arcading' of vessels leading up to the line

**Stage 2** (ridge) arises in the region of the demarcation line, has height and width, and extends above the plane of the retina. Blood vessels enter the ridge and small isolated neovascular tufts ('popcorn') may be seen posterior to it

**Stage 3** (fibrovascular proliferation) extends from the ridge into the vitreous. It is continuous with the posterior aspect of the ridge, causing a ragged appearance as the proliferation becomes more extensive.

**Stage 4** (partial retinal detachment) is divided into extrafoveal and foveal

**Stage 5** is a total retinal detachment

Extent of retinopathy of prematurity is also determined based on location and number of clock hours involved.

### Screening

#### Who to screen

All preterm babies with gestational age of 35 weeks or less

All low birth weight of 2000g or less

All preterm babies on prolonged oxygen therapy at birth  
Newborns admitted in SCBU with the following:

- Respiratory Distress Syndrome

## TREATMENT GUIDELINES

### DELIVERY OF CHILD EYE HEALTH SERVICES IN NIGERIA

- Sepsis
- Multiple blood transfusion
- Intraventricular haemorrhage
- Heart disease
- Apnoea episodes
- Necrotizing enterocolitis

#### When to screen

- First screening to be carried out within 3 to 4 weeks of birth and repeated ever 1-2 weeks (for babies less than 28 weeks or birth weight less than 1000 grams, first screening should be done on the 21st day of life)
- Until vascularization is complete
- Until ROP regresses
- Until ROP requiring treatment develops

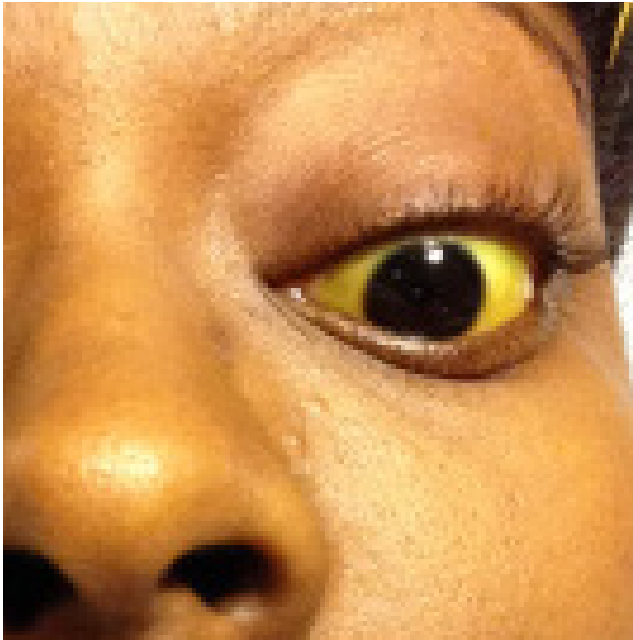
#### Management

- Premature babies should be seen by an ophthalmologist and a neonatologist with its team at the SCBU
- The pupils need to be dilated with phenylephrine 2.5% and tropicamide 1%, and the retina examined using an indirect ophthalmoscope, with scleral depression so that the retinal periphery can be adequately examined.
- Eyes with stage 3 disease (fibrovascular proliferation) with 'plus' disease (dilation of the retinal and iris blood vessels, with vitreous haze) should be treated straight away within 48 hours with either gentle cryotherapy or laser or intravitreal injection of anti-vascular endothelial growth factor to the avascular retinal periphery under local anesthetic and monitoring.
- The infants need to be followed up closely to ensure that the disease is regressing, and to see whether they are developing refractive errors such as myopia, or strabismus, cataract, glaucoma which are more common complications in premature babies and those with ROP.

#### Prevention

- Prevention of blindness from ROP depends on preventing preterm birth (e.g., by good antenatal care of pregnant women, and reducing the rate of unnecessary Caesarean sections)
- Neonatal intensive care of premature babies, with monitoring of blood gases, and early detection of the stage of ROP that needs treatment. Surgery to treat retinal detachment is complex, and often gives disappointing results.

## 23. Sickle Cell and the Eye



### Description

Sickle cell is a genetic disease that causes the red blood cells to become abnormally shaped (like a sickle or a curved blade). It is hereditary and found almost exclusively in black Africans or people of African descent, especially from West Africa. Sickle haemoglobin is called haemoglobin S (HbS). A person with sickle cell disease has HbSS. This haemoglobin becomes sickle shaped when the blood oxygen levels are low. These cells are easily destroyed causing anaemia. They cannot flow properly through small blood vessels causing blockages or reduced blood supply to the tissues.

### Signs

Visual acuity may be normal except if there are problems at the back of the eye such as obstruction of the retinal artery, retinal haemorrhages and new vessels formed on the retina (sickle cell retinopathy) that can bleed causing vitreous haemorrhage.

- They may have blood in the anterior chamber (hyphema)
- They could have retinal detachment or sickle cell orbitopathy.

### Management

#### Primary level

- Identify there is an ocular problem
- Refer to a higher level of care

#### Secondary level

- Comprehensive eye examination
- Treatment of hyphema (refer to section on hyphema)
- Refer to tertiary level if patient has new blood vessels on the iris and retina and if there is retinal detachment
- The child should be co-managed with the paediatrician

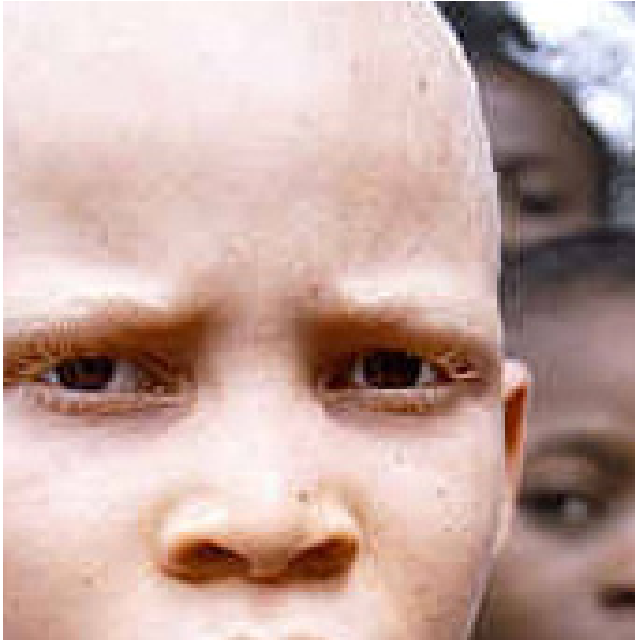
#### Tertiary level

- Treatment of hyphema (refer to section on hyphema).
- New blood vessels on the iris and retina can be treated with laser.
- If there is retinal detachment, they will need surgery to help them retain their vision.
- The children should be co-managed with the paediatrician.

