



MINISTRY OF HEALTH
Republic of Liberia

National Clinical Guidelines for Basic Eye Care in Liberia

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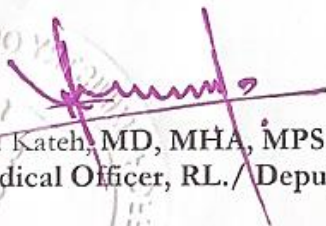

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Introduction

The Ministry of Health national therapeutic guidelines (1st & 2nd Editions) for various clinical conditions was developed with very limited information guiding the delivery of quality eye care services. This is the first edition of clinical guidelines for comprehensive eye care service delivery which aims at providing easy to use, complete, practical, and useful information on how to correctly diagnose and manage various eye conditions at all levels. It is meant to provide clearly defined and a step-by step guidelines for eye care workers at all levels of the health system. This will ensure that patients receive the best possible eye care services and to obtain prompt and effective interventions of their eye care needs. Consequently, this will lead to the rational use of scarce diagnostic and treatment resources including medicines.

The national guidelines for eye care services in Liberia follows the continuum of care in eye health including the provision of assistive devices for the visually impaired. In 2021, a representative population-based survey (r-ATA) was conducted in Liberia on the prevalence of disabilities, functional limitations, and AT use. The results show that the need for vision assistive devices such as spectacles have the highest need and the highest unmet need within surveyed population compared to products for other functional domains. Of all the surveyed-respondents, about 18% require vision-related assistive devices of which 85% do not currently have access to them. This translates to almost 850,000 people in the country in need but without access to vision-related assistive devices as part of their eye care needs. For many people, access to assistive devices is an important part of being able to participate in activities that they want or need to do. However, even with the right assistive devices, it is essential for eye care workers to follow systematic approach in addressing the needs of the visually impaired.

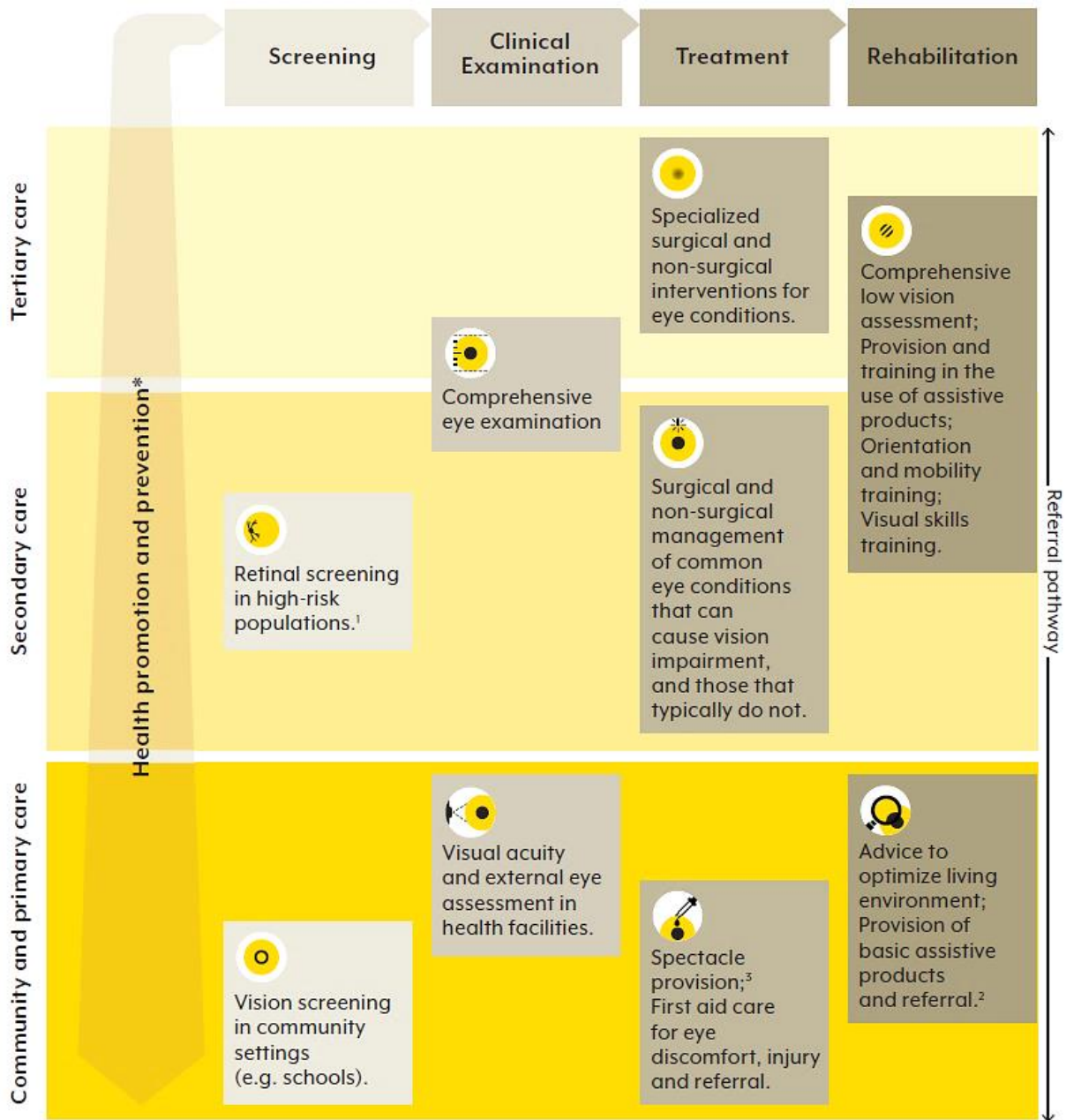
The purpose of the **National Clinical Guidelines for Eye Care** is to set out standards and clinical best practices for the provision of basic eye care and management of various eye conditions by providing first aid, non-surgical or surgical interventions, and assistive devices for use by health workers working in the community, primary clinics, or secondary health centers. These Guidelines provide technical and clinical guidance under the umbrella of the National Eye Health Policy 2022-2032. Complementary guidelines for **Advanced Eye Care** will be developed to guide more complex services at tertiary hospitals and rehabilitation facilities.

The guidance set out in this document is meant to improve provider knowledge, skills, and attitudes in providing of eye care services, including basic vision assistive devices. They should be used in conjunction with other health service provision guidelines as relevant.

Continuum of Care

The continuum of eye care should be fully integrated within the health system (Figure 1). Key categories of eye care interventions across the continuum of care are screening, clinical examination, treatment, and rehabilitation. Depending on the complexity of the eye care intervention, it may either be conducted at the community (e.g., through Community Health Assistants [CHAs]) or primary level facilities, or at the secondary facilities (health centers and some hospitals), tertiary facilities (hospitals) and specialized or rehabilitation facilities.

Figure 1. Eye care interventions and the continuum of care (WHO, 2022)



Eye health and provision of assistive devices should be integrated into existing routine health, education, and social services and systems to improve person-centeredness, efficiency, and quality of care. Eye care should be integrated and holistic in order to address co-morbidities and prevent certain eye health conditions (Table 1). Basic vision screening should be conducted as part of routine health care.

Table 1. Examples of primary care interventions related to eye health

Primary care interventions	Impact on eye health
Provision of clean water	Reduced trachoma and Vitamin-A deficiency
Environmental sanitation	Reduced trachoma and Vitamin-A deficiency
Adequate nutrition	Reduces Vitamin-A deficiency, cataract, diabetic retinopathy
Maternal and newborn health	Reduced Vitamin-A deficiency
Screening pre-term or low-birth-weight newborns for retinopathy of prematurity	Reduces prevalence of eye diseases
Immunization	Measles vaccines prevent Vitamin-A blindness
Control of communicable diseases	Reduces leprosy, trachoma, Vitamin-A deficiency, and congenitally acquired blindness
Control of locally endemic diseases	Reduces congenital blindness
Screening of other high-risk populations (diabetics)	Reduces prevalence of eye diseases

Eye health promotion and education should be conducted at all levels of care, and particularly with simple and effective counseling and outreach at the community, primary, and secondary health care levels to improve linkages to care. This will increase population awareness of eye health, different eye conditions, knowledge of services and management options available (including demand for assistive devices) to improve prevention and care-seeking.

All service delivery points should also ensure that personnel (see Annex 1), products and supplies (see Annex 2 for essential list) are available for the provision of vision assistive devices; where certain elements are not yet available, service delivery points should ensure that appropriate referrals are made.

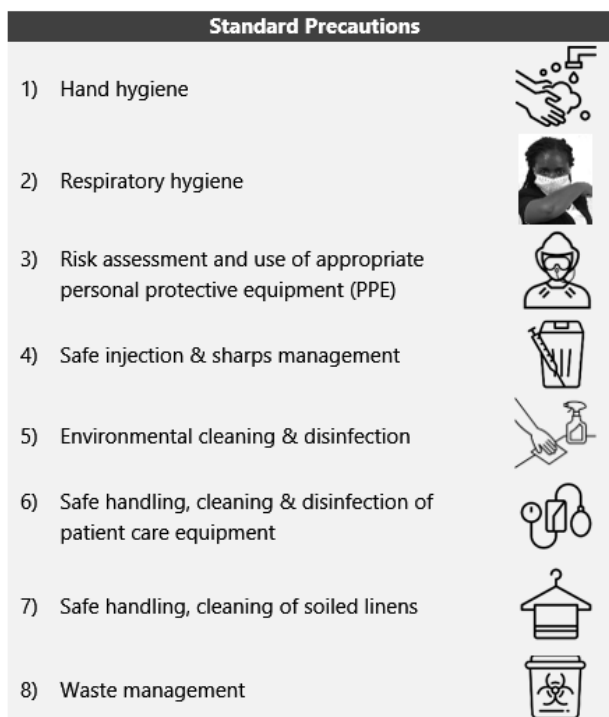
Infection Prevention and Control

Infection prevention and control (IPC) is a scientific approach and practical solution designed to prevent harm caused by infection to patients and health workers.

In preparing for any clinical examination or care, always don **risk-appropriate personal protective equipment (PPE)** and abide by proper IPC measures. Always wash hands immediately before and after any exams, procedures, or contact with any potentially contaminated items or bodily fluids.

Please refer to the most up-to-date Liberia national IPC guidelines for all IPC guidance including those for routine use and for disease outbreaks.

Figure 2. IPC standard precautions



VISION SCREENING & BASIC EYE HEALTH ALGORITHMS

Vision Screening

Overview

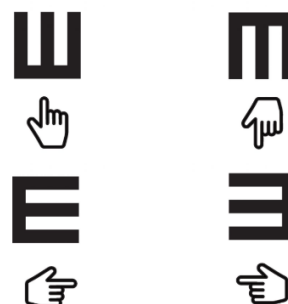
Basic vision screening can be performed to determine if a child or adult has an eye health problem and/or difficulty seeing. It must be done for each patient before a vision assistive device is provided. To enhance integration of eye care into routine health care, a basic vision screening test, inclusive of an eye health check, distance vision test, and near vision test, could also be done for incoming patients who do not present with specific eye problems. **This vision screening can be conducted at all health care levels.**

A basic vision screening test consists of:

- A) **Eye health check** (Step 4 below)
- B) **Distance vision test** (Step 5 below)
- C) **Near vision test** (Step 6 below)

What is the E-chart?

The **vision screen E-Chart** (Annex 3) is a tool used to carry out the simple distance vision test or the simple near vision test. It is only for screening, not for a full vision assessment. The chart is made up of different sizes of 'E's facing different directions. For each test, the patient will indicate the direction of the 'open' end of the E. If the patient is correct, it means they can see the E clearly.



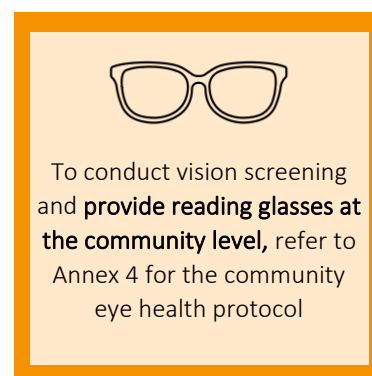
Other vision screening considerations

Please refer to additional sections below on vision screening and eye problems in infants and children (p. 13), as well as simplified algorithms (Annexes 6-11) that can be used at all levels when patients present with certain common eye conditions.

Conducting Basic Vision Screening

Step 1. Prepare the examination room and all supplies needed.

- Have a well-lit space with no direct sunlight or glare
- Have a chair for the patient as well as the provider
- Infection prevention & control (IPC) supplies, such as soap and water for handwashing or alcohol-based hand rub
- Risk-appropriate personal protective equipment (PPE), such as mask, face shield, gloves
- Pen torch
- Tape measure (to measure distance)
- Marker or chalk (to mark distance)
- Vision screen E-Chart**
- Eye health screening form (TAP format) (Annex 5)



Step 2. Explain the procedure to the patient and address any questions or concerns.

- This is a basic vision screen, not a full eye exam.
- The screening will check for signs of any eye health problems, and do a simple distance vision test, and a near vision test.
- The screen is to find out if they need to see an eye health specialist, or if you can assist them with some basic vision assistive devices.

Step 3. Always wash hands immediately before and after any exams, procedures, or contact with any potentially contaminated items or bodily fluids.

Step 4. Conduct the eye health check

- 4.1 Avoid touching the person's eyes.
- 4.2 First, look at each eye for signs of an eye health problem.
- 4.3 Use a small torch so that you can see the eye more clearly. Shine the torch at a **45 degree angle** from the side of the person's head and move the torch across the eye. Avoid shining the torch for longer than a few seconds into the person's eye. Look for:
 - Redness
 - Swelling
 - Lumps, bumps, or growths on or near the eye
 - Discharge
 - Centre of the eye (pupil) is milky colored, or cloudy
 - Any other signs that the eye is not healthy.
- 4.4 Observe if the pupil gets smaller when light is shined on the eye. If not, it is a sign of eye health problem.
- 4.5 If you observe any signs of an unhealthy eye, refer the person to an eye health specialist.
- 4.6 Ask the patient if they have **diabetes and/or hypertension**. If yes, refer to eye health specialist if they have not yet seen one.
- 4.7 Ask the patient if they have any pain (pain that lasted a while, or is sudden) or discomfort in the eyes (e.g., itchy, weepy, or dry). If yes, refer to an eye health specialist if they have not yet seen one.

Step 5. Conduct distance vision test

As you go through the distance vision test, complete the eye health screening form (Annex 5) to document your observations and findings.

- 5.1 Prepare the examination room for the test.
 - **Make sure the E-Chart is 3 meters away from the patient**
 - If you will hold the chart, mark on the floor where you will stand to be 3 meters away from the patient
 - If you are pinning the chart on the wall, make sure it is at patient's eye level when sitting
- 5.2 Have the patient seated; mark the place where the chair should be in case it moves. Explain the procedure and reassure the patient.
- 5.3 Check if the patient uses glasses.
 - If they use glasses for distance vision, patient should wear these during the distance vision test.
 - If they use glasses for near vision, they should take them off.
 - If they are unsure or the glasses are not prescribed specifically for them, they should take off the glasses for this test.
- 5.4 Explain to the patient how you will use the E-Chart:
 - You will ask them to cover one eye while testing the other (i.e., one eye at a time)
 - You will ask them to look at the 'E' on the chart
 - For each 'E' you point to, they need to tell you the direction of the "legs" of each 'E' (where are the legs pointed?); they can tell you with words or show with their hands
 - Practice with them so you know they understand

5.5 Do the distance vision test one eye at a time, starting with the right eye.

- (i) Ask patient to gently cover their left eye with palm
- (ii) **Point to the largest E at the top row** (make sure it is not covered with your hands or the pointer); at this point the E chart should be **3 meters from the patient**.

5.5.1 Ask the patient to indicate the direction of the E legs on the 1st row (large)

- a) If patient indicates the correct direction, move onto the 2nd row (medium)
- b) If patient indicates the correct direction on the 2nd row, move onto the 3rd row (small)
- c) If patient indicates the correct direction on the 3rd row, their distance vision is normal.

5.5.2 If patient cannot see the largest E at the top row, move the chart to half the distance i.e., **move to 1.5 meters**, and ask patient to indicate direction of the E legs on the 1st row. Repeat as 5.5.1 above

5.5.3 If patient still cannot see the largest E at the top row, **move to 1 meter** in front of patient, and ask patient to indicate direction of the E legs on the 1st row. Repeat as 5.5.1 above. If patient cannot see the top row E at 1 meter, patient probably has low vision or other eye conditions. **Reading glasses will not help this patient.**

5.6 Record the findings on the vision screening form: write down the **smallest** row (1st – large; 2nd – medium; 3rd – small) that the patient could see.

Step 6. Conduct the near vision test

As you go through the near vision test, complete the eye health screening form (Annex 5) to document your observations and findings.

6.1 Ask the patient to hold the E-Chart in front of them, or you can hold it for them.

- **Distance between person and the E-Chart should be ~40cm** or a distance that is comfortable for them to hold the E-Chart to read

6.2 **Do the near vision test with both eyes opened.**

- Point to the very bottom row with 5 E's
- Ask the patient to indicate the direction of the legs for each E in the row

6.3 Record the findings on the vision screening form:

- a) If patient indicates the correct direction for at least 4 E's, their near vision is likely normal.
- b) If patient cannot see the E on the simple near vision test, have normal distance vision (i.e., pass the simple distance vision test from Step 5 above), and are **over 40 years of age**, they may need reading glasses. **See p.60 and Annex 11 on how to determine the correct strength of reading glasses.**
- c) If patient cannot see the E on the simple near vision test and are **younger than 35 years of age**, they may need prescription glasses.

Step 7. Discuss the basic vision screening test results and treatment options with the patient.

7.1 Based on results from the basic vision screening test, you may either:

- a) Provide treatment or assistive device to the patient at the community, primary, or secondary level.
- b) Refer patient to higher levels of care to see an eye health specialist for more advanced examination and treatment (e.g., provide refraction; assistive devices such as prescription glasses).

Vision Screening and Eye Problems in Infants and Children

During the neonatal period, timely and proper screening to detect congenital and pediatric eye conditions, followed by prompt and appropriate interventions, is highly effective in ensuring proper visual development. Routine vision screening and eye examination of pre-school age children (aged 3-5) and school age children (aged 5-18) for the detection of reduced visual acuity, amblyopia, strabismus, uncorrected refractive error, infection/inflammation, cataract, and retinoblastoma, followed by prompt referrals and intervention, is key to mitigating future vision impairments. Routine vision screening should be integrated into child health visits, immunization services, and school health services. See and follow Table 2 for age-appropriate vision screening approaches.