### Prevention of ocular complications

Routine eye check every year and when the child has ocular or systemic symptoms

## 24. Albinism



### Description

This is a condition where there is a problem with the melanin system of the skin and eye. It could involve the skin and eye (oculocutaneous albinism) or it could involve only the eye (ocular albinism). It is an inherited disorder. Ocular albinism type 1 (OA1) is a genetic eye condition that primarily affects males. It is caused by mutations in the gene and is inherited in an X-linked recessive manner. Females have been affected in rare instances.

### Signs and symptoms

- Reduced pigmentation of the skin when the skin is involved
- Poor vision due to foveal hypoplasia or aplasia
- Reduced pigmentation of the iris
- Increased sensitivity to light
- Nystagmus
- High refractive error

### Management

#### Primary level

- Identify and refer to a higher level of care

#### Secondary level

- Refractive errors should be detected and treated as early as possible with appropriate spectacle correction
- Prismatic spectacle correction
- Those that require low vision devices should be assessed.
- All patients are at risk of skin cancer and should be counselled to wear light colored clothes, cover their skin as well as use sun screen to protect their skin. They should also use broad hats and sun glasses when under the sun.
- Those who require transition lenses or special filter lenses should be given
- Refer to Dermatologist for management of skin related complications

#### Tertiary level

- As in secondary level
- Surgical intervention may also be considered for muscle alignment

## 25. Ptosis



### Description

This is the drooping of one or both upper eyelids. In children it could be present at birth (congenital ptosis) or it could be associated with abnormalities of the third cranial nerve (oculomotor) or blepharophimosis syndrome. It can also be acquired as in myasthenia gravis.

### Causes

- Congenital
- Recurrent eye infections
- Cranial nerve palsies
- Tumours of the eyelid and orbit
- Weak eyelid muscle

### Signs

- Vision may be blurred if the eyelid covers the visual axis. This could lead to amblyopia (lazy eye)
- Drooping eye lid resulting in cosmetic blemish and chin up posture
- The lid aperture may look small
- There may be absence of upper lid crease when it is congenital

### Management

#### Primary level

- Assess visual acuity
- Treat simple infections/conjunctivitis with antibiotic

#### Secondary level

- Identify cause of ptosis
- The child's vision should be tested to ensure vision is not reduced as this can lead to amblyopia. Refraction should be done to exclude astigmatism.
- Antibiotic for recurrent infections or inflammation of the eyelids
- Incision and curettage for chalazion
- Refer to a higher level if no improvement

#### Tertiary level

- As in secondary level
- Surgery to correct the eyelid position in ptosis
- It is recommended that the child should be 3-4 years old before ptosis surgery is performed to allow the tissue mature to withstand surgical trauma, allow for better preoperative assessment and postoperative care. However, in severe ptosis where the pupil is obstructed and the possibility of amblyopia developing is high, a temporary procedure to elevate the eye lid can be performed and a definitive surgery at a later date

## 26. Congenital Nasolacrimal Duct Obstruction

### Description

This condition occurs when there is delayed canalization of the nasolacrimal duct.

### Signs and symptoms

- There is tearing and matting of the eye lashes
- Children with congenital glaucoma could also present with tearing, therefore it should be excluded

### Management

#### Primary level

- Treat eye infection with antibiotics if present
- The mother should be taught how to do finger massage by the side of the nose (duct) if the child is less than one year of age.
- Do simple examination of the eye and pressure check on the lacrimal sac for expression of mucoid or muco- purulent material and fluorescein stain
- Health workers should be trained on digital massage of the lacrimal sac.
- Topical broad spectrum antibiotics
- Report for follow up after 6 weeks
- Refer to higher level of care if there is no improvement or if child is older than one year
- If improvement on massage and drugs continue treatment for 3 months

#### Secondary level

- Ocular examination
- Topical antibiotics until infection is cleared + digital massage
- EUA + probing and syringing
- Topical antibiotic + steroid following EUA
- Report for follow up in 6,12 weeks
- Further intervention after massage should occur at the tertiary level and after 8 months to one year of age.

#### Tertiary level

- Diagnostic investigations (radiological, MRI, conjunctival swab M/C/S)
- Medical and surgical treatment
- The child should have probing and syringing done after one year of age by the ophthalmologist.

About 90% are cured with the first probing and syringing and more than half of the remainder on the second.

- If watering eye persists, the child would benefit from temporary intubation with fine silastic tubes with or without balloon dilatation of the nasolacrimal duct.
- Patients who fail to respond to such measures can be treated later with dacryocystorhinostomy (DCR), provided the obstruction is distal to the lacrimal sac.



## 27. Complications Arising from Harmful Eye Practices

### Description

these are biologically based therapy or practices that are instilled or applied to the eye or administered orally to achieve a desired effect. Traditional medications are usually prescribed by traditional practitioners.

Harmful eye medicines (HEMs) are used for a great variety of eye diseases in our environment. The result of their use is often a more complicated clinical picture because the local remedy may cause further harm to an already abnormal eye.

### Risk factors

- Low socioeconomic class
  - Cultural affinity and belief
  - Lower cost/ better affordability
  - Easy access to the practitioners because they live among them
  - Poor access to health care facilities especially eye health care
1. Harmful eye practices includes the use of herbal medicines, the juice of squeezed plant leaves, lime juice, kerosene, toothpaste, batteries solution, breast milk and urine (either animal or human), animal dung etc.
  2. Most HEMs cause a chemical or caustic keratoconjunctivitis. Others may introduce infection, such as bacterial infection with *Neisseria gonorrhoeae* from human urine, or fungi from plant materials.
  3. The use of HEMs also causes a delay in presentation to a health facility for appropriate eye care and this will result in many complications.

### Management

In deciding whether the appearance of a child's eye or eyes has been influenced by HEM, the history is important. Keep

in mind the fact that the mother may be very reluctant to admit that HEM has been used. She will realize that the community health worker /eye care personnel will generally not approve the use of TEM.

#### Primary level

- Health education
- Ocular toileting to reduce concentration of the agent used, to removal debris of harmful substances, reduce bacterial load and reduce further damage
- Commence antibiotic eye drop/ ointment.
- Appropriate referral to an ophthalmologist.

#### Secondary level

- Ocular toileting
- Eversion of the lid to examine with binocular loupe or slit lamp
- Treat depending on the cause/complications

#### Tertiary level

- Detailed history on the causative agent, duration of contact
- Examination- To assess level of damage

### Treatment Based On The Cause/Complications

If bacterial conjunctivitis give

- Topical antibiotics e.g chloramphenicol, ciprofloxacin or moxifloxacin eye drops,
- Topical cycloplegic agent to relax ciliary muscle
- Topical analgesic e.g diclofenac also to reduce pain and redness.