Table 2. Age-appropriate vision screening approaches for infants and children

Age	Age-appropriate vision screening approach						
	External examination of the eye	Red reflex test	Pupillary examination	Fix and follow test	Corneal light reflex test	Cover test	Distance visual acuity test
Newborn to 6 months	✓	✓	✓	✓			
6 months until child is able to cooperate for subjective visual acuity measurement	✓	✓	✓	✓	✓		
3-4 years	✓	✓	✓	✓	✓	✓	✓
4-5 years	✓	✓	✓	✓	✓	✓	✓
5 years+	✓	✓	✓	✓	✓	✓	✓

Universal screening at birth

The World Health Organization (2022) recommends **universal screening for abnormalities of the eye** for all infants at birth. This should be accompanied by diagnostic and management of the conditions for children identified with an abnormality.

Universal newborn screening should be conducted with (1) external examination of the eye using a torchlight (refer to p. 10 for details on eye health check), and (2) red reflex test using an ophthalmoscope (or suitable alternative). Prompt referrals to eye health specialists or higher level facilities must be made based on screening results. Screening must be done prior to discharge after a health facility birth, or at the first post-natal contact with the infant (e.g., Well Baby Clinic); it should be done within the first 6 weeks after birth.

Health workers should also **pay particular attention to screening in high-risk populations such as preterm infants born and low birth weight (LBW) infants**, for retinopathy of prematurity (details below).



Vision screening should be conducted in ALL newborns for the detection of neonatal infection, congenital and/or acquired eye conditions, and timely referrals must be made where indicated.

Retinopathy of Prematurity

Retinopathy of prematurity (ROP) occurs due to abnormal development of blood vessels in the retina and is a leading cause of blindness among children in many low and middle-income countries. Prevention and systematic screening strategies should be used to improve neonatal outcomes.

Causes/risk factors

- **Preterm infants born before 32 weeks' gestation**
- **LBW infants weighing < 2.5 kg**
- Exposure to excessive oxygen

Prevention

- Interventions that **reduce preterm birth**, such as prevention of illnesses in the mother during pregnancy and promotion of good nutrition
- Provision of antenatal corticosteroids or tocolytic therapy to mothers with threatened preterm delivery for improving preterm birth outcomes (WHO, 2022)
- High-quality neonatal care immediately after birth, including **appropriate oxygen management** and monitoring of oxygen levels (refer to the *Liberia National Clinical Guidelines for Hypoxemia Management and Oxygen Therapy*)

Presentation

- White pupil (leukocoria)
- Abnormal eye movement (nystagmus)
- Cross eye (strabismus)
- Near-sightedness (myopia)

Screening, Diagnosis & Examination

- **All preterm or LBW infants should be screened for ROP during the 4-5 week post-natal period.** This should be followed by prompt referrals and/or urgent treatment for infants developing the vision-threatening signs of ROP to prevent vision impairment and blindness.
- Diagnosis of ROP should be conducted by eye health specialists in a secondary or tertiary facility using indirect ophthalmoscopy.
- There are five (5) stages of ROP:
 - Stages 1 and 2 – Babies usually get better without treatment and go on to have healthy vision. Health workers should monitor the condition carefully to ensure it does not get worse.
 - Stage 3 – Some babies get better with no treatment, while others need treatment to prevent retinal detachment
 - Stage 4 – Babies have partially detached retinas and need treatment
 - Stage 5 – Babies have completely detached retinas; even with treatment, may result in vision loss or blindness

Management

- While some mild cases of ROP may resolve on its own, treatment for ROP may include laser treatment. Make immediate referral to tertiary facilities. Follow-ups should also be made throughout childhood and adolescence.

Prognosis & Follow-Up

- The prognosis of ROP will depend on the stage of the condition. For stages 1 and 2, the prognosis is good; stage 3-5 could lead to severe complications and loss of vision.

Retinoblastoma

Retinoblastoma 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 child’s 3rd birthday.

Presentation

- **White pupil (leukocoria)**
- Strabismus
- Squint
- Redness of the eye
- Swelling of the eye
- Glowing eye in the dark or Cat’s eye reflex

Screening, Diagnosis & Examination

- All infants and children in whom someone has observed a white pupil (either in person or in a photograph) should have a full dilated-eye examination including red reflex test within 72 hours
- All suspected cases should be referred to a tertiary facility for assessment and management
- Recommended touch points for health workers to screen infants and children for retinoblastoma shown in Table 3.

Table 3. Screening timeline for retinoblastoma

Age	Retinoblastoma screening procedure	Settings
Immediately after birth	<ul style="list-style-type: none"> ▪ External eye examination and red reflex test ▪ High-risk newborns (e.g., at risk of ROP, with family history of hereditary ocular diseases) should be examined by an eye health specialist 	<ul style="list-style-type: none"> ▪ Labor & delivery
Newborn to 3 months	<ul style="list-style-type: none"> ▪ Complete examination of the skin and external eye structures including the conjunctiva, cornea, iris, and pupils ▪ Inspection of the red reflex to rule out lenticular opacities or major posterior eye disease ▪ Failure of visualization or abnormalities of the reflex are indications for an urgent referral to an eye health specialist 	<ul style="list-style-type: none"> ▪ Labor & delivery ▪ Well Baby Clinics ▪ Routine immunization
6 to 12 months	<ul style="list-style-type: none"> ▪ Conduct examinations as above ▪ Conduct strabismus tests (see p.17-19) 	<ul style="list-style-type: none"> ▪ Child health visits ▪ Routine immunization
3 to 5 years	<ul style="list-style-type: none"> ▪ Conduct examination as above. ▪ Assess visual acuity with age-appropriate tool 	<ul style="list-style-type: none"> ▪ Child health visits ▪ Routine immunization ▪ School health
6 to 18 years	<ul style="list-style-type: none"> ▪ Screen as above during routine health visits or whenever complaints occur 	<ul style="list-style-type: none"> ▪ Child and adolescent health visits ▪ School health

Management

- Retinoblastoma is treated accordingly to the stage¹ of the disease.

Community	Primary	Secondary
<ul style="list-style-type: none"> ▪ Refer 	<ul style="list-style-type: none"> ▪ Refer 	<ul style="list-style-type: none"> ▪ Refer to tertiary facilities for advanced care (surgery and/or chemotherapy, laser and cryotherapy)

Prognosis & Follow-Up

- Retinoblastoma is a chemo-sensitive tumor. Therefore, early presentation to the health facility denotes good prognosis. Patient follow-up will be determined by the specialist.

¹ International Intraocular Retinoblastoma Classification includes stages Group A, B, C, D, and E.

Conjunctivitis of the newborn

Conjunctivitis of the newborn is inflammation of the conjunctiva characterized by discharges from the eyes in infants below 1 month of age. Conjunctivitis of the newborn is caused by infections, usually from mother’s birth canal or due to poor hygiene of the person caring for the newborn. May be bacterial (e.g., *Gonococci*, *Chlamydia*), viral (e.g., herpes simplex virus [HSV]), fungal (e.g., *Candida*); or chemical.

Presentation

- Reddening of one or both eyes
- Swelling of the eye lids
- Purulent or watery discharge
- Excessive production of tears (lacrimation)
- Gonococcal conjunctivitis is potentially blinding. It presents with copious purulent discharges from the eye(s) and may cause corneal perforation within 24 hours of onset

Diagnoses & Examination

- Conduct **slit lamp/biomicroscopic examination** where available, or **torchlight examination** with binocular loupe of the anterior segment of the eye is essential
- Also include fluorescein staining of the cornea to rule out corneal ulcerations/keratitis.
- Pus swab: Gram stain; culture and sensitivity

Management

Community	Primary	Secondary
Refer	Infants <ul style="list-style-type: none"> ▪ Frequent cleaning with saline ▪ Apply topical eye drops (gentamicin, chloramphenicol). every half-hour ▪ Apply tetracycline eye ointment 1%, every 6 hrs ▪ Refer for additional care if needed 	Primary management plus: <ul style="list-style-type: none"> ▪ In suspected case of gonococcal conjunctivitis, give IM ceftriaxone single dose at 25mg/kg to 125mg/kg stat, then syrup azithromycin 20 mg daily, 3 days
	Parents (both parents) <ul style="list-style-type: none"> ▪ Oral doxycycline 100 mg, every 12 hrs, 7 days ▪ If mother is pregnant, give oral erythromycin 500 mg, every 6 hrs, 7 days ▪ Sex should be avoided; barrier methods must be used for sexual intercourse. 	<ul style="list-style-type: none"> ▪ Oral cefixime 400 mg stat or IM ceftriaxone 1 g stat, then oral doxycycline 100 mg, every 12 hrs, 7 days. ▪ If mother is pregnant, give oral erythromycin 500 mg, every 6 hrs, 7 days ▪ Sex should be avoided; barrier methods must be used for sexual intercourse.

Prognosis & Follow-Up

- With proper treatment and follow-up, prognosis is good. If not treated early, will result in scar formation or perforation of the cornea, either of which will lead to blindness.
- **Follow-up is essential** for infants and parents. Management of complications such as corneal ulcers and perforation is important in preventing severe visual loss or blindness.

Prevention

- Routine high-quality antenatal care – screening and treatment of mother’s (and partner’s) genital or urinary tract infections
- Clean labor & delivery
- **Prophylactic treatment of all newborns after delivery**
 - 1) Wash your hands thoroughly with soap and water and put gloves on.
 - 2) Clean the eyes of the newborn immediately after birth, using swab soaked in sterile water. Use a separate swab for each eye.
 - 3) Apply tetracycline eye ointment or drops (1%) within 1 hour of birth, usually after initiating breastfeeding

Strabismus

Strabismus (squint/crossed eyes) occurs when the eyes are not aligned; the most common type is horizontal misalignment of the eyes. Strabismus is a contributing factor to **amblyopia (lazy eye)** in children and lead to impaired visual development and reduced visual acuity.

Etiology

Risk factors for primary strabismus include a family history of strabismus, premature birth, and a low birth weight. Strabismus may be idiopathic or congenital, primary, or secondary.

Screening, Diagnosis & Examination

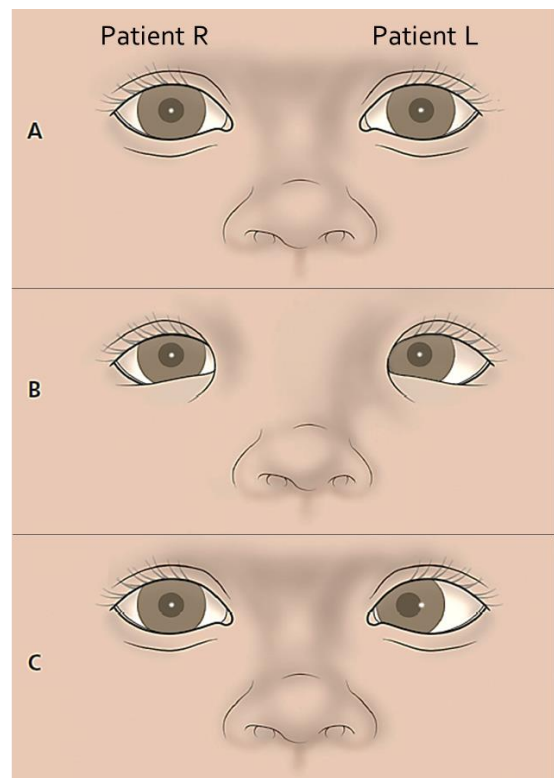
Categories of strabismus include:

- **Congenital esotropia** – inward turning strabismus that develops within the first 6 months of life
- **Accommodative esotropia** – most common type in children over the age of 2, when one eye may turn inward when focusing on an object; can be improved or removed by wearing spectacles
- Non-accommodative esotropia – is not improved by wearing spectacles
- **Exotropia** – when one eye turns outward when looking at an object that is far away

There are four (4) screening tests for strabismus and other eye conditions in infants and children: **(1) light reflex test, (2) red reflex test, (3) cover test, and (4) cover-uncover test.** Primary facilities should focus on tests 1 and 2, while secondary facilities may conduct tests 3 and 4 as well.

1) Light reflex test

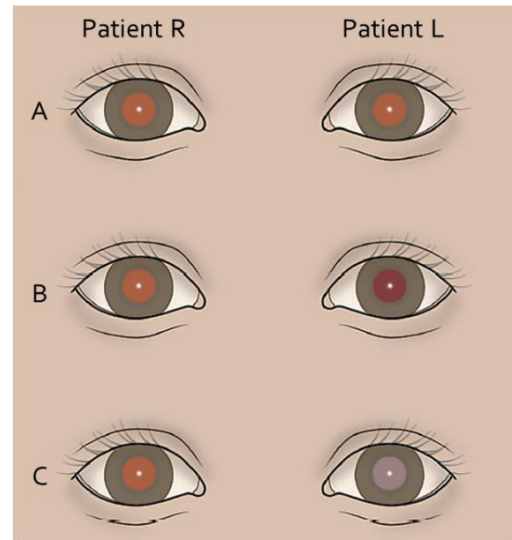
- Stand 1 meter in front of the child, holding a **small torchlight** and direct the child's attention to the light
- Note and compare the position of the light's reflection in each of the child's eyes
 - Normal ocular alignment will show identical light reflection in both eyes
 - Any displacement or deflection of the light reflex indicates abnormal ocular alignment (Left in the diagram)



(A) Normal alignment and light reflex; (B) Pseudo-strabismus where left eye appears to converge towards nose, but note the light reflex is symmetrical in each eye; (C) Normal light reflex in patient right eye, but displaced, abnormal light reflex in left eye

2) Red reflex test

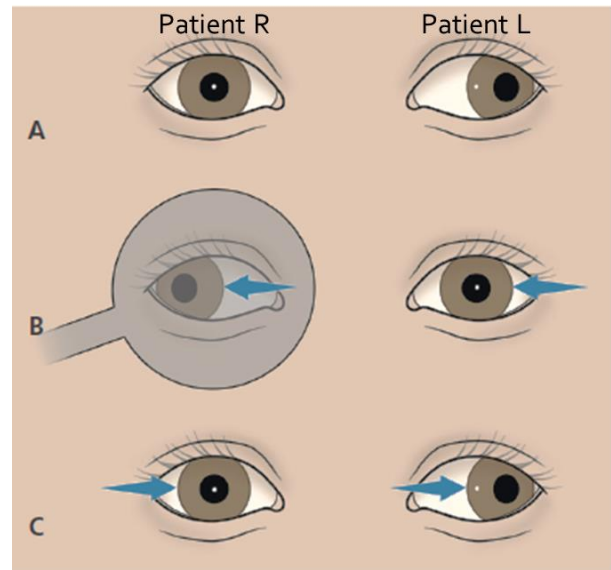
- Use a darkened room
- Stand 0.5 meters in front of the child, holding a **direct ophthalmoscope set at 0** and direct the child's attention to the scope
- Observe the red reflex of both eyes simultaneously
 - Both red reflexes should be identical
 - Inequality in size, shape, or color of the red reflexes is abnormal (Left in the diagram)



(A) Normal symmetrical red reflexes; (B) Normal red reflex in patient right eye, and abnormal, diminished red reflex in left eye; (C) Normal red reflex in patient right eye, and no reflex in left eye

3) Cover test

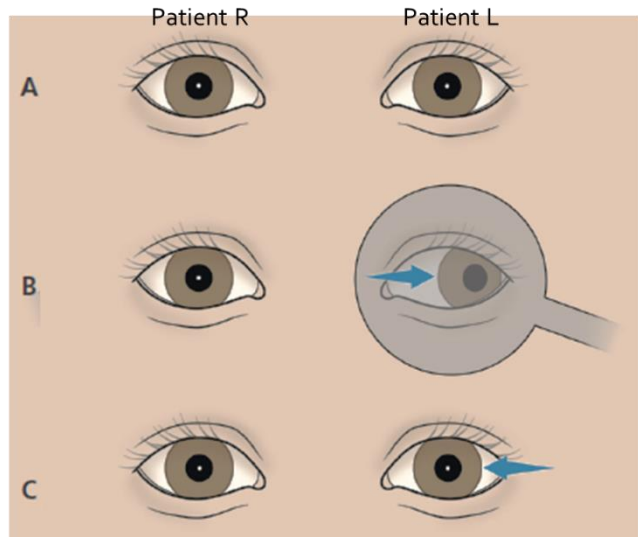
- Test is used to detect **manifest strabismus**
- Place the child on the caregiver's lap
- Stand in front of the child and direct the child's attention to a light or a toy
- Cover one of the child's eyes and observe the uncovered eye for corrective movement
 - If a normal eye is covered, a manifest abnormal eye will **move from its deviated position to take up correct fixation**; movement indicates manifest strabismus in the uncovered eye (Left in the diagram)
- Repeat for the other eye
- Test should be repeated 3x during the visit for reproducibility



(A) On simple observation, patient left eye appears to deviate; (B) When right eye is covered, left eye moves from deviated position into correct alignment; (C) When right eye is uncovered, left eye returns to original location. **Strabismus is present in left eye.**

4) Cover-Uncover test

- Test is used to detect latent strabismus
- Direct the child's attention to a target (light or toy)
- **Cover one of the child's eyes for 5 seconds then quickly remove the cover**
- Observe the newly uncovered eye closely for corrective movement
 - A latent abnormal eye will drift into a deviated position when covered. After it is uncovered, the abnormal eye will then **return to correct fixation**; movement indicates **latent strabismus** in the newly uncovered eye (Left in diagram)
- Repeat for the other eye
- Test should be repeated 3x during the visit for reproducibility



(A) On simple observation, alignment appears normal; (B) When left eye is covered, it drifts into deviated position; (C) When left eye cover is removed, movement is observed and left eye returns to original location. **Strabismus is present in left eye.**

Differential diagnosis:

- Unsteady ocular alignment in newborns (may last up to 3 months)
- Pseudo-strabismus

Management

- All children diagnosed with strabismus should be referred to a secondary facility for further assessment and management.

Community	Primary	Secondary
Refer	Refer	<ul style="list-style-type: none"> ▪ Spectacles ▪ Occlusion therapy (eye patching) for weeks or months ▪ Eye exercises ▪ Atropine eye drops ▪ Strabismus surgery under general anesthesia (if severe and not corrected by spectacles)

Prognosis & Follow-Up

- Treatments very effective if strabismus is detected and treated early; most children will have good vision in the long-term
- If not detected and treated before age of eight, treatment is less likely to be effective
- Strabismus is a risk factor for the development of **amblyopia (lazy eye)** in children if not managed, and subsequently results in poor visual acuity

Pediatric cataract

Cataract in children is unique in that it may interfere with the normal development of vision resulting in **lazy eye (amblyopia)**. Risk factors and causes include hereditary/genetic disorders, intrauterine infections (TORCH), drugs, metabolic diseases e.g., diabetes, trauma; but are unknown in most cases.