If keratitis refer to guidelines on keratitis (corneal ulcer)

If endophthalmitis/panophthalmitis refer to guidelines on endophthalmitis/panophthalmitis

If chemical eye injury refer to guidelines on chemical eye injury

## 28. Keratoconus



### Description

Keratoconus is a condition in which the cornea gradually becomes more cone-shaped and thin at the centre. It is usually bilateral, though asymmetrical, and typically first starts causing symptoms between 15-25 years of age.

### Risk factors

Associated with

- Atopic diseases like asthma, eczema
- Vernal conjunctivitis
- Down's syndrome
- Race e.g. Middle East, Indians

### Signs and symptoms

The patient may have blurring of vision due to myopia and astigmatism, which may be corrected with spectacles. As the disease progresses, lenses may not be effective in correcting vision.

### Management

#### Primary level

- Identify and refer to higher level of care

#### Secondary level

- Identify child with poor vision
- Ocular examination
- Refraction and dispensing of spectacles
- Follow up
- Refer to higher level of care if does not improve with lenses

#### Tertiary level

##### History

Child with poor vision not improving with lenses

##### Examination

- In early stages, "scissors reflex" on retinoscopy or distortion of red reflex on direct ophthalmoscopy
- As disease progresses, the cone becomes more obvious and when the patient looks down, the cone of the cornea distorts the lower eyelid (Munson sign)
- Sometimes there is a sudden split in the corneal endothelium and Descemet's membrane so that the aqueous fluid rapidly enters the corneal stroma, making the cornea oedematous and opaque (hydrops) with worsening of vision

##### Treatment

- As with secondary level
- Treat acute hydrops conservatively or with an injection of sterile air into the anterior chamber
- Advanced cases can be treated with hard contact lenses, corneal graft or corneal crosslinking



# References

- American Academy of Paediatric Ophthalmology and Strabismus (AAPOS)
- Canadian Paediatric Society
- Ugandan Clinical Guidelines 2016

# Annexes

## ANNEX I:

### Frequently asked questions

#### What is a cataract?

A cataract is a cloudiness of the eye's natural lens, which lies between the front and back areas of the eye.

#### Should my child have surgery for cataract?

All surgery involves some risk, as it will restore vision if the surgery is performed early enough. Cataract surgery in children should NOT be delayed. It is the most commonly performed type of eye surgery in children in Nigeria.

#### How is a cataract removed?

A small incision is made into the eye. The surgeon will either remove the lens leaving the back membrane of the lens (called the posterior capsule) in place. Usually, a replacement lens called an intraocular lens is inserted.

#### Will my child see after surgery?

Yes, the child can see after surgery. However, after cataract surgery, spectacles will be given to the child to see distance and near objects and for protection of the eyes. Follow up of all hospital appointments ensures continuous clear vision and early identification and treatment of long term complications in children.

#### What is glaucoma?

Glaucoma is the name for a group of eye diseases associated with raised pressure in the eye resulting into damage to the optic nerve which carries information from the eye to the brain.

#### What is the treatment for glaucoma?

Surgery is the method for treatment for glaucoma in children. This must be followed with a continuous hospital visits and test for appropriate spectacles and prevention of long term complications.

#### Is my child not too young to wear spectacles?

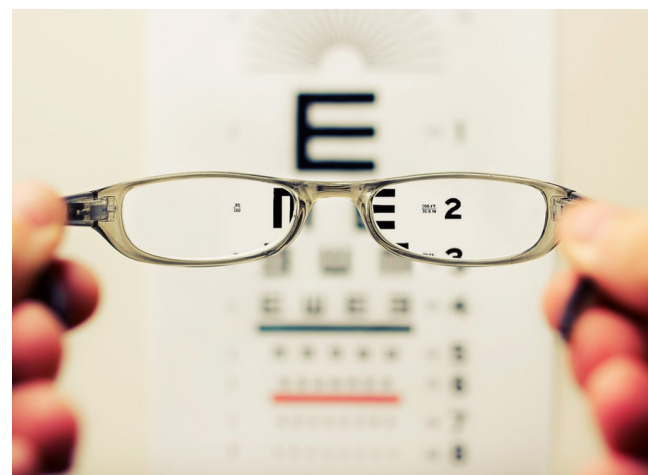
No your child is not too young to wear spectacles. Your child is developing and the eye/visual structures are also

developing. It is important to ensure and maintain a clear image in the developing eye so that the child's vision can develop normally. After the age of 7 years, it becomes difficult to teach the eye how to see if the child has not been seeing clearly before. Spectacles help the child see clearly and protects the eyes from injury.

## ANNEX II:

### Guidelines for prescription of lenses

- Monitoring the refractive error (hyperopia, myopia, or astigmatism) in infants and toddlers before prescribing spectacles is advised.
- If the refractive errors are associated with demonstrable amblyopia, strabismus or nystagmus, the child should be given spectacles.
- The prescription should be undercorrected in the preschool years because of the active process of emmetropization. Emmetropization remains active up to 4-5 years for astigmatism and possibly up to 6 years for spherical ametropia, and even until 9-10 years for some moderate hyperopes.



**Table 4** Degrees of refractive error that should be treated with spectacles

	Age	0 -11 months	12 – 23 months	24- 36 months
<b>ISOMETROPIA</b>	Myopia	>-3.00	>-3.00	>-3.00
	Hyperopia	>+5.00	>+5.00	>+4.50
	Hyperopia + Esotropia	>+2.00	>+2.00	>+1.50
	Astigmatism	>2.00	>2.00	>2.00
<b>ANISOMETROPIA</b>	Myopia	>-2.50	>-2.50	>-2.00
	Hyperopia	>+2.50	>+2.00	>+1.50
	Astigmatism	>2.50	>2.00	>2.00

**Note:** An exception to the above guidelines for prescribing for hyperopia is children with developmental delay or Down's syndrome. Children with significant cortical visual impairment and developmental delay should be prescribed a pair of lenses when refractive error is established.

### Myopia

- The majority of the infants with myopia can just be monitored as emmetropization is active, the visual world of babies is close, and they do not need clear distance vision.
- In infancy, only large amount of myopia needs to be corrected, as his world is confined to seeing near objects. As the child grows and begins to walk, he starts noticing farther objects, and hence his visual demands increase. So, the spectacle prescription should be based upon anticipated visual acuity needs of the child. However, one should undercorrect by about 1 D to aid the process of emmetropization.
- Older school going children (>6-year-old), when acuity can be tested accurately, warrant full correction of myopia. Here, the prescription should be according to the visual acuity of the child.
- Myopic children who have near esophoria and larger lag of accommodation (>0.43 D) or shorter habitual reading distances may be given a + 2.00 D addition progressive lens.
- Individuals with low myopia may not need spectacle correction except for distance activities like school work.