Presentation

- A white pupil (leukocoria)
- "Dancing eyes" (nystagmus)
- Squints
- Older children may complain of poor vision

Diagnoses & Examination

All children presenting with the above signs/symptoms should be referred for diagnoses and examination at secondary or tertiary facilities.

- General health examination and history-taking
 - Age of onset of cataract
 - Duration of cataract
 - Any old photograph of child if available
- Eye examination
 - (i) Slit lamp examination
 - (ii) Dilated fundus and cataract examination
 - (iii) Examine for nystagmus
 - (iv) Examine for visual acuity
- B-scan ultrasonography to assess the state of vitreous and retina in dense cataracts to rule out retinoblastoma

Management

Community	Primary	Secondary
Refer	Refer	<ul style="list-style-type: none">▪ Refer to tertiary facility for cataract surgery conducted by trained personnel

Prognosis & Follow-Up

- Early detection, referral, and intervention leads to good prognosis.

Other eye problems in children

See **ALGORITHM 5** in Annex 10.

If a child under the age of five presents with an eye problem, ask the caregiver for details on the child's condition and examine the child.

- 1) If child's eye(s) have an abnormal appearance** (for example, in color, shape, size, or direction), or if the child does not see/look forwards/follows a face, bright light or object:
 - Examine the child's eyes to confirm.
 - Give vitamin A to the child if they have measles or diarrhea, based on national integrated management of childhood illness (IMCI) guidelines.
 - Refer urgently.

- 2) For infants aged 0–3 months who have swollen eyes and discharge or pus:**
 - Examine the child's eyes to confirm.
 - Clean the eyes (see p. 26).
 - Start on antibiotic drops.
 - Give antipyretics if infant has a fever.

- 3) For children aged > 3 months who have discharge or itchy eyes:**
 - Examine the child's eyes to confirm.
 - Clean the eyes.
 - Start on antibiotic drops for the discharge.
 - Give allergy drops for itchy eyes.
 - Refer urgently if the condition does not improve in 3 days.

Based on the diagnosis, see details on management options in other sections of the guidelines.

Basic Eye Health Algorithms

This section presents guidance for assessing and managing common patient eye health complaints. Each sub-section below begins with the patient presentation or complaint, followed by clinical findings and observations, assessment options (such as vision test, clinical examination), then management or referral options.

These **primary eye care algorithms** provide basic assessments and first-aid management that could be performed before referrals to more advanced management (i.e., at secondary or tertiary levels). This information is also presented as clinical algorithms in **Annex 6–11**.

Refer to 'Managing Common Eye Conditions' (p. 35) for all other details on presentation, diagnosis & assessment, management, prognosis & follow-up. Also refer to other sections such as 'Basic Eye Care Techniques' (p. 25) for more details.

If Patient Complains They Cannot See Well

See ALGORITHM 1. in Annex 6.

If patient complains they cannot see close (for example, when reading), begin by conducting the distance vision test (see p. 11).

- 1) If distance vision test is normal in both eyes and the patient is 40 years or older, proceed to conduct the **near vision test** (see p. 12).
- 2) If distance vision test is normal in both eyes and the patient is below 40 years of age, and there are no other eye conditions, reassure the patient and send home.
- 3) If near vision test finds is normal (i.e., patient reads N8 of the E-chart at 40 cm), you should reassure the patient and send home. However, if near vision test is abnormal (i.e., patient cannot read N8), you should provide appropriate reading glasses (see p. 60-61), or refer to another facility if unavailable.
- 4) If the initial distance vision test finds abnormal vision, ask the patient whether their condition happened suddenly or gradually. If the loss of vision was gradual, refer the patient to a higher level facility for care. If the loss of vision was sudden, referrals must be made urgently.
- 5) If patient's complaint of change in vision does not match findings from the near vision test or distance vision test, reassure the patient and schedule for a return visit in a year's time.

If the patient complains they cannot see far or if their vision is blurry, begin by conducting the distance vision test (see p. 11).

- 1) If distance vision test is normal in both eyes, you should reassure the patient and send home.
- 2) However, if the distance vision test is abnormal (in either one or both eyes), follow step 3 above.
- 3) If patient's complaint of change in vision does not match findings from the near vision test or distance vision test, reassure the patient and schedule for a return visit in a year's time.

If Patient Presents with Red Eye

See **ALGORITHM 2. Annex 7.**

If patient presents with red eyes, begin by conducting the distance vision test (see p. 11).

- 1) If the distance vision is normal in both eyes, ask or determine whether patient has pain, discharge, or itchiness:
 - **Pain** – Patients with mild pain can be provided with painkillers, lubricating drops. If no change or condition worsens in 2 days, refer patient urgently. Patients with moderate to severe pain can be provided with painkillers then referred urgently.
 - **Discharge (pus)** – Advise patients to wash eyes (see p. 25). Provide a topical antibiotic. If no change or condition worsens in 2 days, refer patient urgently.
 - **Itchy and watering** (feeling like sand in the eyes) – Advise patient to wash eyes with cold water frequently. May provided patients with allergy medications.
- 2) If vision is abnormal, ask the patient whether their condition happened suddenly or gradually. If the gradual, provide relief for pain, discharge, or itch, then refer. If sudden, provide relief and refer urgently.

If Patient Has Swelling, Lump on Eye, or Abnormal Eyelashes

See **ALGORITHM 3. in Annex 8.**

If patient has swelling or lump on the eye, conduct the distance vision test (see p. 11) **and determine the location of the swelling or lump:**

- 1) If the whole eyeball or whole eyelid is swollen, refer urgently.
- 2) If there is growth on the eyeball, refer.
- 3) If there is lump on the eyelids, ask whether it is painful.
 - If pain – Patient should be advised to apply warm compress (see p. 27) and provide antibiotic ointment.
 - If no pain – Patient can be referred.

If patient has abnormal lashes, conduct the distance vision test and determine the location of the condition or discomfort:

- 1) If eye lashes are full of crusts, show the patient how to clean eyelashes (see p. 26) and provide antibiotic ointment.
- 2) If eye lashes are touching the eyeball, epilate (see p. 33) or refer.

If Patient Has Injured Eye(s) or Foreign Body in the Eye(s)

See **ALGORITHM 4. in Annex 9.**

If patient presents with injured eye(s), ask for details on how the injury occurred.

- 1) **Chemical** – Perform irrigation for 10 minutes with clean water (see p. 25). If possible, conduct distance vision test (see p. 11), apply eye ointment, cover the eye, and refer urgently.
- 2) **Thermal (fire, hot liquid)** – If possible, conduct distance vision test, apply eye ointment (see p. 29), **cover** the eye (see p. 30), and refer urgently.
- 3) **Knock or blow on the eye** – Conduct distance vision test. If vision is normal, provide relief for pain and reassure the patient. If vision is abnormal or the eyeball/skin is open or broken, provide relief for pain, clean with sterile water, **shield** the eye with sterile gauze (see p. 30), give tetanus antitoxin (TAT), and refer urgently.
- 4) **Foreign body** – See p. 32 for details on the techniques.

BASIC EYE CARE TECHNIQUES

Basic Eye Care Techniques

This section of the document will provide guidance on basic eye care techniques that may be used as first-aid or to manage various eye conditions. These techniques may be carried out at all health facility levels provided there is trained personnel and adequate supplies. Basic eye care techniques covered here include:

- 1) Irrigating the Eyes
- 2) Cleaning Eyelids
- 3) Applying Warm Compress
- 4) Everting Eyelids
- 5) Instilling Eye Drops
- 6) Applying Eye Ointment
- 7) Making & Applying Eye Pads or Eye Shields
- 8) Removing a Foreign Body
- 9) Epilation

When performing these techniques, **follow all appropriate IPC considerations** (see p. 8). For example: always don risk-appropriate PPE such as gloves; always wash hands immediately before and after any exams, procedures, or contact with any potentially contaminated items or bodily fluids; etc.

1) Irrigating the Eyes

Where warranted, irrigation of the eyes is an EMERGENCY procedure that must be done promptly and thoroughly. Proceed to irrigation immediately. AFTERWARDS, check visual acuity.

Step 1. Prepare your supplies quickly.

- Local anesthetic eye drops, if available
- Clean towel
- Cotton buds (sterile)
- Small container or bottle with pouring spout
- Irrigation fluid – saline/universal buffer solution; if not available, use clean water at room temperature
- Wired speculum

Step 2. Explain to the patient what you are about to do. Prepare the patient.

- 2.1 Have the patient sitting or lying down, with neck and shoulders protected with the towel.
- 2.2 If there is a chemical burn affecting ONE eye only, **tilt the head with the affected eye lower than the unaffected eye**, so that water does not flow into the unaffected eye.

Step 3. Instill local anesthetic eye drops (see p. 28).

Step 4. Irrigate the eyes.

- 4.1 Spread open the eyelids (using thumb and index finger if wired speculum is not available).
- 4.2 From a distance of no more than 5 centimeters, pour the irrigation fluid slowly and steadily onto the **front surface of the eye, inside the lower eyelid, and under the upper eyelid.**
 - Use copious amounts of fluid (e.g., **1-2 liters of saline solution or clean water**)
- 4.3 Evert the upper eyelid (see p. 27).
- 4.4 Ask patient to **move their eye continuously in all directions (15-30 minutes)** while irrigation is performed.

Step 5. Remove any residual foreign bodies with moist cotton buds.

Step 6. Once irrigation is completed, check visual acuity.

2) Cleaning Eyelids

Step 1. Prepare your supplies.

- ❑ Sterile gauze swabs or cotton buds (do not use large size ones because they can leave fluff and become an irritant and even cause complications)
- ❑ Irrigation fluid – saline/universal buffer solution; if not available, use clean water at room temperature

Step 2. Explain to the patient what you are about to do.

Step 3. Clean the eyelids.

Top lid

- 3.1 Take a folded gauze swab or cotton bud and moisten with saline or clean water.
- 3.2 Ask the patient to close both eyes.
- 3.3 With the swab or bud, **clean gently along the eyelashes in one movement from inner to outer canthus.**
 - Keep the **cornea** in view throughout and avoid touching it with the gauze swab or cotton bud.
- 3.4 Discard the swab or bud after use. If the eyelashes need further cleaning use a **new** swab or cotton bud.

Bottom lid margin

- 3.5 Ask the patient to look up.
- 3.6 With one hand take a moistened sterile swab or bud.
- 3.7 With the index finger of the other hand gently hold down the lower eyelid.
- 3.8 With the swab or bud clean gently along the lower eyelid margin in one movement from inner to outer canthus.
- 3.9 Discard the swab or bud after use. If lower eye lid margin needs further cleaning, use **new** swab or cotton bud.



Top lid margin

- 3.10 Ask the patient to look down.
- 3.11 With one hand take a moistened sterile swab or cotton bud.
- 3.12 With a thumb or a finger of the other hand **gently ease the upper eyelid up against the orbital rim (just below the eyebrow).**
- 3.13 With the swab or bud clean gently along the upper eyelid margin in one movement from inner to outer canthus.
- 3.14 Discard the swab or bud after use. If upper eye lid margin needs further cleaning, use **new** swab or cotton bud.



Step 4. You may need to repeat any of these procedures until all debris or discharge is removed.

3) Applying Warm Compress

Step 1. Prepare your supplies.

- Clean towel or cloth
- Bowl of warm water

Step 2. Explain to the patient what you are about to do.

Step 3. Rinse a clean towel or cloth that has been submerged in warm water.

Step 4. Apply the clean towel or cloth to the affected eye for 5-10 minutes.

- Avoid excessively hot compresses to avoid scalding.

Step 5. Ask patient or caregiver to repeat 3-4 times daily or until lump or swelling on the eye is gone.

4) Everting Eyelids

Never evert the upper eye lid if a penetrating injury or corneal thinning (e.g., due to ulceration) is suspected.

Step 1. Prepare your supplies.

- Cotton buds (sterile or clean)
- Paper clip or small blunt object (e.g., pen cap)

Step 2. Explain to the patient what you are about to do. Ask the patient to look down.

Step 3. Evert the eyelids

- 3.1 With one hand, hold the eyelashes of the upper eyelid between thumb and index finger.
- 3.2 With the other hand, place cotton bud or other small blunt object on the upper eyelid, **midway from the eyelid margin.**
- 3.3 Turn the eyelid against steady and **gentle pressure** on the upper eyelid.

Step 4. Conduct examination as needed or remove foreign body if present (see p. 32).

Step 5. Once complete, ask patient to look up and the eyelid will return to its normal position.



5) Instilling Eye Drops

Step 1. Prepare your supplies

- Required eye drops (not expired)
- Sterile or clean wool

Step 2. Explain to the patient what you are about to do. Prepare the patient.

- 2.1 Let the patient know that they might taste the eye drops in their throat and that is okay.
- 2.2 Ensure that you have the correct medication (not expired).
- 2.3 Ask patient to tilt their head backwards and look up.

Step 3. Instill the eye drops in the affected eye.

- 3.1 Shake the eye drop bottle.
- 3.2 Gently pull down the patient's bottom eyelid by retracting it with your index finger. This creates a pocket.
 - Do not evert the eyelid too much as instilled eye drops may spill out onto the cheek.



- 3.3 Hold the eye drop bottle a few centimeters above the eye.
- 3.4 Press the bottle to release **ONE drop** of the medication into the lower eyelid pocket.
 - **Do not allow the dropper to touch the eyeball, skin, or eyelashes.** If this happens, the tube of medication will no longer be sterile and must be discarded.
 - Do not allow the eye drops to fall onto the cornea as they can sting
- 3.5 Wait a few seconds and release the bottom eyelid.
- 3.6 Ask the patient to close their eye and press gently for a few seconds with a finger over the corner of the eye (next to their nose). This will keep the drops in the eyes.
- 3.7 Wipe away any excess drops which may have leaked out when the patient closed their eyes.

Step 4. Teach patient or their caregiver how to instill eye drops in the second affected eye.

Ask the patient or their caregiver to instill the eye drops so you can check that it is being done properly, and that they will do it properly at home.

Step 5. Instill another type of eye drops if necessary

- If you have to put in more than one kind of eye drop at the same time, it usually does not matter which one is instilled first.
- Allow 3-5 minutes between instilling different eye drops, so that the second eye drop does not wash out the first.

6) Applying Eye Ointment

Step 1. Prepare your supplies

- Required eye ointment (not expired)
- Sterile or clean cotton gauze

Step 2. Explain to the patient what you are about to do. Prepare the patient.

- 2.1 Ask patient to tilt their head backwards and look up.
- 2.2 Ensure that you have the correct medication (not expired)

Step 3. Apply the eye ointment to the affected eye.

- 3.1 Shake the eye ointment.
- 3.2 Gently pull down the patient's bottom eyelid by retracting it with your index finger. This creates a pocket.
- 3.3 Hold the nozzle of the tube approximately 2.5 centimeters above the eye.
 - **Do not allow the nozzle to touch the eye, skin, or eyelashes.** If this happens, the tube of medication will no longer be sterile and must be discarded.
- 3.4 Go from the nasal corner outwards, apply a line of ointment about 1 cm long to the inner edge of the lower eyelid.



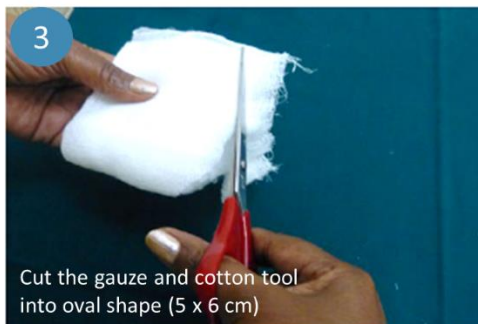
- 3.5 Ask the patient to close their eye. Wipe away any excess ointment with clean or sterile gauze which may have leaked out when the patient closed their eyes.
- 3.6 Close the nozzle cap. Explain to the patient that their vision will be blurry for a few minutes.

Step 4. Teach patient or their caregiver how to apply eye ointment in the second affected eye.

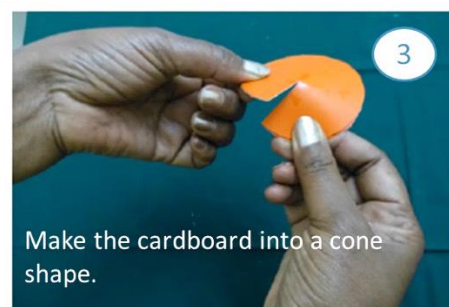
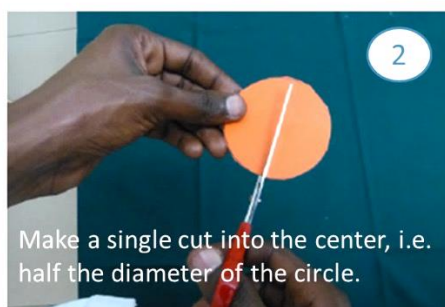
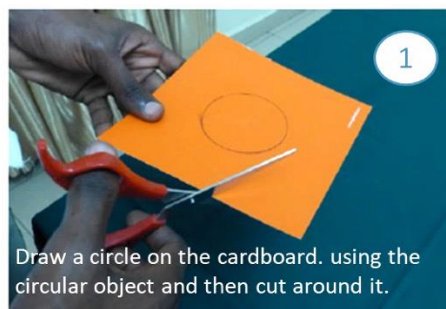
Ask the patient or their caregiver to apply the eye ointment so you can check that it is being done properly, and that they will do it properly at home.

7) Making & Applying Eye Pads or Eye Shields

Making Eye Pads



Making Eye Shields



Applying eye pad or eye shield

Step 1. Prepare supplies.

- 1.1 Gather scissors, adhesive tape, and the eye pad or shield.
- 1.2 Put a piece of adhesive tape (~15 cm long) to the eye pad or shield.

Step 2. Explain to the patient what you are about to do. Ask the patient to close both eyes.

Step 3. Apply the eye pad

- 3.1 Position the eye pad or shield diagonally over the closed lids, and secure with tape to the patient's forehead and cheek.
- 3.2 Apply a second and third piece of tape to ensure the eye pad lies flat.

Step 4. Instruct the patient to try not to open the affected eye under the pad i.e., keep the eye closed.



8) Removing a Foreign Body

Only follow these steps to remove a foreign body if appropriate at your level of care (see p. 43). Otherwise, do not attempt to wipe out or remove; cover the eye and refer urgently.

Step 1. Prepare your supplies.

- Local anesthetic eye drops, if available; if unavailable, refer patient
- Cotton buds or gauze (sterile/clean)
- Saline or cooled boiled water

Step 2. Explain to the patient what you are about to do.

- Let the patient know that they might experience a brief increase in discomfort. Reassure them to relax and keep still, and that relief should be felt immediately after the foreign body has been removed.

Step 3. Remove the foreign body.

- 3.1 Instill local anesthetic eye drops (see p. 28).
- 3.2 Examine the eye to see if there is a foreign body **on the white of the eye**. If yes, use the moistened tip of the cotton bud or clean cloth to remove the foreign body.
- 3.3 Evert the eyelid to see if there is a foreign body **on the inside of the lid**. If yes, use the moistened tip of the cotton bud or clean cloth and with a **gentle upward movement**, remove the foreign body.
- 3.4 **If the foreign body cannot be removed or is on the black of the eye, REFER IMMEDIATELY.**

Step 4. Show the foreign body to the patient to reassure them that it has been removed.

- Ask the patient to return for follow-up if pain is still there the next day.

9) Epilation

Step 1. Preparations

- Wash your hands (before and after procedure)
- Position the patient comfortably with his/her head supported
- Note that one assistant (helper) is needed to hold the torch light during the procedure. The patient, helper, and examiner should be positioned appropriately.
- Avoid distraction for yourself and the patient.
- Prepare your supplies:
 - ❑ Magnifying loupe (2.5X)
 - ❑ Torch light or flashlight
 - ❑ Gauze swabs
 - ❑ Local anesthetic eye drops
 - ❑ Epilation forceps
 - ❑ Antibiotic eye ointment

Step 2. Explain to the patient what you are about to do.

- Let the patient be aware that they will experience brief discomfort.
- Reassure them to relax and keep still, and that they will experience immediate relief after the removal of the ingrowing eyelashes (Trichiasis).

Step 3. Perform the procedure.

3.1 Instill the local anesthetic eye drops (see p. 28).

3.2 Using magnification, identify the eyelashes which need epilation.

3.3 ***For lower eyelashes***

- Ask the patient to look up
- Fix his/her gaze, and keep still
- With an index finger, gently hold down the lower eyelid
- With the epilation forceps in the other hand, hold the ingrowing eyelash close to its base and pull gently forward to pluck it out

For upper eyelashes

- Ask the patient to look down
- Fix his/her gaze, and keep still
- With a thumb, gently ease the upper eyelid up against the orbital rim
- With the epilation forceps in the other hand, hold the ingrowing eyelash close to its base and pull gently forward to pluck it out
- Between each epilation, wipe the eyelash off the forceps with a clean swab
- Repeat until all ingrown eyelashes are epilated



Step 4. Reassure the patient.

- When all the ingrowing eyelashes have been removed, reassure the patient, and advise him/her not to rub the eye.

MANAGING OTHER COMMON EYE CONDITIONS

Managing Common Eye Conditions

This section will outline the management of common eye conditions. Information for each eye condition is arranged as: etiology, presentation (signs and symptoms), diagnoses & examination, management, prognosis & follow-up.

Cataract

Cloudy or opacification of the crystalline lens.

Etiology

Most common causes and risk factors for cataract are:

- Age
- Obesity Diabetes
- Drugs (e.g., corticosteroids)
- Smoking
- Eye injuries/trauma
- Others

Presentation

- Gradual, painless loss of vision
- White pupil

Diagnosis & Examination

- Patient history
- General examination
 - Assessment of general health conditions
 - Measure blood pressure
 - Measure blood glucose level
 - History of trauma
- Eye examination
 - External eye examination
 - Slit lamp examination or torch examination with a loupe where possible
 - Dilated fundus and cataract examination
 - Examine for visual acuity
 - Biometry and A-scan
 - Measurement of intraocular pressure
 - In patients where fundus is not accessible, use B-scan ultrasonography to assess state of vitreous and retina

Management

Community	Primary	Secondary
Refer	<ul style="list-style-type: none">▪ Refer to eye health specialist or higher level facility	<ul style="list-style-type: none">▪ Uncomplicated cataract can be managed by cataract surgery conducted by trained personnel▪ First line procedure of choice is small incision cataract surgery (SICS)▪ Refer complications to tertiary facility

Prognosis & Follow-Up

- Following cataract surgery, the majority of patients have good outcomes.
- Follow-up 2-3 months post-surgery to assess healing and assess whether patient experiences:
 - Vision loss
 - Pain that persists despite use of OTC medications
 - Increased eye redness
 - Light flashes or seeing floating spots in front of eyes
- Also give spectacles in follow up when necessary

Conjunctivitis

Conjunctivitis is a generalized redness of the conjunctiva of the eye. See p. 16 for conjunctivitis of the newborn.

Etiology

- Infection: viral or bacterial (can be spread through direct or indirect contact with liquid that drains from the eye of someone who is infected)
- Trauma: chemical, foreign bodies
- Others: exposure to smoke; allergy from irritants

Presentation

- Discomfort or foreign body sensation
- Redness, usually both eyes, but may start in one eye and later spread to the other
- Watery discharge (viral or chemical)
- Pus discharge (bacterial)
- Swelling of lids or conjunctiva
- Itching
- Normal visual acuity
- Differential diagnosis: **Anterior uveitis, diffuse scleritis, keratitis** (tends to be in one eye only, redness is greatest near the cornea, pain often great)

Diagnosis & Examination

- Patient history
- Conduct **slit lamp/biomicroscopic examination** where available, or **torchlight examination** with binocular loupe of the anterior segment of the eye
- Stained cornea with fluorescein strip to rule out corneal ulcerations/keratitis
- **Pus swab**: Gram stain; culture and sensitivity

Management

Community	Primary or Secondary
<ul style="list-style-type: none"> ▪ Identify ▪ Irrigate the eyes with clean water ▪ Referral 	<p><i>Infective conjunctivitis</i></p> <ul style="list-style-type: none"> ▪ Apply antibiotic eye drops chloramphenicol or gentamicin or ciprofloxacin, every 2-3 hrs ▪ Change treatment as indicated by results of culture and sensitivity where possible ▪ Apply tetracycline 1% ointment 1% or chloramphenicol 1% eye ointment at bedtime ▪ Continue treatment for at least 7-10 days ▪ Gonococcal conjunctivitis should be treated aggressively and in line with syndromic management of Sexually Transmitted Infections (STIs) <p><i>Allergic conjunctivitis</i></p> <ul style="list-style-type: none"> ▪ Mast cell stabilizers: cromolyn sodium, alomide (lodoxamide), patanol; apply every 3-4 hours daily ▪ There is <u>NO</u> indication for systemic steroids in allergic conjunctivitis ▪ The use of systemic steroids in allergic conjunctivitis should be limited to short duration for fear of unwanted complications with tapering ▪ Do <u>not</u> use steroid preparations unless sure of the diagnosis as they may mask infections.

Prognosis & Follow-Up

- Infection (viral) usually clears up in 7 to 14 days without treatment and without any long-term consequences
- In some cases, viral conjunctivitis can take 2 to 3 weeks or more to clear up.
- Antiviral medication should be prescribed to treat more serious forms of viral conjunctivitis

Prevention

- Good personal hygiene; daily face washing
- Wear protective goggles when using dangerous chemicals
- Avoid irritants and allergies

Eye Injuries

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

Eye injuries may be caused by:

- Chemical products
- Thermal exposure (fire, hot liquid)
- Blunt forces (ball or blow on the eye)
- Perforating injury from a sharp object such as knife, high velocity projectile from explosives, grinding and hammering

For all patients presenting with eye injuries, diagnosis and examination should include:

- (i) Patient history: time of injury, cause of injury, any first aid/treatment already provided including use of harmful traditional eye medicines (hTEM)
- (ii) Assess the visual acuity (conduct distance vision test)
- (iii) Conduct external examination of the eye

Chemical injuries to the eye

Various chemicals may injure the eye when they come into contact with the eyes or face. **Chemical injury** is an ophthalmic emergency. It often results in significant ocular morbidity. For example, acids and alkaline products will cause serious injuries to the lids, conjunctivae, and cornea. Exposure to chemicals will affect all the exposed mucous membranes, including the eyes, nasal mucosa, mouth, and throat.

Etiology

- Alkalic agents (examples: whitewash, fertilizer, cement, caustic soda, etc.)
- Acidic agents (examples: car batteries, refining petroleum, fertilizer, explosives, rocket propellant etc.)

Presentation

- Eye(s) will sting and tear copiously
- Pain
- Photophobia
- Blepharospasm
- Diminished vision
- Eyelid edema
- Chemosis
- Corneal abrasion or epithelial defect
- **Alkaline products** (like lime and mortar) may affect the inner layers of the eye resulting in glaucoma and iritis

Management

Community	Primary	Secondary
Irrigate and refer immediately	<ul style="list-style-type: none">▪ Immediately irrigate with copious amounts of clean water as a first aid treatment. Continue with normal saline to wash out the entire chemical▪ After irrigation of the eye, apply an antibiotic ointment (chloramphenicol or tetracycline eye ointment)▪ Cover the eye and refer to eye health specialist or higher level facility	<ul style="list-style-type: none">▪ Primary management plus additional care by eye health specialist

Thermal injuries to the eye

Acute ocular burns may constitute an ophthalmic emergency. The severity of the injury depends on multiple factors. These factors include the offending agent, length of exposure, the surface area affected, and which ocular tissues are involved. Moderate to severe burns of the eye and the ocular adnexa cause serious morbidity and may result in long-term consequences on both vision and quality of life.

Etiology

Common causes of thermal ocular burns include:

- Hot water
- Hot cooking oil
- Curling irons
- Flames, as seen in an explosion or a fire

Presentation

- Severe pain
- Reduced visual acuity
- Blurred vision
- Red eyes
- Excessive watering in the eyes
- Foreign body sensation
- Photophobia (increased sensitivity to light)
- Blepharospasm

Management

Community	Primary	Secondary
Remove patient away from the offending agent and refer	<ul style="list-style-type: none">▪ Instill eye ointment▪ Cover the eye and refer to eye health specialist or higher level facility	Primary management plus additional care by eye health specialist: <ul style="list-style-type: none">▪ Promoting ocular surface healing▪ Controlling inflammation▪ Support of reparative processes▪ Rodding the eyes▪ Prevention of complications: early presentation to the facility

Ocular adnexa injuries

Blunt ocular injuries

A blunt object striking the eye with great force may result in minor or severe injury to the eye. Different structures of the eye may be involved.

Etiology

The most common causes of blunt trauma are:

- Sports related injuries such as cricket, basketball, football, water sports
- Elastic luggage straps
- Aggression/assaults (example, hit with a fist, belt)
- Fall from height
- Automobile accidents

Blunt injuries to the lid, conjunctiva, and cornea

Presentation

- Eyelid swelling (mild to severe) and subcutaneous bleeding
- Corneal abrasions and conjunctival swelling and sub-conjunctival hemorrhage

Diagnosis & Examination

- Patient history: the time of injury, cause of injury and any first aid/treatment provided including use of traditional eye medications should be explored
- Assess visual acuity
- Assess intraocular pressure
- Assess pupil
- Assess extraocular movement

Management

Community	Primary	Secondary
Refer	<p>Reassure the patient.</p> <p><i>If vision is normal</i></p> <ul style="list-style-type: none"> ▪ Antibiotic drops or ointment (gentamycin or chloramphenicol eye drops; or chloramphenicol or tetracycline eye ointment) ▪ Pain reliever (paracetamol or NSAIDs) ▪ Cold compress to help with lid swelling <p><i>If vision is abnormal or the eyeball/skin is open or broken</i></p> <ul style="list-style-type: none"> ▪ Pain reliever (paracetamol or NSAIDs) ▪ Give TAT ▪ Shield the eye and refer urgently ▪ NB: If the visual acuity is poor, <i>refer the patient to a specialist</i> as this is an indication of injury to deeper structure. 	<ul style="list-style-type: none"> ▪ Primary management plus additional care by eye health specialist

Blunt injuries to the anterior chamber, lens, vitreous or retina

A blunt injury with decreased visual acuity is an indication that the injury has involved either the anterior chamber, lens, vitreous or retina.

Presentation

- In the anterior chamber, there may be bleeding of various degrees (hyphemia). This is a serious problem as it may lead to raised intraocular pressure.
- Lens may be dislocated or ruptured.
- There may be bleeding in the vitreous or a retinal hemorrhage or even retinal detachment.
- All the above will result in poor vision and are potentially blinding conditions.

Management

Community	Primary	Secondary
Refer	<ul style="list-style-type: none">▪ Pain reliever (paracetamol or NSAIDs)▪ Pad/cover the eye and refer urgently	<ul style="list-style-type: none">▪ Primary management plus additional care by eye health specialist

Blunt injuries to the orbital bones

A blunt injury may result in orbital bone fractures, the most common is a fracture of the ethmoid bone, blowout fracture

Presentation

- Swelling of the eye and proptosis if there is hemorrhage in the orbit or a sunken or retracted eyeball, depending on the site of the fracture
- Double vision (diplopia)

Management

Community	Primary	Secondary
Refer	<ul style="list-style-type: none">▪ Pain reliever (paracetamol or NSAIDs)▪ Cover the eye and refer urgently	<ul style="list-style-type: none">▪ Primary management plus additional care by eye health specialist

Penetrating eye injuries

Penetrating eye injuries are common in all ages, which result from injury by a sharp object. Penetrating injuries by definition penetrate into the eye but not through and through – there is no exit wound. Perforating injuries have both entrance and exit wounds. Penetrating injuries may primarily involve the cornea and the sclera depending on the impact. However, a cut involving the eyelids medially may injure the lacrimal system. 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 coloboma effect. Ocular penetrating and perforating injuries (commonly referred to as open globe injuries) can result in severe vision loss or loss of the eye.

Etiology

- Windshield-related accidents (may be associated with foreign body and tissue loss).
- Bite wounds may implicate infection (e.g., rabies) and tissue loss. In human bite wounds, determine the assailant’s HIV and hepatitis status.
- Trauma by other sharp objects (e.g., knife, cutlass)

Presentation

- Pain
- Tearing
- Swelling of the eyelids
- Chemosis (edema of the conjunctiva)

Management

Community	Primary	Secondary
Refer	<ul style="list-style-type: none">▪ Pain reliever (paracetamol or NSAIDs)▪ Apply eye shield and refer urgently	Primary management plus additional care by eye health specialist: <ul style="list-style-type: none">▪ Treatment of corneal / scleral lacerations is immediate repair with 10/0 sutures under an operating microscope or if the laceration is extensive, an immediate evisceration of the eye should be performed in the absence of infection

Corneal and scleral perforations

All corneoscleral laceration or perforations of the cornea or sclera are serious ocular injuries and may lead to blindness. These may occur following blunt, penetrating, or perforating ocular trauma.

Presentation

- Vision loss
- Pain
- Leakage that may be mistaken as tears
- Prolapse of intraocular contents
- Irregular pupil
- Blood in anterior chamber (hyphemia)
- Periorbital swelling

Diagnosis & Examination

- Patient history
- **Seidel test:** a sterile fluorescein strip is saturated with a sterile saline and painted over the suspected area of perforation. If the clear aqueous humor from the eye runs through the yellow stain, the patient's test is positive for cornea perforation

Management

Knowledge of the cause of the perforation is essential for proper management. Corneal perforations are different from corneal lacerations in that tissue loss is involved, making their treatment more complicated.

Community	Primary	Secondary
Refer	<ul style="list-style-type: none">▪ Do not remove object▪ Apply eye shield when applicable▪ Pain reliever▪ Refer urgently	Primary management plus: <ul style="list-style-type: none">▪ Immediate repair with sutures in the absence of retained object under an operating microscope within 24 hours▪ Immediate evisceration of the globe if completely ruptured in the absence of infection▪ Immediate referral to the next level when foreign body is retained

Foreign Body (FB) in the Eye

Foreign bodies in the eye may cause a lot of discomfort or even very severe pain to the sufferers. Most times they enter the eye accidentally but may be intentional in children and mentally derailed individuals.

Etiology

- Solids e.g., dust, insects, metal, or wood particles

Presentation

- Foreign body sensation: FB may be visible
- Pain
- Tearing
- Redness

Diagnosis & Examination

- Patient history
- Find out details on circumstances and nature of the FB, any first aid or treatment given (including traditional medication)
- Most times ocular FBs lodge below the upper eyelid. It is therefore essential that all patients with complaints of FB in the eye have their upper eyelids everted (see p. 27) for proper examinations and removal of the foreign bodies
- Differential diagnosis: corneal ulcer; other injury or trauma

Management

Community	Primary	Secondary
Refer	<ul style="list-style-type: none">▪ Wash eyes with copious amounts of clean water or saline▪ Attempt to remove FB with sterile cotton bud <u>ONLY IF</u> it is superficial (i.e., within the eye lids, conjunctiva, and non-penetrating cornea)▪ OTHERWISE do <u>not</u> attempt to wipe out or remove; cover the eye and refer urgently▪ Instill antibiotic eye drops (but do <u>not</u> use steroid eye drops) <p>See p. 32 for details on the techniques to remove a foreign body</p>	Primary management plus: <ul style="list-style-type: none">▪ Do eye examination using slit lamp or a loupe and remove FB

Prognosis & Follow-Up

- Prognosis is usually good depending on the degree and location.

Keratitis / Corneal Ulcer

This refers to inflammation or sores on the cornea.