- Because of the progressive nature of myopia in childhood and adolescence, screening examinations that include visual acuity are recommended every 1 to 2 years

### Hyperopia

- In preschool children, it is advised that one should under prescribe so as to leave the uncorrected error just above the mean refractive error for the age, leaving enough stimulus for emmetropization.
- Slight under correction may be desirable in young individuals with hyperopia because there is some physiologic accommodative tone. As the patient ages, full correction may be necessary to provide optimal distance vision and to minimize difficulties with near vision.

### Astigmatism

- Symmetric astigmatism <1.5 D typically may not be corrected, unless it is associated with high myopia or high hyperopia.
- In children <6 years with 1.00 D or more of astigmatism, where visual acuity is impaired, lenses should be prescribed.

- In school going kids (above 6 years), >0.75 D cylinder should be prescribed in the absence of symptoms, and even smaller errors if visual acuity improves significantly.

### Anisometropia

If anisometropia is associated with amblyopia, it always has to be treated fully.

Above 1-year of age, correction should be given for  $\geq 3.00$  D of anisometropia, because this is unlikely to be transient and is highly and likely to cause amblyopia.

**Please note:**

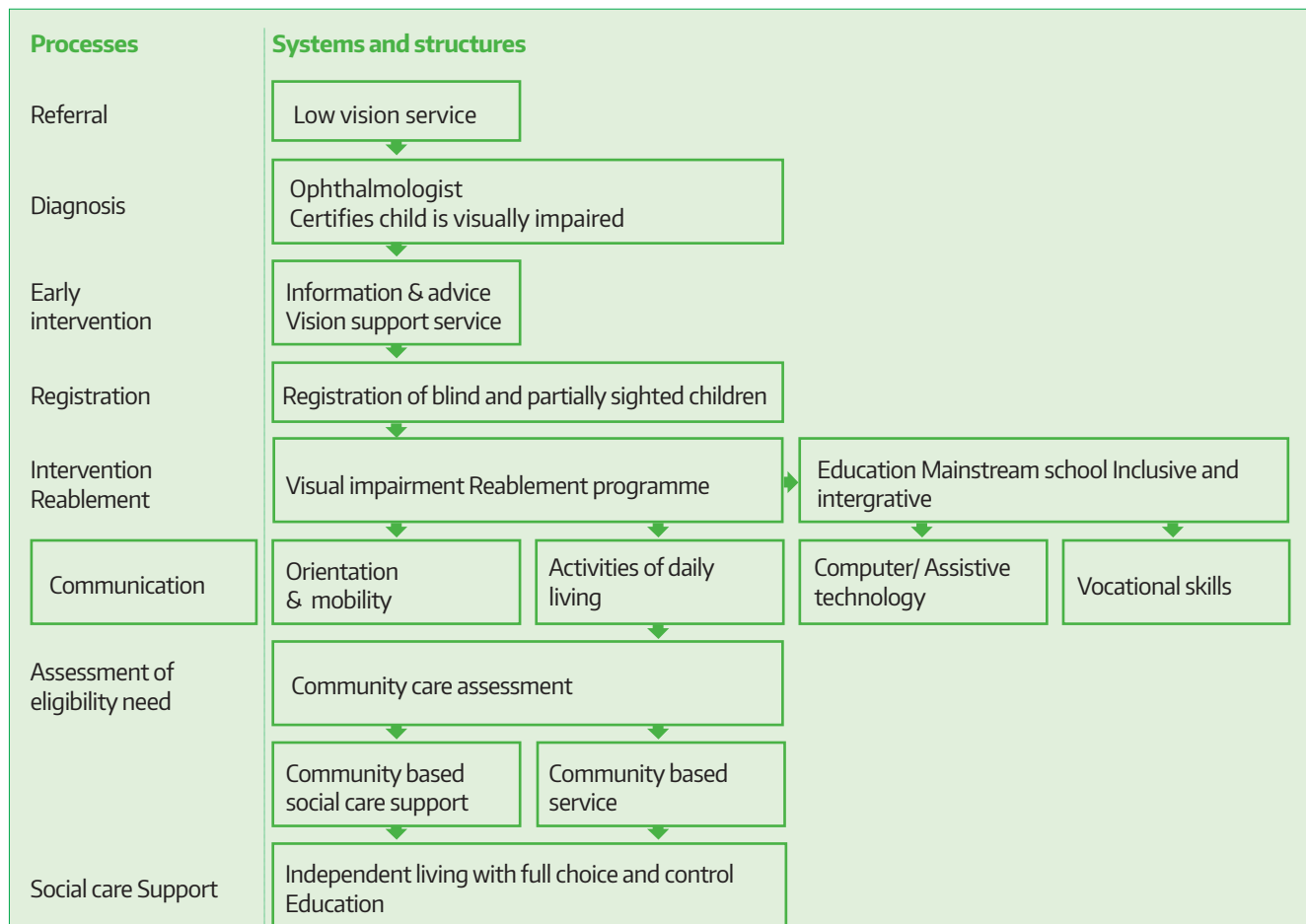
The following should have annual evaluation by an ophthalmologist at the tertiary centre with feedback to the secondary centre from which the referral was made:

- Children with moderate to high myopia (>-3.00D)
- Children with high hyperopia (+5.00D)
- Children less than 7 years who have been prescribed a pair of lenses irrespective of refractive error
- Children with special needs or delayed mental development

## ANNEX III

### Algorithm for low vision

This is the path blind or partially sighted children should take to be certified for support services



## ANNEX IV:

### Rehabilitation of the blind child

#### Description

Blindness here refers to an individual with a visual acuity of less than 3/60 to no light perception. Blindness exerts significant impact on the physical and mental well-being of the child as well as difficulties with carrying out activities of daily living. Vision rehabilitation for the blind is a set of processes aimed at helping the blind child to attain and maintain an independent lifestyle and to improve quality of life.

#### Vision rehabilitation services

1. Patient evaluation
  - Determine that the child is blind
  - determine cause and onset of blindness
  - identify other medical conditions
  - determine appropriate rehabilitation interventions
  - appropriate referral to other rehabilitation team worker ( e.g. social worker, orientation and mobility specialist, psychiatrist, psychologist)
  - Information on available rehabilitation centers
2. Rehabilitation interventions
  - Counselling
    - Counselling for parents/care givers, child and siblings on acceptance of the child and the condition and adaptation; and to avoid discrimination and creating equal opportunities with other children
  - Orientation and Mobility training
  - Use of cane for older children
  - Sighted guides
  - Adaptation of the environment
  - Education/ Vocational training (Preferably inclusive education)
  - Braille literacy
  - ICT training
  - Audio books
  - Recreation
3. Multidisciplinary team management
  - Refer to other healthcare personnel if there are other disabilities.