Etiology

- Infection: bacterial, viral, or fungal, leading to corneal ulceration
- Trauma: chemical, foreign bodies
- Other systemic disorders

Presentation

- Pain in the eye
- Redness
- Tearing
- Light sensitivity
- Visual acuity usually reduced
- The cornea is not clear and will stain with fluorescein in the case of corneal ulcer (pattern of staining depends on the causative agent, for example dendritic in viral keratitis)
- Condition is often unilateral

Diagnosis & Examination

- Patient history
- Perform **corneal staining** in all patients suspected to have keratitis to demonstrate the extent and pattern of the epithelial loss
- Pus swab: Gram stain; culture and sensitivity

Management

- Treat the specific underlying cause
- Use of topical corticosteroids in patients with infective keratitis is **contraindicated** (fungal)

Community	Primary	Secondary
Refer	<p><i>Bacterial</i></p> <ul style="list-style-type: none"> ▪ Fortified gentamycin eye drops alternate with chloramphenicol eye drops, or ciprofloxacin eye drops alone, every 1-2 hrs, for at least 10-14 days ▪ Apply tetracycline eye ointment 1% or chloramphenicol eye ointment at bedtime <p><i>Viral</i></p> <ul style="list-style-type: none"> ▪ Apply acyclovir eye ointment 5 times daily, for 10-14 days for herpes simplex / viral keratitis <p><i>Fungal</i></p> <ul style="list-style-type: none"> ▪ Natamycin suspension, voriconazole eyedrops, every 2 hrs, for at least 2-4 weeks <p><i>Supportive treatment for all causes</i></p> <ul style="list-style-type: none"> ▪ Atropine eye drops to relieve pain ▪ Vitamin A capsules for children 	<p>Primary management, plus:</p> <ul style="list-style-type: none"> ▪ In-patient 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 (hypopyon/ scleritis) ▪ Debridement ▪ Surgery may be necessary in some circumstances i.e., conjunctival flap and tarsorrhaphy

Prognosis & Follow-Up

- Corneal ulcers can cause blindness when untimely referred.
- 2-3 days follow-up is needed, response to treatment is noted. On follow-up, assess the size of the epithelial defect, the size and depth of infiltrate.

Low Vision

Visual impairment is defined as a functional limitation of the eye(s) or visual system and can manifest as combination of the following: reduced visual acuity or contrast sensitivity, visual field loss, photophobia, diplopia, visual distortion, visual perceptual difficulties, or any combination of the above. A visual impairment can cause disabilities by significantly interfering with one’s ability to function independently, to perform activities of daily living, and/or to travel safely through the environment. Low vision may be hereditary, congenital, or acquired.

A person who has significantly reduced vision that cannot be fully restored with prescription glasses or other treatment; they can see some things but require the help of low vision assistive devices to carry out some tasks. Low vision may be managed by provision of vision assistive devices such as low vision assistive products (e.g., magnifiers) to increase, maintain, or improve the functional capabilities of individuals with disabilities.

Refractive Errors

Refractive error refers to the inability of images to be focused properly on the retina. The most common refractive errors are **long-sightedness (hyperopia)**, **near-sightedness (myopia)**, and **astigmatism** (Table 4). Refractive error is a problem of the relationship between the optical parts of the eye such as, the curvature of the cornea, refractive indices, crystalline lens, and the overall length of the eye.

Table 4. Types of refractive errors

	Hyperopia (long or farsightedness)	Myopia (short or nearsightedness)	Astigmatism
Description	Difficulty in seeing close objects clearly	Difficulty in seeing distant objects clearly	Vision is blurred or distorted at all distances
Causes	Mainly genetic	Genetic and environmental factors such as intensive near work activities (e.g., doing homework, reading books, using smartphones) or reduced time spent outdoors	Mainly genetic; Frequently occurs in addition to myopia or hyperopia. The Cause is based on irregularity in the cornea, Cataract
Typical age of onset	Childhood	~8-12 years old	Childhood or develop throughout life

Hyperopia

Hyperopia, also termed long-sightedness or far-sightedness, is a common refractive error in children and adults. Clinically hyperopia can be physiological (axial or refractive) or pathological in nature. There are degrees of refractive error in hyperopia:

- Low hyperopia consists of an error $< +2.00$ diopters (D)²
- Moderate hyperopia includes a range of error from $+2.25$ D to $+5.00$ D
- High hyperopia consists of an error $> +5.00$ D

Etiology

- Axial etiology (length of the eye, small eyes)
- Refractive etiology (power of the eye)
- Trauma
- Paralysis of accommodation

Presentation

- Blurred vision
- Asthenopia (eye strain, headaches, etc.)
- Accommodative dysfunction
- Binocular dysfunction
- Amblyopia (lazy eye)
- Strabismus (squint/crossed eye)

Diagnosis & Examinations

- Patient history
- **Assess visual acuity (distance vision test, near vision test, pinhole)**
- Refraction
 - Objective refraction (static retinoscopy and/or autorefractometry)
 - Subjective refraction
 - Cycloplegic retinoscopy (children under 10 years)
- Ocular motility, binocular vision and accommodation
- Slit lamp examination
- Fundus assessment

Management

- Management of refractive errors in children should include management of amblyopia.

Community	Primary	Secondary
<ul style="list-style-type: none">▪ Spectacles	<ul style="list-style-type: none">▪ Spectacles▪ Magnifiers (see p. 63)	<ul style="list-style-type: none">▪ Spectacles▪ Magnifiers

Prognosis & Follow-up

- Good prognosis with early detection and can be corrected with assistive devices; however, the condition itself does not go away without refractive surgery
- **Early screening, detection and management is particularly important in children/pre-school age group**

² Diopter (D) is a unit used to calculate the focusing strength of a pair of glasses.

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 in nature, induced or pseudo-myopia. There are degrees of refractive error in myopia:

- Low myopia consists of an error < -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

Etiology

- Axial etiology (length of the eye, big eyeball)
- Refractive etiology (power of the eye)
- Ocular disease e.g., keratoconus
- Trauma

Presentation

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

Examinations

- Patient history
- **Assess visual acuity (distance vision test, near vision test, pinhole)**
- Refraction
 - Objective refraction (static retinoscopy and/or autorefraction)
 - Subjective refraction
 - Cycloplegic retinoscopy (children under 10 years)
- Ocular motility, binocular vision and accommodation
- Slit lamp examination
- Fundus assessment
- Supplemental testing may be indicated for identifying associated ocular conditions, documenting and for monitoring retinal changes in patients with degenerative myopia:
 - Fundus photography
 - A- and B-scan ultrasonography
 - Visual field testing
 - Fasting blood sugar (to identify causes of induced myopia especially in sudden onset cases who were previously normal sighted)
 - Testing intraocular pressure exam

Management

- Management of refractive errors in children should include management of amblyopia.

Community	Primary	Secondary
<ul style="list-style-type: none">▪ Spectacles	<ul style="list-style-type: none">▪ Spectacles	<ul style="list-style-type: none">▪ Spectacles▪ Telescopes (see p. 66)

Prognosis & Follow-up

- Good prognosis with early detection and can be corrected with assistive devices; however, the condition itself does not go away without refractive surgery

Loss of vision (blindness)

A person who is blind has significant vision loss and presents with visual acuity $<3/60$ in the better eye with the best correction with spectacle.

- People with central vision loss (loss of the ability to see things directly in front of them) will have difficulty seeing detail in objects or people.
- People with peripheral vision loss (loss of the ability to see things on the edges of their vision) may have difficulty moving around, as seeing the ground under them and any obstacles is difficult.

Depending on the cause of blindness, people with blindness could be treated to improve or restore their vision. People who are permanently blind can be rehabilitated.

Presbyopia

Presbyopia is an age-related visual impairment. It results from the gradual decrease in accommodation expected with age and can have multiple effects on quality of vision and quality of life. Presbyopia may be classified as:

- Incipient (early/borderline)
- Functional (visual difficulties manifest)
- Absolute (no accommodative ability left)
- Premature (insufficient accommodative ability)
- Nocturnal (reduced amplitude of accommodation in dim illumination)

Etiology

- Age (40 years or above)
- Hyperopia (accommodative demand, especially if uncorrected)
- Occupation with high visual demand
- Ocular disease/trauma (removal or injury to lens, ciliary body or zonules)
- Systemic diseases (diabetes, multiple sclerosis, cardiovascular accidents, etc.)
- Drugs (decreased accommodation is a side-effect of prescription and over the counter drugs)
- Iatrogenic factors (intra-ocular surgery)

Presentation

- Blurred near vision
- Difficulty seeing at usual near working distance
- Asthenopia (fatigue, eye strain, headaches, etc.)
- Drowsiness
- Double vision (diplopia)

Examinations

- Patient history
- **Assess visual acuity (distance vision test, near vision test, pinhole)**
- Refraction
 - Objective refraction (static retinoscopy and/or autorefractometry)
 - Subjective refraction
- Binocular Vision and Accommodation
- Positive lens to clear near vision
- Positive and Negative Relative Accommodation (PRA/NRA)
- Amplitude of Accommodation (AA)
- Accommodative Convergence/Accommodation Test (AC/A ratio)
- Complete ocular assessment
- Take patient history
- Supplemental testing: retinoscopy to assess for any other coexisting refractive errors; intermediate distance testing

Management

Community	Primary	Secondary
<ul style="list-style-type: none">▪ Spectacles (see p. 60)	<ul style="list-style-type: none">▪ Spectacles	<ul style="list-style-type: none">▪ Spectacles▪ Multifocal lenses (bifocals, trifocals, etc.)▪ Low vision aids

Prognosis & Follow-up

- Presbyopia can be managed by use of appropriate spectacles and other vision assistive devices.

Endophthalmitis

This is severe inflammation involving both the anterior and posterior segments of the eye due to both exogenous and endogenous causes.

Etiology

Post-operative endophthalmitis is caused by the peri-operative introduction of microorganisms into the eye, either from the patient's normal conjunctival and skin flora, or from contaminated surgical instruments. Once the microorganisms enter the vitreous cavity, severe inflammation is likely to occur.

Presentation

- Bacterial endophthalmitis usually presents acutely with pain, redness, lid swelling, and decreased visual acuity
- Fungal endophthalmitis presents less acutely with blurred vision, pain, and decreased visual acuity
- Decreased vision and permanent loss of vision are common complications of endophthalmitis

Diagnosis & Examination

- Patient history
- A complete examination of both the anterior and posterior segments of the eye using a slit lamp or binocular loupe, or indirect ophthalmoscope is essential
- Vitreal tapping for gram stain, culture and sensitivity analysis
- B-scan

Management

- Treatment should begin promptly, within an hour of presentation, especially in severe cases

Community	Primary	Secondary
<ul style="list-style-type: none">▪ Refer	<ul style="list-style-type: none">▪ Refer	<ul style="list-style-type: none">▪ Topical, periocular, and intravitreal injections (vancomycin, ceftriaxone/cefuroxime)▪ Atropine to relieve pain

Prognosis & Follow-up

- Rapid recognition, diagnosis, and treatment is critical in optimizing outcomes

Primary Open-Angle Glaucoma (POAG)

A subset of glaucoma in the presence of an open anterior chamber angle.

Etiology

- Age: POAG increases in prevalence with age
- Family history and genetics
- Vascular dysregulation (migraine, vasospasm, abnormalities in ocular blood flow)
- Low ocular perfusion pressure
- Raised intraocular pressure (IOP)
- Myopia
- Central Corneal Thickness: thinner corneas are associated with increased risk

Presentation

- Most patients have no signs or symptoms until eyesight is lost at a later stage
- Damage progresses very slowly and destroys vision gradually, starting with the peripheral vision

Diagnosis & Examination

People suspected to have glaucoma should be referred for diagnosis and examination at secondary or tertiary facilities.

- Patient history
- **Assess visual acuity**
- **Conduct slit lamp/biomicroscopic examination**
- Assess pupil reactions
- Measure intraocular pressure (IOP) (record time of day)
- Assess Central Corneal Thickness
- Gonioscopy
- Evaluation of optic nerve head and retinal nerve fiber layer with magnified stereoscopic visualization
- Evaluation of the rest of the fundus (through a dilated pupil whenever feasible)
- Visual field evaluation

Management

Community	Primary	Secondary
<ul style="list-style-type: none"> ▪ Refer 	<ul style="list-style-type: none"> ▪ Refer 	<ul style="list-style-type: none"> ▪ Topical medication as initial therapy: <ul style="list-style-type: none"> - Prostaglandin (PG) derivatives: Latanoprost 0.005% apply once daily in the affected eye(s)³ - Beta-blockers: Timolol 0.25% or 0.5% apply twice daily in the affected eye(s) - Combined preparation: Combigan (brimonidine/timolol)⁴ 0.2%/0.5% apply twice daily in the affected eye(s) ▪ Set initial target IOP at 20% lower than pre-treatment IOP ▪ If patient is not responding to medical treatment, refer to tertiary facility for further management ▪ CAUTION: Alpha 2-Agonists (Brimonidine) is absolutely contraindicated in children <2 years of age

Prognosis & Follow-up

- Most patients have no signs or symptoms until eyesight is lost at a later stage. If not diagnosed and treated, it can cause a gradual loss of vision. Goal of treatment is to arrest or delay progression of disease, not for visual improvement; therapy will be lifelong.
- Condition usually responds well to medication, especially if caught early and treated.
- Glaucoma patients who are on medical treatment or have had surgery should be monitored for evidence of further physical damage (optic nerve damage) and functional loss (visual field changes) at least 4 times per year.

³ Dose should not exceed one drop in the affected eye(s) daily as more frequent administration may lessen the IOP lowering effect.

⁴ Improves convenience and patient's compliance. They are cost-effective.

Angle-Closure Glaucoma

Angle-closure glaucoma is glaucoma associated with a physically obstructed anterior chamber angle, which may be chronic or acute. Acute angle-closure glaucoma is an ocular emergency that results from a rapid increase in intraocular pressure due to outflow obstruction of aqueous humor.

Etiology

- Age
- Hyperopia
- Shallow peripheral anterior chamber
- Can be primary, secondary to another eye disease (e.g., phacomorphic glaucoma; ectopic lens; neovascularization of the angle secondary to diabetic retinopathy or ocular ischemia; tumors)
- May be drug-induced

Presentation

- Headaches
- Eye pain
- Nausea
- Rainbows around lights at night
- Very blurred vision.

Diagnosis & Examination

- Patient history
- People suspected to have glaucoma should be referred for diagnosis and examination at secondary or tertiary facilities.
- Examination typically reveals conjunctival hyperemia, a hazy cornea, a fixed mid-dilated pupil, and anterior chamber inflammation. Vision is decreased. IOP measurement is usually 40 to 80 mmHg
- Diagnosis is made by noting high intraocular pressure (IOP 40-80 mmHg), corneal edema, shallow anterior chamber, and a closed angle on gonioscopy

Management

Community	Primary	Secondary
<ul style="list-style-type: none">▪ Refer	<ul style="list-style-type: none">▪ Refer	<ul style="list-style-type: none">▪ Refer to tertiary facilities for advanced care (medication; laser or conventional surgery)

Prognosis & Follow-up

- Prognosis is favorable if the IOP can be controlled
- In general, surgery for angle-closure glaucoma is successful and long lasting. Regular checkups required to monitor other chronic forms of glaucoma

Squamous Cell Carcinoma of the Conjunctiva

Squamous cell carcinoma (SCC) of the conjunctiva is part of a wide spectrum of diseases called ocular surface squamous neoplasia (OSSN). It is a cancer of the surface of the eye (conjunctiva).

Etiology

- Multifactorial etiology, likely involves a variety of environmental factors in a susceptible host
- Prolonged exposure to ultraviolet radiations
- Immunosuppression/HIV
- Old age
- HIV /AIDS
- Association with HPV is unclear

Presentation

- Eye irritation/discomfort/foreign body sensation
- Growth or tumor on the eyeball that may exhibit the following features
 - Leukoplakic (white), fleshy-colored or red patch
 - Rounded, elevated growth
 - Growth that has gel-like appearance/gelatinous
 - Presence of large, dilated blood vessels leading to the tumor
- In early disease the tumor often appears in the bulbar conjunctiva nasally or temporally or at the limbus
- SCC should be suspected in cases of chronic conjunctivitis that lasts longer than 3 months

Diagnosis & Examination

- Patient history
- Suspected cases should be referred to a tertiary facility for assessment and management
- Diagnosis involves excision (total) biopsy and sending specimen for histopathological examination; staging will be based on the Tumor, Nodes, Metastasis (TNM) cancer staging system.
- Differential diagnoses: pterygium; solar keratosis; pinguecula

Management

- Management options will depend on clinical staging

Community	Primary	Secondary
<ul style="list-style-type: none">▪ Refer	<ul style="list-style-type: none">▪ Refer	<ul style="list-style-type: none">▪ Refer to tertiary facilities for advanced care (surgery, chemotherapy, and/or radiation therapy; palliative care)

Prognosis & Follow-up

- The prognosis will depend on the stage of the disease
- Follow up to be determined by the specialist

Stye (External Hordeolum)

Stye is a localized infection of the hair follicle of the eyelids.

Etiology

- Bacterial e.g., *Staphylococcus aureus*, *Streptococcus pneumoniae*
- Poor personal hygiene

Presentation

- Itching in the early stages
- Swelling of the eyelids
- Pain, tenderness
- Pus formation
- May burst spontaneously

Diagnosis & Examination

- Patient history
- External examination of the eye
- Differential diagnosis: chalazion; blepharitis, etc.

Management

Community	Primary	Secondary
<ul style="list-style-type: none">▪ Refer	<ul style="list-style-type: none">▪ Warm compress▪ Antibiotic eye drops▪ Antibiotic topical ointment	Primary management plus: <ul style="list-style-type: none">▪ Surgery for eyelid abscess (I&D) if needed

Trachoma

An infection of the eye caused by the bacteria *Chlamydia trachomatis*. Trachoma is easily spread through direct personal contact such as from fingers, through shared towels and clothes, and through flies that have been in contact with the eyes or nose of an infected person. Left untreated, repeated infections can cause severe scarring on the inside of the eyelid and the eyelashes to scratch the cornea (trichiasis). In addition to causing pain, trichiasis permanently damages the cornea and can lead to irreversible blindness. Trachoma is not endemic in Liberia.

Etiology

- Bacterial: *Chlamydia trachomatis*

Presentation

Early stages

- Reddening of the eye
- Irritation
- Follicles (grain-like growth) on the conjunctiva

Later stages

- Scar formation on the eyelids causing the upper eyelid to turn inwards (entropion) and causing the eyelashes to scratch the cornea (trichiasis)

Diagnosis & Examination

- Patient history
- Clinical examination using loupes
- Bacteria culture
- Differential diagnosis: allergic conjunctivitis (chronic); other chronic infections of the eye

Management

- Community diagnosis of trachoma is essential to establish whether the disease is of public health importance
- SAFE strategy including mass drug administration (see p. 70)

Prognosis & Follow-Up

- Trachoma is preventable and treatable
- Outcomes are good if treatment is started early before scarring and changes to the eyelids develop
- Untreated trachoma can lead to irreversible blindness

Uveitis

An inflammation of the uvea of the eye (i.e., the iris + the ciliary body + the choroid); may be anterior uveitis (more common), intermediate, or posterior uveitis.

Etiology

- Autoimmune diseases
- Prior infections (e.g., *Herpes simplex*, *Herpes zoster*, *Mycobacterium tuberculosis*, *Treponema pallidum*, *Toxoplasma*)
- Trauma or injury

Presentation

- Eye pain, usually a dull ache in or around the eye, which may be worse when focusing
- Sensitivity to light (photophobia)
- Blurred or cloudy vision
- Small shapes moving across field of vision (floaters)
- Keratic precipitates
- Lacrimation

Diagnosis & Examination

- Patient history
- Diagnosis of uveitis requires expertise and can only be confirmed by slit lamp examinations

Management

Community	Primary	Secondary
<ul style="list-style-type: none">▪ Refer	<ul style="list-style-type: none">▪ Atropine eye drops to relieve pain and refer	Primary management plus: <ul style="list-style-type: none">▪ Topical steroids▪ Oral steroid in cases of intermediate and posterior▪ Antibiotics in case of bacteria etiology

Prognosis & Follow-up

- Most cases of uveitis get better with treatment, especially if treated early
- Sometimes uveitis can lead to further eye problems such as glaucoma and cataracts

PROVIDING
VISION ASSISTIVE DEVICES

Assistive Technologies (AT)

Overview

Assistive devices—such as wheelchairs, hearing aids, and spectacles—are devices, equipment, instruments, and software that are external to the body that help to maintain or improve a person’s functioning and independence. The World Health Organization defines **assistive technologies (AT)** as the umbrella term for “systems and services used to deliver assistive products.” **Assistive products**, assistive devices, and AT are used interchangeably here.

Availability of and access to AT can potentially help to reduce hospitalization rates, avoid loss of productivity, and reduce long-term health care and welfare costs; this in turn allows disabled persons to minimized direct health and welfare costs and engage into productive and economic activities (UNDESA, 2019). Accelerating access to AT for people living with disabilities (PLWDs), the aging population and those affected by chronic health conditions can improve their well-being by enabling them to live healthy, productive, and independent lives where they can fully participate in education, the labor market and community life. In recent years, the World Health General Assembly Resolution (WHA71.8) and various international health strategies and call for action have also recognized AT access as being integral to the achievement of Universal Health Coverage (UHC).

Assistive devices may be provided to help persons with vision problems. They include products for people with refractive error or low vision that correct or improve vision; as well as products for people with low vision or blindness or use their hearing or touch to carry out tasks, or to move about (see Annex 16 for all vision assistive devices currently on the Liberia National APL).

Enabling AT Access

Providing AT is just one step to accessibility. For many people, access to AT allows them to participate in activities they want or need to. However, even with the appropriate AT, people may still face barriers that limit their participation (e.g. inaccessible environment and infrastructure, social stigma and discrimination, lack of accessible information, lack of supportive services). Enabling AT access must be considered together with holistic disability-inclusive health service delivery.

There are many roles in ensuring that people who require AT have access to them:

- The person who needs AT and their family and caregivers
- Those who identify a person who may benefit from AT, and refer them to services
- Trained personnel who work to provide a person with appropriate AT
- Community members who support people who use AT



Steps to AT provision

While the type of vision AT provided depends on the specific diagnoses after a clinical examination and assessment, there are **four basic steps to AT provision**. The amount of time it takes to complete these four steps depends on the complexity of the product, the capacity of the health worker and the patient/user.

1) Select

- Select the product that best meets the person's needs, considering their health, lifestyle, living environment, etc.
- Gather information about the person's health, activity and ability, and where they will use their assistive device.

2) Fit

Once the right assistive device has been selected, the provider must make sure that the product is:

- Properly assembled
- Adjusted to the right size
- Comfortable and safe for use

It is important to get direct feedback from the user during this step. Depending on the specific product, fitting may include making additional adjustments and/or modifications to the product to make sure it matches the user's needs.

3) Use

- Teach the user how to use and look after their assistive device.
- Explain how the product should be used, demonstrate how the product should be used, then have the user practice using the product.
- Where appropriate, also teach the user's family members or caregivers on how to use and look after the assistive device.
- Allow patients and family members to demonstrate the use of the assistive device.

4) Follow-up, maintenance & repair

Follow-up visits provide an opportunity to check whether the product is still meeting the user's needs and in good condition:

- Check that the product still meets the user's needs (for example, a child may require regular adjustments to size of the product as they grow).
- Check that the product is in good working order.
- Provide additional training as needed.
- Adjust the fit of the product.
- Conduct, arrange or refer for maintenance or repairs.
- Address other questions or concerns, including referrals for other health services as needed.

Reading Glasses

Overview

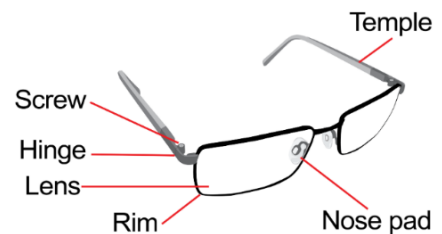
Spectacles, also called eyeglasses, are lenses mounted into a spectacle frame. Different types of spectacles can be used to help people see things more clearly. There are spectacles for hyperopia (farsightedness i.e., near objects appear blurry), myopia (nearsightedness i.e., distant objects appear blurry), presbyopia (near objects appear blurry, occurs with age), or astigmatism.

Spectacles can be fitted and used for adults or children. Spectacles may be provided at the community, primary and secondary levels (reading glasses), or at higher levels of care if they are more advanced (prescription glasses). These guidelines will focus on the provision of **reading glasses, which are ready-to-wear**. Reading glasses work by making texts or objects look larger for individuals with presbyopia. The strength of the lens determines how much bigger the text or objects will look, and the right lens and left lens have the same magnifying power.

Product description

Reading glasses have 2 main parts – the lens and the frame.

- 1) The **lens** is the part that people look through
- 2) The **frame** includes:
 - (i) Rims – hold the lens in place.
 - (ii) The bridge – joins the two rims and sits above the person's nose.
 - (iii) Nose pads – small plastic pieces that sit on either side of the user's nose to keep glasses in a comfortable position.
 - (iv) Temples – extend from the rim to each side of a person's head and over their ears.
 - (v) Hinge – allows the glasses to be folded when not in use.



Reading glasses usually have magnification range of +1.00 (weakest) to +3.00 (strongest) and go up in increments of 0.5.

Assess

To assess whether a person requires reading glasses, complete the basic vision screening test (see p. 10-12):

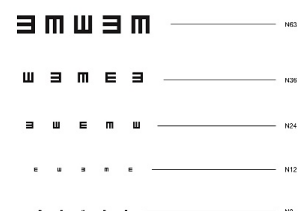
- A person who has problems with near vision can be fitted with reading glasses.
- A person who has problems with distance vision problems (whether or not they also have problems with near vision) cannot be fitted with reading glasses; they may need prescription glasses and should be referred to higher levels of care.

Select

See **ALGORITHM 6. SELECTING THE RIGHT READING GLASSES** in Annex 11.

At this point, you should have already screened the patient using the distance vision test (found normal), the near vision test (found abnormal), and concluded that the patient has near vision problems and require reading glasses. Note that if the patient's distance vision test was abnormal, they have low vision and reading glasses will not work for them. To select the best type of reading glasses, use the standard reading glasses E-chart and follow the steps below.

Standard Reading Glasses E Chart
(Testing Distance 40 cm)



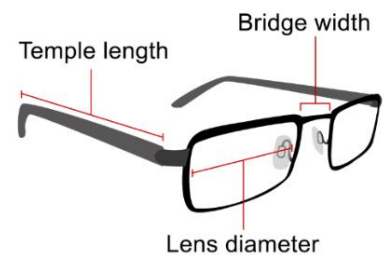
- 1) Hold, or have the person hold the **standard reading glasses E-chart** (full image in Annex 3) in front of them, at **~40 cm**.

- 2) Have the patient look at the E-chart with both eyes and ask them which is the **smallest row** they can see clearly by indicating direction of the E legs.
- 3) You will allow the patient to try on reading glasses starting with the lowest strength device (+1.00) and try to test their ability to see the **N8 row**.
- 4) Increase the strength of the reading glasses to determine which is most suitable for this patient to see clearly.
- 5) For some people, it may not be possible to find the right reading glasses at your facility level. If this happens, refer them to higher levels of care to see another eye health specialist for further assessment.

Fit

After selecting the appropriate strength of lenses, you will help fit the person with the best frame.

Reading glasses should fit comfortably on a person's face. Frame sizes may vary depending on the manufacturer, but common size options consider the diameter of the lens, width of the bridge, and length of the temples.



Find the frame size that best fits the person based on the products available and by checking the following:

- 1) The frame width should be no wider than the overall width of the person's face – there should be **no more than ONE finger width gap between the person's face and the arm of the glasses.**
 - If frame is too wide or narrow, the temples will not sit comfortably on the side of the face.
- 2) Ask the person if the glasses are comfortable (not pinching); the glasses should fit snugly on the bridge of the person's nose.
- 3) Ask the person to move their head up and down to ensure the glasses stay in place.
- 4) The frame should sit level on the person's face and is not slanted.



Use

Step 1. Explain the following to the reading glasses user:

- Confirm that these reading glasses are for seeing nearby text or objects more clearly. They can be worn whenever the person needs them; they will not cause the person any harm.
- The reading glasses are not for seeing faraway things more clearly.
- For general eye health, avoid reading things in dim or poorly lit areas.

Step 2. Tell the user they should see a health worker or return to the facility if they experience:

- Headaches
- Close up objects become hard to see again
- They are straining to see
- They need to hold objects or reading material too close or too far away to see them clearly

Step 3. Demonstrate how to handle the reading glasses.

- Handle reading glasses by the frame.
- Avoid touching the lens.
- Take reading glasses off and on with two hands. This helps to maintain the frame.
- Place reading glasses down so that they rest on the frame – **never put them down on the lenses.**
- Store reading glasses in a protective case.

Step 4. Demonstrate how to clean the reading glasses.

- 4.1 Rinse glasses under slightly warm tap water to remove dust and dirt.
- 4.2 With clean hands, gently rub both sides of the lens and frame.
 - **Do not dry rub the lenses.** This will cause dirt to be rubbed in and cause scratches.
- 4.3 Rinse thoroughly and dry with a clean lint free cloth (e.g., soft cotton cloth).



Step 5. Demonstrate how to check the screws on the glasses.

- Users should regularly check the tiny screws on the hinge and nose pads of the screws.
- Loose screws can be gently tightened with the correct size screwdriver.

Follow-up, maintenance, and repair

During any follow-up visit, remind the user how to use and take care of the reading glasses. Also ask the following questions to the user:

- Are the reading glasses still meeting the person's needs?
 - Can the person still see with them? As people get older, their vision can continue to change. They may need stronger reading glasses. They may also experience other vision problems.
 - Do the reading glasses still fit?
- Do the reading glasses need repair or replacing?
 - Are the reading glasses broken?
- Does the person require referral to another health service?
- It is particularly important to follow up children regularly (every 3-6 months)** because visual needs can change with age.

Basic maintenance and repair can be conducted by the user, or by a health worker during follow-up:

- If frame is broken or lens are severely scratched, health worker should provide a new pair of reading glasses**
- If screws are loose, tighten them with mini screwdrivers
- If screws are lost, replace with spare screws
- Remove the nose pad if broken, and replace with a spare

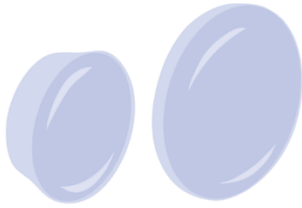


Magnifiers (hand-held, dome, or stand)

Overview

Magnifiers are a type of low vision assistive device that make objects appear larger. They are intended to be used by children and adults with low vision that cannot be fully corrected alone by spectacles or other treatments such as surgery. Magnifiers can help with near vision (i.e., helps to see objects that are close). **Magnifiers can make a huge difference for many children with low vision, especially in school.**

Product description

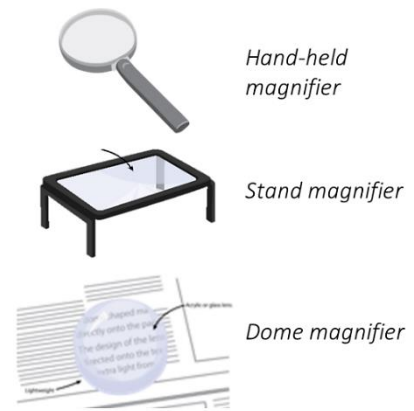


Left = high power lens is thicker, smaller diameter; Right = lower power lens is thinner, larger diameter

An optical magnifier uses positive power lens to produce a magnifying effect. The range of magnifying power (magnification) is measured in diopters (D). Magnifiers have different magnification power; some are stronger than others. A magnification power of 2x means the object appears two times larger than it is. Higher power devices have thicker, heavier, and smaller diameter lenses compared to lower power devices. This means you can see **less at once (but larger)** using high power magnifiers compared to lower power devices. Some magnifiers include a

built-in light source.

Magnifiers can be held in a person's hand (hand-held), stand on its own, or be worn in front of a person's eyes. There are also sheet magnifiers on adjustable stands, magnifiers that can be worn around the neck, etc. Some mobile smartphone apps also provide magnifying functions. Magnifiers can be used in addition to spectacles.



Assess

Not everyone with low vision will benefit from a magnifier. Before providing a magnifier, check that the patient has undergone basic vision screening test; other devices such as prescription glasses could improve their vision. You need to determine the type of magnifier most suitable for a patient, based on their daily activities and work, the magnifying power needed, etc. Follow the steps below to assess a patient for a magnifier:

- 1) Determine the patient's known vision problems.
 - a) Basic vision screening (eye health check; distance vision; near vision; low vision)
 - b) Determine if patient has problems with their central visual field
 - c) Determine if patient has problems with their peripheral visual field
 - d) Determine if patient has sensitivity to light
- 2) Find out about the person's ability and what activities they want to do.
- 3) Find out if the person wears glasses (prescription or reading glasses), and whether extra light to see clearly is particularly important.
- 4) Use the information gathered during the above assessment to decide if a magnifier may assist the person (and which type) (see Table 5 and Annex 12 for selection guidance).

Select

If the patient can be assisted by a magnifier, select a product to try with them.

- 1) Practice the activity that the patient wants to do with the **lowest** magnification power device available.
- 2) If the activity is still difficult for the patient, check that there is adequate light. Add light source if needed.

- 3) If the activity is still difficult with adequate light, try a device with the next level of magnification, until the correct magnifying power is found.

For some people, it may not be possible to find the right magnifier at your facility level. If this happens, refer them to higher levels of care to see another eye health specialist for further assessment.

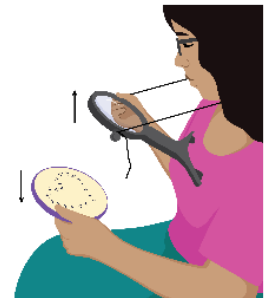
Table 5. Types of magnifiers

	Purpose	Advantages and characteristics	Disadvantages
Hand-held magnifier	For people with difficulty seeing objects, texts, pictures within arms' distance	<ul style="list-style-type: none"> Small, light, can fit inside pocket Plastic or glass lens Magnifying power between 2-4x 	<ul style="list-style-type: none"> Need to be kept at the correct distance from print/objects and held steady Difficult to use for tasks that require both hands
Dome magnifier	For people with difficulty seeing objects, texts, pictures within arms' distance	<ul style="list-style-type: none"> Small, light, can fit inside pocket Plastic or glass lens Magnifying power between 2-5x Can sit flat on a page or object Helps to direct natural light Use without good hand strength 	<ul style="list-style-type: none"> Not useful for activities such as writing
Stand magnifier	For people with difficulty seeing close up, and who need to use their hands for tasks or cannot hold a magnifier steady	<ul style="list-style-type: none"> Portable or fixed, with legs that stand Can use both hands for tasks Magnifying power between 2-5x Larger field of vision 	<ul style="list-style-type: none"> Larger, not as easy to carry around

Fit

Most magnifiers do not need to be fitted. However, if the product selected is a sheet magnifier with adjustable stands (adjust height), or around-the-neck magnifiers (adjust length of strap), they can be adjusted. The best height or length will depend on a person's vision and the magnifying power of the device.

- 1) Place magnifier over the object (e.g., writing on a page).
- 2) Slowly lift the magnifier away from the object towards the patient's eyes. Ask the patient to notice how the object begins to look bigger.
- 3) Keep lifting until the point when then the text, image, or object looks clearest to the patient. The adjustable stand or neck strap can be adjusted at this height/length.



Use

Teach the patient how to properly use their magnifier. The field of view (area that can be seen) through a magnifier is small, so it will take practice to use properly. If the person uses reading or prescription glasses, they should wear them when using their magnifier.

Remind the patient that having good light is important. Some tips:

- When indoors, sit beside a window or door to best use natural light
- Aim for the light to be coming from behind and to one side
- Do not face into the light
- Use light colored curtains to improve light in a room
- Use good electric lights where possible
- If outdoors, avoid being directly in the sun as this can cause glare; shade the eyes using a hat

Hand-held magnifiers

- 1) Hold the object (e.g., newspaper) at a comfortable distance, or place on a table.
- 2) Hold magnifier over the object and **slowly move the magnifier towards eyes.**

- 3) Keep going until the image is clearest; this is position to keep the magnifier during use.
- 4) If reading, slowly move the magnifier in the direction of reading (e.g., left to right) while trying to keep the same distance between the page and the magnifier.
- 5) At the end of the line move back across the same line to the beginning, then move down one line and start again. Use finger as a guide to help locate the next line if needed.

Stand magnifiers

- 1) Place the magnifier over the object.
- 2) **Move head as close to the magnifier** as needed to get a clear and the widest field of view.
- 3) Find a position that is comfortable to carry out the task. Take regular breaks to limit fatigue.

Dome magnifiers

- 1) Place the dome flat on the page.
- 2) **Move head as close to the magnifier** as needed to get a clear view.
- 3) If reading, slowly move the magnifier in the direction of reading, keeping it flat on the page.
- 4) At the end of the line move back across the same line to the beginning, then move down one line and start again.

Follow-up, maintenance, and repair

People who use magnifiers should be followed up regularly to make sure the product still meets their needs.

- Some low vision may get worse over time
- People's needs and activities change, so they may need a different product
- **It is particularly important to follow up children regularly (every 3-6 months)** because visual needs can change with age.

During any follow-up visit, ask the following questions to the user:

- Is the magnifier/telescope helping you to do the activities you want to use it for?
- Do you have any problems using your magnifier/telescope?
- Do you have any questions about your magnifier/telescope?
- Ask the patient to show you how they are using their magnifier. This will help you to find out if they need any further training.
- Check the condition of the device and replace if needed
 - Is the lens scratched or broken?
 - Is any other part of the product broken or worn out?