4. Follow up

To monitor the child's progress and determine if there are new health or other challenges.

## ANNEX V:

### Optical management of corneal opacity

#### Description

Corneal opacity is a disorder of the cornea. It occurs when the cornea becomes scarred. This stops light from passing through the cornea to the retina and may cause the cornea to appear white or clouded. Cornea opacity may be central, peripheral or total.

#### Causes

- Injury
- Trauma
- Vitamin A deficiency
- Trachoma
- Congenital

#### Optical management

When vision is totally obstructed, optical management is purely for cosmetic purposes but where the cornea opacity is not dense or central and vision can be improved, refraction is recommended.

##### Primary level

- Identify and refer

##### Secondary level

- Cosmetic contact lenses
- Tinted spectacles

##### Tertiary level

- Cosmetic contact lenses
- Tinted spectacles
- Optical iridectomy

## ANNEX VI

### Red reflex examination

The red reflex examination in young children is of great advantage in detecting eye conditions such as cataract, retinoblastoma, squint and refractive error. This test is carried out postnatally at 6 weeks check as well as when



the child comes for immunization. It can be carried out by nurses, clinical officers and ophthalmic assistants.

### **Technique**

The examiner sits at arm length, using an ophthalmoscope set at close to zero, focussed on the child's face; encourage the child to look at the light. If it is unclear whether the reflex is normal or not, the pupil can be dilated with drops such as tropicamide 1%. Examination of the parents' eyes will help the examiner recognize normal red reflex. The corneal reflex is checked at the same time.

### **What to look for**

Normal red reflex and corneal reflex

The colour and brightness of the red reflex and the location of the small white corneal reflex is identical in each eye

### **Red reflex abnormal**

A red reflex that is the wrong colour or brightness in one or both eyes suggests serious eye disease such as cataract or retinoblastoma and requires immediate referral. When the corneal reflex is not central, this indicates a squint which requires prompt referral to exclude serious underlying disease

## ANNEX VII

### Summary of care tables for various eye conditions in children

This is the path blind or partially sighted children should take to be certified for support services

**Table 5 Summary of care for Paediatric Cataract**

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Paediatric cataract	<p>Early identification and presentation to the health facility</p> <p>Trauma prevention at home i.e. avoid beating child on the head</p>	Key informants for tracing and case finding. Also tag and refer the children	Identification by teachers or care givers at school	<p>Early detection and referral. Rubella vaccination, red reflex test for screening of infants and young children during immunisation and child welfare clinics</p>	Initial diagnosis and referral to tertiary level for definitive treatment. Follow up.	Investigations, definitive diagnosis, surgery, early post-operative care	<p>Enforce ocular examination as part of Maternal and Child health care at PHC level</p> <p>Enforce vaccination of females of reproductive age against rubella. Adequate antenatal care</p> <p>Enforce trauma prevention in schools i.e. avoid beating the child on the head</p>

**Table 6** Summary of care for Childhood Glaucoma

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Childhood glaucoma	Mother to notice big eyes with tearing and fear of light	Notice big eyes with tearing and fear of light	Teachers trained on school vision screening	Identify child with big eyes / poor vision	Identify by Visual Acuity, Direct Fundoscopy , IOP measurement Refraction	Definitive diagnosis  Surgery  Medical treatment  Refraction	Enforce ocular examination as part of Maternal and Child health care at PHC level
	Black part of the eye not clear	Black part of the eye not clear  poor vision or child believed not to be seeing well	Refer those with poor vision	Refer to Secondary/ Tertiary center	Commence medical treatment Timolol (not for asthmatics) Latanaprost Acetazolomide in short doses	Low Vision counselling Visual Rehabilitation	Training of Eye Care Cadres at all levels Training of Teachers for School Vision Screening (School eye care program)
	Poor vision Early presentation to the health facility	Refer to nearest health facility			Refer to Tertiary for definitive diagnosis and management	Regular Follow up	Provision of Infrastructure, equipment and include anti-glaucoma drugs in NHIS

**Table 7 Summary of care for Amblyopia**

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Amblyopia	Early recognition and early presentation of children with poor vision, squint, other obvious eye abnormalities like cataract	Early recognition and early presentation of children with poor vision Preschool (3-5years) vision screening	Early recognition and early referral of children with poor vision Preschool (3-5years) vision screening	Early identification of children with causes and risk factors for amblyopia and poor vision Red reflex test of neonates and infants Prompt referral of children with abnormal red reflex to ophthalmologist	Obtain history Visual acuity assessment and ocular examination Refraction Spectacle prescription for children with refractive errors Refer if vision does not improve with spectacles Refer children with other causes of poor vision such as cataract, retinoblastoma, corneal opacity, ptosis, glaucoma, strabismus	Definitive treatment of children with cataract, retinoblastoma, corneal opacity, ptosis, glaucoma, strabismus etc Definitive treatment of amblyopia	Implementation of policies on vision screening in infants and young children

**Table 8 Summary of care for Endophthalmitis**

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Endophthalmitis	Early identification, Avoid use of harmful eye medications	Educate members of the community on early identification of children with poor vision	Educate teachers on identification and referral	Refer suspected cases	Diagnose and refer Follow up	Diagnosis, investigations, treatment Prevention-aseptic surgical procedures, ensure use of medications appropriately Follow up	Standardize guideline for sterilization and ophthalmological procedures Ensure access to eye health care

**Table 9 Summary of care for Conjunctivitis**

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Conjunctivitis	<p>Early identification of redness, eye discharge</p> <p>Good hand/ personal hygiene</p> <p>Immediate presentation to health care facility</p>	<p>Early identification of redness, eye discharge</p> <p>Good hand/ personal hygiene</p> <p>Immediate presentation to health care facility</p>	<p>Early identification by teacher to prevent spread</p> <p>Teachers to encourage early presentation by parents to health facility</p>	<p>Identify and differentiate types of conjunctivitis and treat</p> <p>Educate the parent on prevention</p> <p>Refer where indicated</p> <p>Educate antenatal and skilled birth attendants on good hygiene</p>	<p>Investigation, diagnosis and management of minor complications</p> <p>Refer where indicated Follow up</p> <p>Educate antenatal and skilled birth attendants on good hygiene</p> <p>Refer to ophthalmologist for treatment of complications</p>	<p>As in secondary</p> <p>Treatment of major complications by specialist</p> <p>Follow up</p>	<p>Health promotion campaign to encourage good personal hygiene</p> <p>Provision of equipment for microscopy, culture and sensitivity at all levels</p> <p>Enforce hygienic practices during delivery</p>