Magnifiers should be regularly cleaned and taken care of properly. Most magnifiers cannot be repaired if broken, so a replacement is usually necessary.

- 1) Clean the lens regularly with a soft cloth.
- 2) Keep in a soft cover or bag when not in use.

Telescopes

Overview

Telescopes are a type of low vision assistive device that make objects appear larger. Telescopes can help with distance vision (i.e., helps to see objects that are far away, such as a blackboard, street signs, or people across a room). Telescopes are not useful for people whose vision problem includes central visual field loss (i.e., cannot see directly in front of them). Note that this device is not included in the Liberia national APL.

Product description



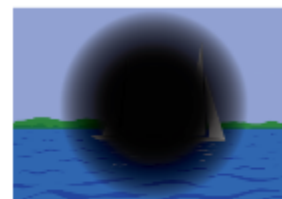
Hand-held telescopes are small, light, and can fit into a pocket. They have a plastic lens and come in magnification range of 2-6x. They usually have a neck or wrist strap for ease of use.

Assess

Not everyone with low vision will benefit from a telescope. Before providing a telescope, check that the patient has undergone basic vision screening test; other devices such as prescription glasses could improve their vision. Follow the steps below to assess a patient for a telescope.

- 1) Determine the patient's known vision problems.
 - a) Basic vision screening (eye health check; distance vision; near vision; low vision)

- b) Determine if patient has problems with their central visual field
 - The central visual field is the area of vision directly in front of a person.
 - A person with a limited central visual field cannot see people or objects in front of them (see diagram on the right).
 - **Telescopes are not suitable for people with a central visual field problem.**



- c) Determine if patient has problems with their peripheral visual field
 - The peripheral visual field includes the things we see on the edges of our vision.
 - A person with a limited peripheral visual field only sees things directly in front of them (see diagram on the right).
 - **Telescopes are not suitable for people with a peripheral visual field problem**



- 2) Determine if patient has sensitivity to light
- 3) Find out about the person's ability and what activities they want to do.
- 4) Find out if the person wears glasses (prescription or reading glasses), and whether extra light to see clearly is particularly important.
- 5) Use the information gathered during the above assessment to decide if a telescope may assist the person (and which type) (see Annex 12 for selection guidance).

Select

If the patient can be assisted by a telescope, select a product to try with them. Similar to magnifiers, telescopes also have different magnification power; some are stronger than others. For some people, it may not be possible to find the right telescope at your facility level. If this happens, refer them to higher levels of care to see another eye health specialist for further assessment.

Use

Teach the patient how to properly use their hand-held telescope. This requires extensive training. The field of view (area that can be seen) through a telescope is small, so it will take practice to use properly. If the person uses reading or prescription glasses, they should wear them when using their telescope.

- 1) Remove any caps from the telescope to allow viewing and show the person the part of the telescope that is held to the eye (eyepiece).
- 2) Hold telescope steady as close to the eye as possible (used with the better eye).
- 3) **To focus:**
 - (i) Identify a large object in the distance, without the telescope.
 - (ii) Hold telescope to the eye, turn the focusing ring out as far as possible while looking at the object.
 - (iii) Turn the focusing ring in the opposite direction slowly, to bring the object into focus.
- 4) **To localize** (i.e., find objects at a distance):
 - (i) Start by practicing finding and focusing on large objects in the distance.
 - (ii) When confident, progress to finding and focusing on smaller objects.
 - (iii) When objects that are still/not moving can be localized, progress to finding and focusing on moving objects such as people.
- 5) **To track moving objects:**
 - (i) Always move the head rather than the eyes when tracking.
 - (ii) Start by tracking a straight line by following a line on the floor. This involves practicing the correct head movements (scanning) to follow an object.
 - (iii) When confident, the person can practice tracking the service provider or a family member as they walk around the room.
 - (iv) Progress to faster moving objects when confident.

A telescope should never be used while the person is moving, as it limits field of view and is dangerous.

Follow-up, maintenance, and repair

People who use telescopes should be followed up regularly to make sure the product still meets their needs.

- Some low vision may get worse over time
- People's needs and activities change, so they may need a different product
- **It is particularly important to follow up children regularly (every 3-6 months)** because visual needs can change with age.

During any follow-up visit, ask the following questions to the user:

- Is the magnifier/telescope helping you to do the activities you want to use it for?
- Do you have any problems using your magnifier/telescope?
- Do you have any questions about your magnifier/telescope?
- Ask the patient to show you how they are using their telescope. This will help you to find out if they need any further training.
- Check the condition of the device and replace if needed
 - Is the lens scratched or broken?
 - Is any other part of the product broken or worn out?

Telescopes should be regularly cleaned and taken care of properly. Most telescopes cannot be repaired if broken, so a replacement is usually necessary.

- 1) Clean the lens regularly with a soft cloth.
- 2) Keep in a soft cover or bag when not in use.

White Canes

Overview

White canes are long sticks (folded and unfolded) with a handle on one end and a tip or roller on the other. The body of the white cane is covered with reflective tape to make the user visible. White canes are intended for use by children and adults with low vision or blindness to help with walking.

A white cane gives users information about the environment they are moving through, such as obstacles in their path, stairs they are coming to, curb edges they are approaching and various other aspects of their environment.

The device also helps to tell others that the user has low vision or is blind. Some white canes have a section of red or yellow paint or reflective tape at the tip to indicate the user is blind; others have alternating colors of white and red indicating both vision and hearing loss.

In Liberia, white canes are provided by health workers specializing in vision/mobility assistive devices.



Contact Lenses

Overview

Contact lenses (contacts) are thin, clear plastic disks worn in the eye to improve vision. Contacts float on the tear film that covers the cornea. Contacts, like spectacles, are used to correct refractive errors (hyperopia, myopia, presbyopia, astigmatism). Contact lenses are assistive devices that must be prescribed after appropriate vision screening and assessment; currently they are not common in Liberia. Education on the adverse effect of contact lens use is important for users to avoid keratitis.

Braille Writing Equipment / Brailleurs

Overview



Braille slate/frame



Braille typewriter

Braille writing equipment and braille machines are used to either manually (the former) or mechanically (the latter) produce embossed Braille characters on paper.

Braille writing equipment consists of a manually operated slate or frame with Braille cells and a special-tipped object called a stylus. The stylus is a short rod with a blunted point and is used to emboss the Braille dot into the page by hand.

A Braille typewriter has a hard casing and a keypad. Braille letters are indented into Braille paper by pressing on one of the six Braille keys. They are intended to support communication for children and adults with blindness or low vision and for Braille transcribers to write in Braille.

Prevention of Eye Conditions

While screening and treatment guidelines have been provided in previous sections, prevention is an essential and effective element to eye health interventions. Preventative interventions in eye health may be those that prevent the incidence of eye conditions before they occur by targeting the specific causes and risk factors, or those that prevent eye conditions which are secondary to other health conditions.

Conjunctivitis

Infective conjunctivitis can be prevented by improving personal hygiene (e.g., daily face washing, handwashing, avoid touching eyes with unwashed hands). Use clean towels and clean cloths. Do not share personal eye care items. Allergic conjunctivitis can be prevented by avoiding known irritants and allergens.

Corneal Opacities

Interventions to prevent health conditions such as vitamin A deficiency, measles and rubella, through vitamin A supplementation and immunization, are highly effective in reducing the risk of corneal opacities that can occur secondary to these conditions. Community education on avoiding harmful traditional eye practices is also important.

Diabetic/Hypertensive Retinopathies

In diabetic patients, optimal management of hyperglycemia and hypertension can help prevent, delay onset, or help reduce the progression of diabetic retinopathy. Regular eye examination for early detection of complications is key.

Eye Injuries

Use protective eyewear when working under conditions that may damage your eyes, for example, when welding, working with chemicals, working with metal or wood, etc. Wear protective eyewear when playing sports that could result in eye injuries. If chemicals or substances that burn or sting come into contact with your eyes, immediately rinse your eyes with cold, **clean water** for at least 15 minutes and seek care.

Myopia

Prevention can be done in the form of lifestyle changes, such as increased time spent outdoors and decreased near-work activities.

Onchocerciasis (River Blindness)

Please refer to the latest Ministry of Health guidelines on Neglected Tropical Diseases (NTDs) for details.

Retinopathy of Prematurity

See p. 14 above on ROP.

Trachoma

The **SAFE strategy** is effective in preventing the transmission of infection through eyelid surgery for trichomatous trichiasis (S); antibiotics (A) such as mass drug administration of azithromycin; facial cleanliness (F); and environmental improvements such as increase access to clean water and sanitation (E).

Figure 3. Trachoma SAFE strategy



Promoting Healthy Eyes

Health messages for mothers and caregivers of children

- ❖ Prevent serious eye infections in newborn infants: clean their eyes immediately after birth and if available, instill antibiotic eye medication.
- ❖ A baby with swollen eyelids and severe eye discharge needs treatment immediately: seek help from the nearest health facility.
- ❖ To avoid your child being lifelong blind, seek help from an eye care provider as soon as possible if the child's eyes do not look normal, the child does not look towards or follow a face, bright object or light source, or if someone thinks the child may have eye or vision problems.
- ❖ Children should not play with or near sharp objects to avoid eye injuries.

Health messages for all ages concerning eye health:

- ❖ Use protective eyewear when working with objects that might damage your eyes: welding, chemicals, projectile metal or wood, etc.
- ❖ If chemicals, or substances that burn or sting, come into contact with your eye, immediately rinse your eye with clean water for at least 15 minutes.
- ❖ If you have an eye problem, go to your nearest health care facility as soon as possible. Go immediately if you have an eye injury, if your eyes are painful or if your vision suddenly becomes poor.
- ❖ Do not put any medication into your eyes unless prescribed by a health care provider.
- ❖ Protect your eyes from excessive sunlight with, for example, hats, scarves, sunglasses, or umbrellas.
- ❖ If you have diabetes prevent your eyes from going blind by having a complete eye examination at least once a year, and by checking your blood sugar regularly.
- ❖ If you have a relative with glaucoma, have an eye examination for glaucoma at least once a year.
- ❖ If you have problems seeing small nearby objects or when reading, you may need glasses.

ANNEX

Annex 1. Health Worker Scopes of Work for Eye Care

Cadre	Basic vision screening*	Basic eye care techniques**	Management of eye conditions based on guidelines	Referral as needed
Ophthalmologists	Yes	Yes	All levels	Yes
Optometrist	Yes	Yes	All levels	Yes
Doctors	Yes	No	Secondary-level management	Yes
Cataract surgeons	Yes	Yes	Secondary-level management	Yes
Nurses	Yes	No	Primary-level management	Yes
Ophthalmic nurses/ Ophthalmic medical assistants (OMA)	Yes	Yes	All levels	Yes
Physician assistants	Yes	No	Primary-level management	Yes
Optometric technicians	Yes	Yes	Secondary-level management	Yes
Vision technicians	Yes	Yes	Primary-level management	Yes
Midwives	Yes	No	Primary-level management	Yes
Nurse aides	Yes	No	Primary-level management	Yes
Community Health Assistants (CHA)	Yes	No	Community-level management	Yes
Community Health Promoters (CHP)	Yes	No	Community-level management	Yes

*Basic Vision Screening Page 10-12

**Basic Eye Care Techniques Page 25-33

Annex 2. Essential Medicines, Supplies, Equipment List for Basic Eye Care

		Community	Primary	Secondary
General				
General supplies	✓ PPE	✓	✓	✓
	✓ Pain reliever (e.g., NSAIDs)	✓	✓	✓
	✓ Atropine eye drops		✓	✓
	✓ Cotton buds (sterile)		✓	✓
	✓ Torchlight		✓	✓
Supplies and equipment for clinical examinations				
Visual acuity (distance, near, pinhole)	<ul style="list-style-type: none"> ✓ Snellen charts with letters, pictures, numbers, or tumbling E (E-charts) ✓ Pinhole ✓ Measuring tape ✓ Patch/occlude ✓ LogMAR charts; LEA symbols, Sloan letters; HOTV charts; Kay's pictures* 	✓	✓	✓
General newborn or infant vision screening	<ul style="list-style-type: none"> ✓ Medical torch/flashlight/penlight ✓ Ophthalmoscope set 		✓	✓
Strabismus or amblyopia	<ul style="list-style-type: none"> ✓ Light ✓ Eye occluder ✓ Direct ophthalmoscope* 		✓	✓
Preferential looking visual acuity (for infants and toddlers)	<ul style="list-style-type: none"> ✓ Stimulus fields ✓ Peepholes 			✓
Torchlight exam (external eye examination)	<ul style="list-style-type: none"> ✓ Torch or phone flashlight ✓ Fixation object 	✓	✓	✓
Slit lamp exam	<ul style="list-style-type: none"> ✓ Slit lamp biomicroscope ✓ 60D, 78D, or 90D lens ✓ Stand and table-top for slit lamp 			✓
Automated refraction/objective refraction	<ul style="list-style-type: none"> ✓ Autorefractor ✓ Photoscreener ✓ Computer software 			✓
Subjective refraction	<ul style="list-style-type: none"> ✓ Universal trial frame ✓ Pediatric trial frame ✓ Lens bars ✓ Cross cylinder ✓ Light box ✓ Full aperture trial lens set 			✓
Retinoscopy	<ul style="list-style-type: none"> ✓ Retinoscope ✓ Retinoscopy lens rack 			✓
Visual field testing	<ul style="list-style-type: none"> ✓ Standard automated perimeter with progression software ✓ Amsler grid chart ✓ Pencil 			✓
Contrast sensitivity	<ul style="list-style-type: none"> ✓ Pelli-robson chart ✓ Bailey Lovie chart 			✓
Color vision	<ul style="list-style-type: none"> ✓ Ishihara plates ✓ HRR plates 			✓
Tonometry	<ul style="list-style-type: none"> ✓ Applanation tonometer ✓ Non-contact tonometer ✓ Fluorescein strips 			✓
Keratometry	<ul style="list-style-type: none"> ✓ Keratometer 			✓
Biometry	<ul style="list-style-type: none"> ✓ Optical and/or ultrasound biometer 			✓
Direct ophthalmoscopy	<ul style="list-style-type: none"> ✓ Direct ophthalmoscope 			✓
Indirect ophthalmoscopy	<ul style="list-style-type: none"> ✓ Indirect ophthalmoscope ✓ 20D lens ✓ 28D lens 			✓

		Community	Primary	Secondary
	✓ Pan retinal pens			
Gonioscopy	✓ Goniolens ✓ Slit lamp			✓
Ultrasonography	✓ Ultrasound scanner Mode A and B ✓ Coupling agent ✓ Computer and software for viewing images			✓
Pachymetry	✓ Ultrasound/optical pachymeter ✓ Computer and software			✓
Fundus photography	✓ Fundus camera			✓
Binocular vision assessment – Stereoacuity test	✓ Titmus Stereo Test			✓
Binocular vision assessment – Fusion test	✓ TNO Stereo Test			✓
Binocular vision assessment – Prism test	✓ Lang Stereo Test			✓
Duochrome	✓ Frisby Stereo Test			✓
Optical coherence tomography (OCT)	✓ Random Dot Stereo Test			✓
Dry eye assessment	✓ Supplies as needed			✓
Corneal topography	✓ Supplies as needed			✓
Color vision test	✓ Supplies as needed			✓
Functional vision assessment	✓ Visual functioning questionnaire (including assessment of vision for learning, parent input, and activities of daily living)			✓
For non-surgical management				
Spectacles	✓ Frames (including options for bifocals) for adults and children ✓ Inventory of optical lenses ✓ Auto-edger ✓ Lensmeter ✓ Manual edger ✓ Frame heater ✓ Pattern cutter ✓ Centration device ✓ Set of optical pliers			✓
Spectacles, ready-to-wear (reading glasses)	✓ Ready-to-wear reading spectacles (+1.00, +1.50, +2.00, +2.50, +3.00)	✓	✓	✓
Magnifiers	✓ Magnifiers			✓
Telescopes	✓ Telescopes			✓
Patching (for strabismus, amblyopia)	✓ Eye patch	✓	✓	✓
Management of posterior capsular opacification	✓ YAG Laser			✓
Laser peripheral iridotomy	✓ YAG Laser			✓
Selective laser trabeculoplasty	✓ YAG Laser			✓
Irrigation of the eyes, simple	✓ Clean water ✓ Saline ✓ Cotton buds	✓	✓	✓
Irrigation of the eyes, in case of chemical exposure	✓ Clean water ✓ Saline ✓ IV infusion set for irrigation ✓ Ringer lactate solution	✓	✓	✓
Management of corneal abrasions, erosions, and/or small perforations	✓ Bandage contact lens ✓ Cyanoacrylate glue			✓
Punctal occlusion for dry eye	✓ Lacrimal dilator ✓ Silicone punctal plugs			✓
Anti-vascular endothelial growth factor (anti-VEGF) therapy	✓ Speculum ✓ Calipers ✓ Tuberculin syringe ✓ 30 or 32 gauge needle			✓
Retinal laser photocoagulation	✓ Slit lamp delivery system with a contact lens ✓ Indirect ophthalmoscope system with non-contact binocular indirect ophthalmoscope condensing lens (28D or 20D)			✓

		Community	Primary	Secondary
	<ul style="list-style-type: none"> ✓ Coupling agent ✓ Laser protection goggles 			
Cleaning eyelids	<ul style="list-style-type: none"> ✓ Sterile gauze swabs or cotton buds ✓ Clean water ✓ Saline 	✓	✓	✓
Applying warm compress	<ul style="list-style-type: none"> ✓ Bowl of warm, clean water ✓ Clean towel or cloth 	✓	✓	✓
Everting eyelids	<ul style="list-style-type: none"> ✓ Sterile cotton buds ✓ Paper clip or small blunt object (pen cap) 		✓	✓
Instilling eye drops or applying eye ointment	<ul style="list-style-type: none"> ✓ tetracycline eye ointment ✓ gentamycin or chloramphenicol ✓ ciprofloxacin ✓ doxycycline ✓ cefixime ✓ ceftriaxone ✓ natamycin suspension, voriconazole eyedrops ✓ acyclovir ✓ atropine ✓ NSAID eye drops such as ketorolac 4% ✓ ofloxacin ✓ tobramycin ✓ combination of steroids and antibiotics ✓ lidocaine + adrenaline ✓ amethocaine/tetracaine/acain/proparacaine ✓ tropicamide + phenylephrine 		✓	✓
Applying eye pads or eye shields	<ul style="list-style-type: none"> ✓ Scissors ✓ Sterile gauze ✓ Sterile cotton wool ✓ Cardboard and adhesive tape 	✓	✓	✓
Removing a foreign body	<ul style="list-style-type: none"> ✓ Local anesthetic eye drops, if available ✓ Cotton buds (sterile) or clean cloth ✓ Saline or cooled boiled water 		✓*	✓
For surgical interventions				
Strabismus surgery	<ul style="list-style-type: none"> ✓ Strabismus set 			✓
Filtration surgery (trabeculectomy) and iridectomy	<ul style="list-style-type: none"> ✓ Trabeculectomy set 			✓
Glaucoma surgery – glaucoma drainage devices	<ul style="list-style-type: none"> ✓ Ahmed valve 			✓
Cataract surgery	<ul style="list-style-type: none"> ✓ Anesthetic equipment and consumables ✓ Cataract equipment and consumables 			✓

Annex 3. Standard Reading Glasses Screen E-Chart

Standard Reading Glasses E Chart

(Testing Distance 40 cm)

≡ ≡ ≡ ≡ ≡ _____ N60

≡ ≡ ≡ ≡ ≡ _____ N36

≡ ≡ ≡ ≡ ≡ _____ N24

≡ ≡ ≡ ≡ ≡ _____ N12

≡ ≡ ≡ ≡ ≡ _____ N8


Annex 4. Community Eye Health Protocol



*Refer to the updated Community Health Assistants Training Modules for details.