**Table 10 Summary of care for Keratitis**

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Keratitis	<p>Educate the parent to present to the health facility if there are complaints and to avoid use of harmful eye medicines</p>	<p>Educate on the need to seek appropriate care when there are complaints</p>	<p>Teacher to be trained on need to identify a child with poor vision and encourage the parent to present early to the health facility</p>	<p>Identify cases and refer</p>	<p>Identify cases, treat when expertise is available. Otherwise refer</p> <p>Follow up</p>	<p>Detailed history, examination, investigation and diagnosis</p> <p>Medical and surgical treatment</p> <p>Follow up</p> <p>Rehabilitation</p>	<p>Enforce policies to ensure facilities are equipped with appropriate manpower at all level of health care</p>

**Table 11 Summary of Care for Preseptal and Orbital Cellulitis**

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Orbital cellulitis	Early and prompt identification of the child with ocular complaints such as bulging of the eye + catarrh and cough Seek prompt medical attention	Early and prompt identification of the child with ocular complaints  Seek prompt medical attention	Early and prompt identification of the child with ocular complaints  Seek prompt medical attention	Urgent referral to the ophthalmologist	Admit Intravenous antibiotics  Refer if need for surgical intervention	Same as secondary level  Surgical intervention if there is orbital abscess	Free or subsidized treatment
Preseptal cellulitis	Same as for orbital cellulitis Early and prompt identification of the child with ocular complaints	Same as for orbital cellulitis	Same as for orbital cellulitis	Same as for orbital cellulitis	Treat with topical and oral antibiotics  Admission and intravenous antibiotics in severe cases	Same as secondary level	Free or subsidized treatment

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Stye	Mother observes child with eye lid swelling which is painful and presents to the health facility	Identify child with painful eyelid swelling Present to the health facility	Identify child with painful eyelid swelling Refer to the health facility	Identify child with painful eyelid swelling Refer to the health facility	Same as primary level	Further investigation and management	Provision of information materials (IECs) on eye health and personal hygiene

**Table 13 Summary of Care for Trachoma**

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Trachoma	Identify child with redness, itching and purulent discharge  Early presentation to the health facility  Health education on face and hand washing  Keep environment clean	Identify child with redness, itching and purulent discharge  Early presentation to the health facility  Health education on face and hand washing  Keep environment clean	Identify child with redness, itching and purulent discharge  Referral to the health facility  Health education on face and hand washing  Keep environment clean	Identify child with redness, itching and purulent discharge  Evert eyelid and examine for TF and TI  Treat with antibiotic  Health education on face and hand washing  Keep environment clean	Identify child with redness, itching and purulent discharge  Evert eyelid and examine for TF and TI  Treat with antibiotic TT surgery Health education on face and hand washing  Keep environment clean	Identify child with redness, itching and purulent discharge  Evert eyelid and examine for TF and TI  Treat with antibiotic TT surgery Health education on face and hand washing  Keep environment clean	Implement SAFE strategy with involvement of necessary ministries e.g. Ministry of Environment, Water resources

**Table 14 Summary of Care for Uveitis**

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level
Uveitis	Early identification of systemic illness, redness of the eyes, closing of the eyes to light or a whitish patch in the eye.  Immediate visit to a health facility Follow up	Early identification of systemic illness, redness of the eyes, closing of the eyes to light or a whitish patch in the eye.  Immediate visit to a health facility	Early identification of systemic illness, redness of the eyes, closing of the eyes to light or a whitish patch in the eye.  Refer immediately	Poor vision redness, systemic complaints, Ocular examination + Visual acuity + high suspicion of systemic aetiology OR Retinoblastoma  Simple investigation (TB, HIV, ) where there is suspicion Refer immediately	Detailed ocular examinations and ocular investigation + B scan Ultrasound R/O Retinoblastoma  Refer to ophthalmologist and to a paediatrician for a systemic work up and further investigations	Detailed ocular examinations and ocular investigation + B scan Ultrasound R/O Retinoblastoma  Definitive diagnosis  Evaluation by a paediatrician for a systemic work up and further investigations

**Table 15 Summary of Care for Chalazion**

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Chalazion	Mother observes child with painless progressive eyelid swelling and presents at the health facility	Identify child with eyelid swelling  Presentation to the health facility	Identify child with eyelid swelling  Referral to the health facility	Identify child with painless progressive eyelid swelling  Advise on warm compress  Refer if unresolved	Identify child with painless progressive eyelid swelling  Incision and curettage  Follow up for recurrence	Identify child with painless progressive eyelid swelling  Incision and curettage  Follow up for recurrence  Further investigations when tumour suspected	Provision of IECs on eye health and personal hygiene

**Table 16 Summary of Care for Foreign Body in the Eye**

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Orbital cellulitis	Prevention of eye injuries Supervision of playtime Removal of sources of injury  Early presentation to health facility	Prevention of eye injuries Supervision of playtime Removal of sources of injury  Early presentation to health facility	Prevention of eye injuries Supervision of playtime Removal of sources of injury  Early referral to health facility	Removal of superficial conjunctival FB using cotton bud or irrigation with water If unsuccessful, pad eye with gauze and refer to higher level of care Refer corneal and other FBs that are embedded Give prophylactic antibiotics	Removal of FB using cotton bud, forceps, or needle under magnification after instilling topical anaesthetic  Give prophylactic antibiotics  Pad the eye with gauze	Removal of FB using cotton bud, forceps, or needle under magnification after instilling topical anaesthetic  Give prophylactic antibiotics  Pad the eye with gauze	Implementation of laws and policies on prevention of eye injuries



**Table 17 Summary of Care for Ocular and Adnexa Injuries**

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Ocular and adnexa injuries Chalazion	Prevention of eye injuries Supervision of playtime Removal of sources of injury  Early presentation to health facility	Prevention of eye injuries Supervision of playtime Removal of sources of injury  Early presentation to health facility	Prevention of eye injuries Supervision of playtime Removal of sources of injury  Early referral to health facility	Obtain history Check visual acuity If blunt injury and vision is good, give antibiotic, pain relief, reassure patient If chemical injury, copious irrigation with water or saline, apply antibiotic ointment, pad eye and refer to ophthalmologist immediately If other types of injury or vision poor, pad eye, give pain relief, refer patient	Obtain history Detailed examination under magnification Necessary investigations If ophthalmologist available, definitive treatment of injury Check for complications and refer to tertiary level If no ophthalmologist available, refer to tertiary level	Detailed examination under magnification Necessary investigations Definitive treatment of corneal or scleral lacerations, hyphema, vitreous haemorrhage, chemical injuries and burn injuries	Implementation of laws and policies on prevention of eye injuries

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Hyphema	Prevention of eye injuries, supervision of play time, removal of sources of injuries, Early presentation to health facility	Prevention of eye injuries, supervision of play time, removal of sources of injuries, Early presentation to health facility	Prevention of eye injuries, supervision of play time, removal of sources of injuries, Early referral to health facility	Early identification and urgent referral to ophthalmologist	If ophthalmologist is available: History, examination, investigations and definitive treatment of hyphema. Refer for early identification and management of associated injuries or complications If no ophthalmologist available: Refer to ophthalmologist immediately	Definitive management of hyphema and associated injuries or complications e.g. vitreous haemorrhage, pupil block, endothelial staining, amblyopia, rebleeds, persistent IOP elevation	Implementation of laws and policies on prevention of eye injuries

**Table 19** Summary of Care for Low Vision

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Low vision	<p>Early identification and presentation to a health facility</p> <p>Recognize: Difficulty in recognizing faces</p> <p>Difficulty with reading</p> <p>Bumping into objects</p> <p>Poor school performance</p> <p>Encourage the use of LVD Good lighting Environmental modification</p>	<p>Early identification and presentation to a health facility</p> <p>Recognize: Poor school/ social interaction</p> <p>Bumping into objects</p>	<p>Recognize: Difficulty seeing the board</p> <p>Difficulty with reading</p> <p>Poor school performance</p> <p>Assist with use of LVD</p>	Identify and refer	History Examination Refraction LVD	As in secondary level	<p>Develop a means to aid low vision patients to identify different money denominations</p> <p>Include provision of LVD in NHIS Make LVD easily available and affordable Enhance services of social workers/ rehabilitation officers</p>

**Table 20 Summary of Care for a Child with Refractive Error**

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Hyperopia	Early detection by parents when children show difficulty identifying objects	Vision Screening Early referral of children with poor vision	School eye health program/ Teachers involvement in identifying and referring Children with visual impairment	Visual acuity measurement. Anterior segment assessment/ optical correction	Cycloplegic refraction.  Optical Correction/ Contact lenses/ Orthoptics and Vision Therapy	As in secondary level  Refractive surgery	Train teachers to identify refractive errors
Myopia	Early detection by parents when children show difficulty identifying objects	Vision Screening Early referral of children with poor vision	School eye health program/ Teachers involvement in identifying and referring Children with visual impairment	Visual acuity measurement. Anterior segment assessment/ optical correction	Cycloplegic refraction.  Fundus Photography  Optical Correction/ Contact lenses/ Orthoptics and vision therapy	As in secondary level  A- and B-scan ultrasonography  Refractive surgery	Myopia should be regarded as a public health issue
Astigmatism	Early detection by parents when children show difficulty identifying objects	Vision Screening Early referral of children with poor vision	School eye health program/ Teachers involvement in identifying and referring Children with visual impairment	Visual acuity measurement. Anterior segment assessment/ optical correction	Cycloplegic refraction.  Contact lenses / Orthoptics and vision therapy	As in secondary level	

**Table 21 Summary of Care for Retinoblastoma**

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Retinoblastoma	Mother and caregiver notice white pupil, squint or abnormal red reflex and seek immediate health care	Community caregivers notice white pupil, squint or abnormal red reflex and seek immediate health care	Teachers, sick baby nurses notice white pupil, squint or abnormal red reflex and seek immediate health care	Health workers are trained to screen infants and small children by checking for red reflex  Health workers identify children at risk	Diagnostic investigation with ultrasound scan and MRI  Detailed ocular examination of BOTH EYES Refer high risk children -having a small tumour with potential to save the eye -With bilateral or multifocal tumours -after enucleation for further management -With extraocular disease	Multi-disciplinary approach  Confirmatory diagnostic tests including genetics and staging for treatment  Fitting of prosthesis (artificial eye)  Lifelong follow up for secondary malignancies	Ocular screening of the new born and pre-schoolers should be included in the policy for maternal and child health programmes  Programmes screening for leucocoria should be mandated to treat all cases of leucocoria identified from such a programme

**Table 22 Summary of Care for Strabismus**

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Strabismus	Early detection by parents that the eyes are not aligned  Early presentation to the health facility	Vision Screening/Key information and early referral of children with deviation of the eye	School eye health program/ Teachers involvement in the flagging and referring children with visual impairment and deviation of the eye	Visual acuity assessment and identification of deviation	Measurement of degree of deviation. Refractive correction, Orthoptics and Visual Therapy	Surgical intervention	Vision screening policies  Incorporation of eye health into school health programmes

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Vitamin A deficiency/ measles	<p>Nutritional education on food rich in vitamin A e.g. green leafy vegetables, palm oil for mothers and children</p> <p>Night vision problems</p> <p>Encourage home gardens and appropriate food preparation</p>	<p>Nutritional education on food rich in vitamin A e.g. green leafy vegetables, palm oil for mothers and children</p> <p>Night vision problems</p> <p>Prophylaxis against vitamin A deficiency by supplemental immunization</p>	<p>Education on vitamin A rich foods, food preparation and signs of vitamin A deficiency</p> <p>Early identification of children at risk</p> <p>School food programme rich in vitamin A</p>	<p>Ensure routine vitamin A supplementation in the immunization programme</p> <p>Treatment of diarrheal disease</p>	<p>Early detection and treatment of vitamin A deficiency and measles</p> <p>Treat underlying conditions</p> <p>Topical broad spectrum antibiotics</p>	<p>Further investigation</p> <p>Intensified treatment of vitamin A deficiency and underlying causes</p> <p>Screen for corneal involvement and treat corneal complications</p> <p>Visual rehabilitation</p>	<p>Ensure fortification of food with vitamin A</p> <p>Sustained Immunization programmes</p>

**Table 24 Summary of Care for Retinopathy of Prematurity**

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Retinopathy of prematurity	<p>Antenatal Care</p> <p>Observe any child with leucocoria (white pupil)</p> <p>Seek medical care</p> <p>Skilled birth attendants should refer premature babies immediately</p>	<p>Health Education on importance of antenatal care</p> <p>Identify children with poor vision , leucocoria (white pupil)</p> <p>Midwives and Skilled birth attendants should refer premature babies immediately</p>	<p>Identify children with poor vision or leucocoria (white pupil)</p> <p>School vision screening</p>	<p>Identify children with poor vision or leucocoria (white pupil)</p> <p>Health Education on antenatal care</p> <p>Refer all preterm and low birth weight babies to nearest Secondary or Tertiary Centres with a Paediatrician</p>	<p>Refer all premature babies/low birth weight to a facility with SCBU</p> <p>Ophthalmologist to screen</p> <p>Provision of Optical Services</p>	<p>Protocol for screening all babies with low birth weight and preterm babies , very sick neonates</p> <p>Facilities for SCBU</p> <p>Neonatologist</p> <p>Paed/Vitreo retinal Ophthalmologist</p> <p>Equipment for treatment e.g Laser, Cryotherapy, BIO Anti VEG</p> <p>Low Vision Aids And Visual Rehabilitation</p> <p>Facilities and Specialist to treat the other ocular complications</p>	<p>Provision of IEC materials on protocol for screening all babies with low birth weight and preterm babies including very sick neonates</p> <p>Provision of Equipment,</p> <p>Training of Personnel to provide services at the Secondary Centres</p>

**TREATMENT GUIDELINES**

DELIVERY OF CHILD EYE HEALTH SERVICES IN NIGERIA

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Sickle cell disease	<p>Identify child with visual complaints such as yellowish discoloration of the eyes, and blurred vision</p> <p>Yearly eye examination</p> <p>Seek prompt medical attention when there are ocular or systemic symptoms</p>	<p>Identify child with visual complaints such as yellowish discoloration of the eyes, and blurred vision</p> <p>Seek prompt medical attention when there are ocular or systemic symptoms</p>	<p>Identify child with visual complaints such as yellowish discoloration of the eyes, and blurred vision</p> <p>Refer for medical attention when there are ocular or systemic symptoms</p>	Urgent referral to the secondary Level	<p>Comprehensive eye examination</p> <p>Treatment of hyphema</p> <p>Refer to tertiary level if patient has new blood vessels on the iris and retina and if there is retinal detachment</p> <p>Co-manage with the paediatrician</p>	<p>Comprehensive eye examination</p> <p>Treatment of hyphema</p> <p>management of sickle cell retinopathy</p> <p>retinal detachment surgery</p> <p>co-manage with the paediatrician</p>	Free/Subsidized medical care

**Table 26 Summary of Care for Ptosis**

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Ptosis	<p>Early Identification of drooping of eyelid</p> <p>Identify child with poor vision</p> <p>Recognize abnormal deviation of the eye</p> <p>Early presentation to health facility</p>	<p>Early Identification of drooping of eyelid</p> <p>Identify child with poor vision</p> <p>Recognize abnormal deviation of the eye</p> <p>Early presentation to health facility</p>	<p>Early Identification of drooping of eyelid</p> <p>Identify child with poor vision</p> <p>Recognize abnormal deviation of the eye</p> <p>Prompt referral to health facility</p>	<p>Vision assessment</p> <p>Treat simple infections/ conjunctivitis</p> <p>Refer if no improvement</p>	<p>Diagnosis and identification of the cause of ptosis</p> <p>Refraction and dispensing of spectacles</p> <p>Refer to tertiary facility</p>	<p>Definitive diagnosis, identify cause, evaluation</p> <p>Medical/ surgical and optical treatment</p>	Ensure school eye health programme is sustained to aid detect children with poor vision or abnormal eye deviation

**Table 27 Summary of Care for Nasolacrimal Duct Obstruction**

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Nasolacrimal duct obstruction	<p>Early identification of wet eyes and eye discharge</p> <p>Early visit to a health facility</p> <p>Training on digital massage of the lacrimal sac and duct.</p> <p>Follow up</p>	<p>Early identification of wet eyes and eye discharge</p> <p>Early visit to a health facility</p> <p>Follow up with health facility</p>	<p>Simple eye examination and pressure check on the lacrimal sac for expression of mucoid or muco- purulent material and fluorescein stain</p> <p>Training on digital massage of the lacrimal sac.</p> <p>Topical broad spectrum antibiotics</p> <p>Report for follow up after 6 weeks Refer if no improvement</p>	<p>Ocular examination</p> <p>Topical antibiotics until infection is cleared + digital massage</p> <p>EUA + probing and syringing</p> <p>Topical antibiotic + steroid following EUA</p> <p>Report for follow up in 6,12 weeks</p>	<p>Early detection and treatment of vitamin A deficiency and measles</p> <p>Treat underlying conditions</p> <p>Topical broad spectrum antibiotics</p>	<p>Diagnostic investigations (radiological, MRI, conjunctival swab m/c/s)</p> <p>Medical and surgical treatment</p> <p>Follow up</p>	

**Table 28 Summary of Care for Complications Arising from Harmful Eye Practices**

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Complications arising from harmful eye practices	<p>Educate and encourage parents to avoid use of TEM and encourage early presentation to health care centre</p>	<p>Health education and sensitization on the use of harmful TEM</p>	<p>Teachers should identify eye conditions early and encourage parents to access health care</p>	<p>Educate parent and community Identify TEM used Offer primary intervention like eye toileting and immediate referral</p>	<p>Further management, follow up and referral where necessary</p>	<p>Diagnosis Detailed evaluation, investigations' Medical and surgical treatment and rehabilitation</p>	<p>Institute policy to restrain traditional practitioner from using harmful TEM</p>

**TREATMENT GUIDELINES**

DELIVERY OF CHILD EYE HEALTH SERVICES IN NIGERIA

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Keratoconus	Identify child with poor vision  Early presentation to the health facility	Identify child with poor vision  Early presentation to the health facility	Teachers trained to identify and refer children with poor vision, poor school performance	Vision assessment  If vision poor, identify and refer	History Ocular examination Refraction and dispensing of lenses Follow up If no improvement with lenses, refer to higher level of care	Detailed history and examination Refraction Further investigation Treatment of complications	Ensure school eye health programme is sustained to aid detection of children with poor vision

**Table 30** Summary of Care for the Blind Child

Level of care/ Disease	Home	Community	School	Primary level	Secondary level	Tertiary level	Government role/ policy
Total blindness	Identify  Seek medical attention  Acceptance environmental modification  Avoid discrimination	Acceptance  Environmental modification  Avoid discrimination	Acceptance  Environmental modification  Avoid discrimination	Identify  Counselling  Refer to secondary centre	Identify  Patient evaluation  Counselling  Refer to rehabilitation centre	Same as secondary	Environmental modifications  Waver on custom duties on importation of assistive devices  Subsidize assistive devices  Sensitization to reduce stigmatization/ discrimination  Full implementation of the disability bill  Strengthen/ increase rehabilitation services  Encourage local production of assistive devices  Domesticate the Marrakesh Treaty because it will result in better access to print information for the blind child in Nigeria