1 Set Up the Space	2 Greet the client	3 Explain and Demonstrate	4 Test Distance Vision
5 Test Near Vision	6 Dispense Reading Glasses	7 Do the Torchlight Test	8 Follow Up

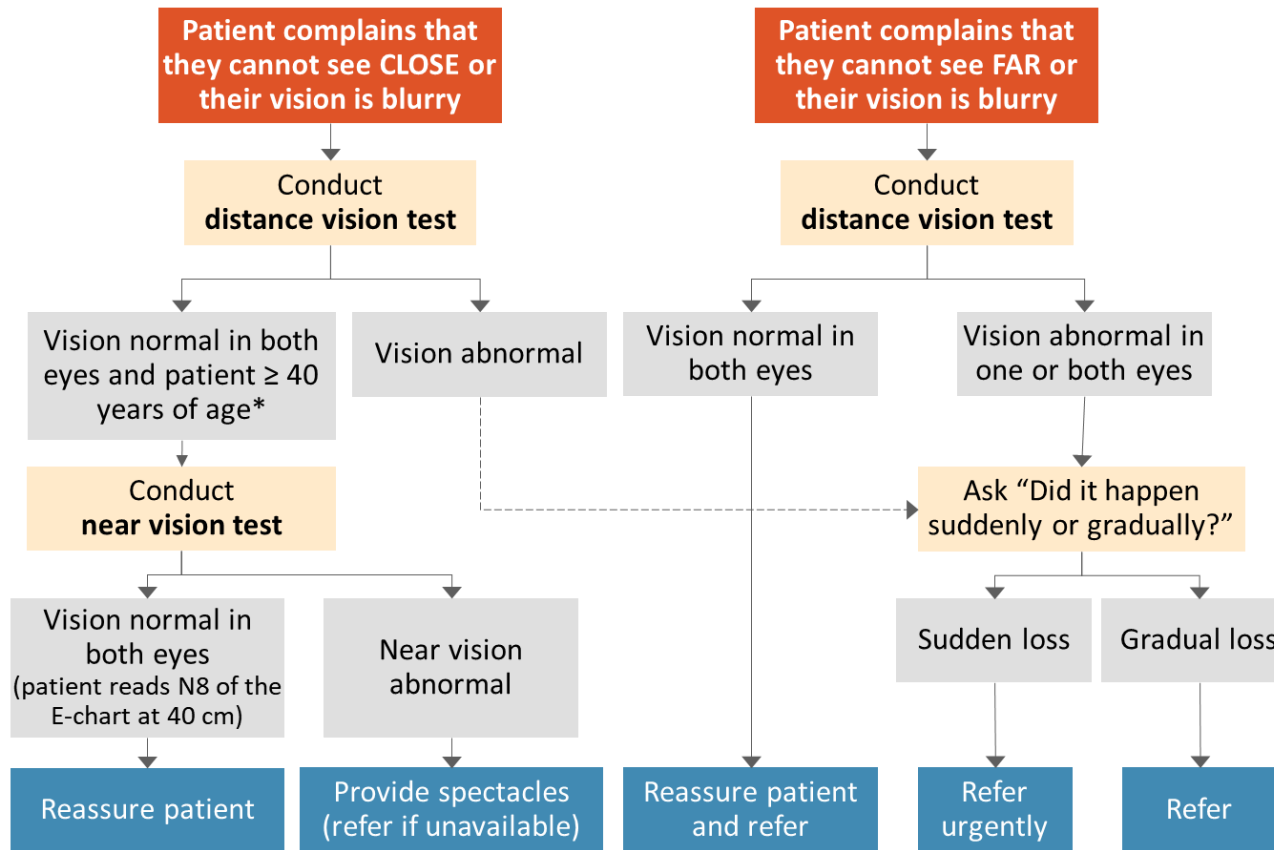
Annex 5. Basic Vision Screening Form

*From WHO TAP Training Platform.

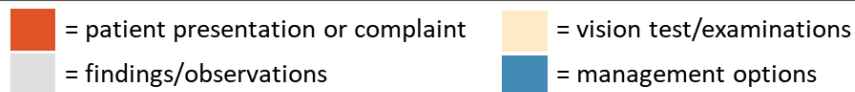
Screening form: Eye health and vision				TAP	
1. Information about the person					
First name:	Family name:		Gender:	Male <input type="checkbox"/>	Female <input type="checkbox"/>
Age:	0-5 <input type="checkbox"/>	6-18 <input type="checkbox"/>	19-39 <input type="checkbox"/>	40-54 <input type="checkbox"/>	55+ <input type="checkbox"/>
Address:			Telephone:		
2. Simple eye health check					
Look closely at each eye with torch					
Do both eyes look normal (healthy)?		Yes <input type="checkbox"/>	No <input type="checkbox"/>	→ Refer to eye health professional	
Ask the following questions					
Do you have diabetes?		Yes <input type="checkbox"/>	No <input type="checkbox"/>	If Yes to either question → Refer to eye health professional	
Do you have any eye pain or discomfort?		Yes <input type="checkbox"/>	No <input type="checkbox"/>		
3. Simple vision tests					
Check if the person wears glasses prescribed by an optician / trained glasses provider					
Do you wear glasses that were prescribed for you?		Yes <input type="checkbox"/> No <input type="checkbox"/>			
If Yes Are these glasses for:	Seeing in the distance	<input type="checkbox"/>	→ Wear for simple distance vision test		
	Seeing up close	<input type="checkbox"/>	→ Wear for simple near vision test		
	Not sure	<input type="checkbox"/>	→ Do not wear during tests		
Carry out simple distance vision test					
Distance: 3m Instructions: Test one eye at a time, starting with the large E.		<i>Tick the smallest E the person can see clearly for the right then the left eye</i>			
	Small E	L <input type="checkbox"/>	R <input type="checkbox"/>	Distance vision is normal	
	Medium E	L <input type="checkbox"/>	R <input type="checkbox"/>	This person may need prescription glasses	
	Large E	L <input type="checkbox"/>	R <input type="checkbox"/>	→ Refer to an eye health professional	
	Cannot see large E	L <input type="checkbox"/>	R <input type="checkbox"/>	This person may benefit from low vision AP → Refer to eye health professional → Low vision AP assessment only after eye health professional assessment.	
Carry out simple near vision test					
Distance: 40cm (or at a distance that is comfortable for the person) Instructions: Test both eyes at the same time (both eyes open).		Can see small E <input type="checkbox"/> Near vision is normal			
		Cannot see small E <input type="checkbox"/> If person is 40 or older and distance vision is normal → Reading glasses assessment If person is younger than 35 → Refer for an eye exam			
4. Plan					
Refer:	To doctor	<input type="checkbox"/>	Assess for:	Reading glasses <input type="checkbox"/>	
	To eye health professional	<input type="checkbox"/>		Low vision AP (after eye health professional assessment) <input type="checkbox"/>	
	Other: <input type="text"/>			No action <input type="checkbox"/>	
<input type="checkbox"/> Referral recommended <input type="checkbox"/> Write notes here TAP Vision AP SCREENING FORM RevC Aug20.pdf Page 1 of 2					

Additional information: Eye health and vision screening		TAP	
How to carry out the simple distance vision test			
	<ul style="list-style-type: none"> • Testing distance: 3 metres • Test one eye at a time, covering the other eye gently with the palm of the hand. • Test the right eye before testing the left. • Start with the large E, and test each row. • The person 'passes' each row if they can clearly see the Es • Record the smallest E row the person can see for each eye. 		
How to carry out the simple near vision test			
	<ul style="list-style-type: none"> • Testing distance: 40 cm or at a distance that is comfortable for the person. • Test both eyes at the same time (both eyes open). • Ask the person to hold the E-Chart in front of them. If they cannot hold it easily, you can hold it for them. • Test the row of 5 small Es at the bottom of the chart. • The person 'passes' if they can clearly see at least four of the five near vision Es. • Record if the person can or cannot see four of the five near vision Es. 		
Signs of an unhealthy eye			
What you may see	<ul style="list-style-type: none"> • Redness or swelling • Lumps, bumps or growths on or near the eye • Discharge from eyes • Centre of the person's eye (pupil) is white or cloudy (signs of a cataract) • Pupil not reacting to light • Jerky or rapid eye movements 		
What people may say	<ul style="list-style-type: none"> • Sudden bad headache that has lasted longer than a few hours • Eyes are painful or uncomfortable (for example itchy, weeping, dry) 		
What you should do	<ul style="list-style-type: none"> • Refer to an eye health professional. • You can carry out the vision tests, and send a copy of the completed form with the person to the eye health professional. 		
What if a person has glasses?			
Find out	<ul style="list-style-type: none"> • Were the glasses prescribed for them? Prescribed means that the glasses were chosen or made just for them, after a test has been done to check their vision. The test should be done by a trained eye health professional. • Are the glasses for seeing in the distance, up close (near), or for both? 		
Should they wear their glasses during the test?	Yes	<ul style="list-style-type: none"> • If glasses were prescribed for seeing in the distance, they should wear them for the simple distance vision test • If glasses were prescribed for seeing close up they should wear them for the simple near vision test • If glasses were prescribed for both seeing in the distance and seeing close up, they should wear them for both distance and near vision test. 	
	No	<ul style="list-style-type: none"> • If the glasses were not prescribed for them, do not belong to them, or they are not sure what they are for – they should not wear them during the test. 	
TAP Vision AP SCREENING FORM RevC Aug20.pdf Page 2 of 2			

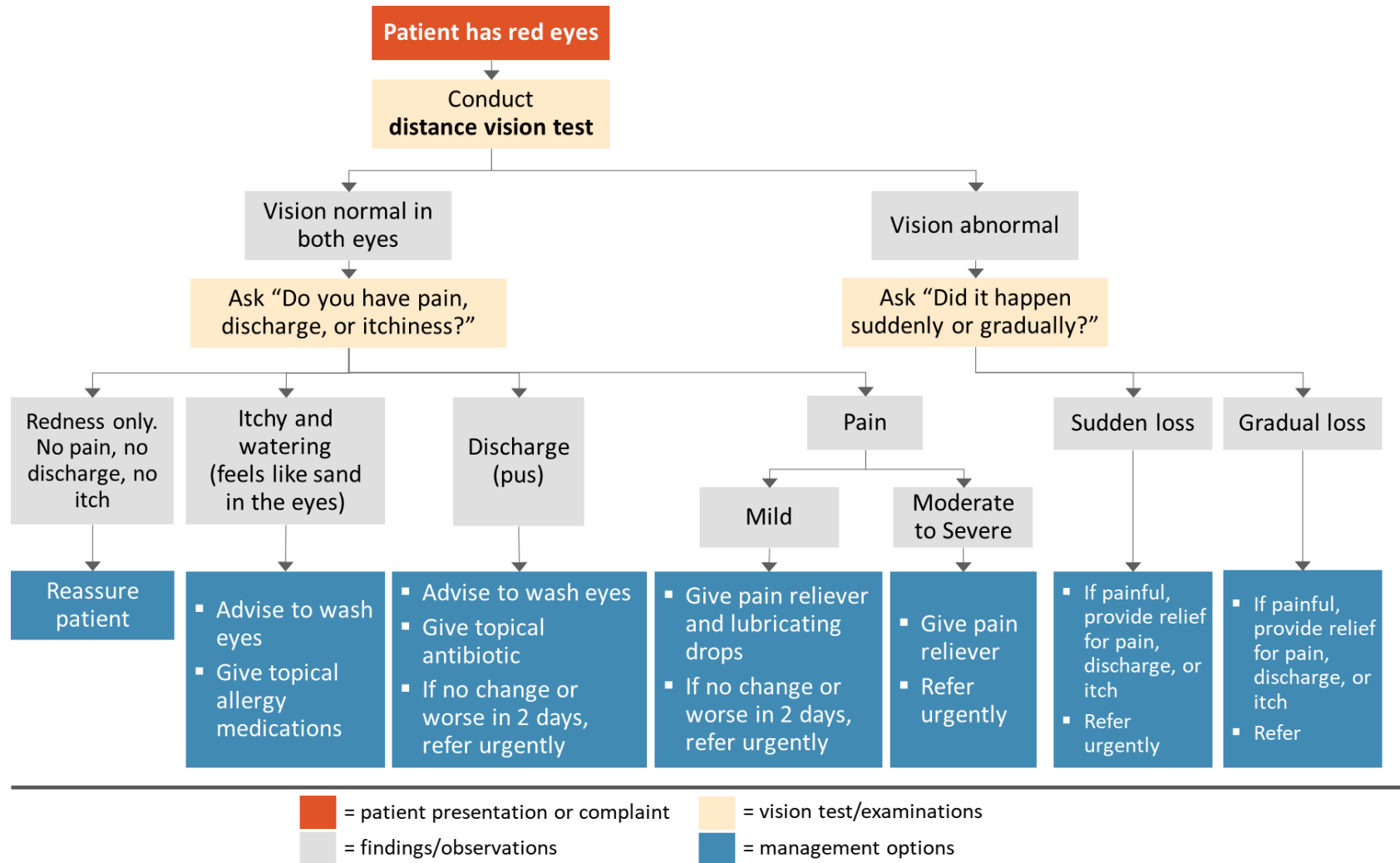
Annex 6. Algorithm 1: If patient cannot see well



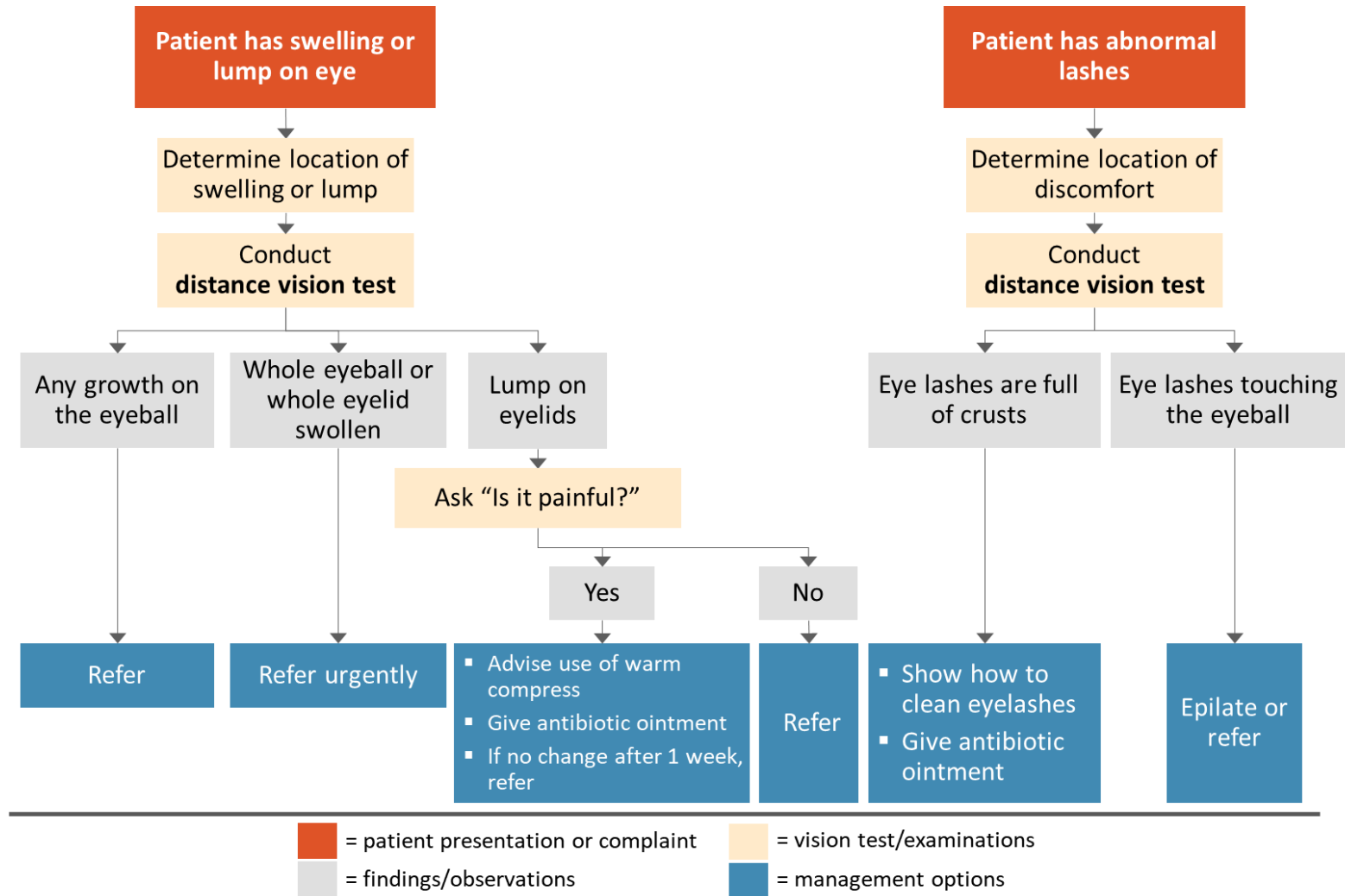
**If patient is below 40 years of age, reassure and send home.*



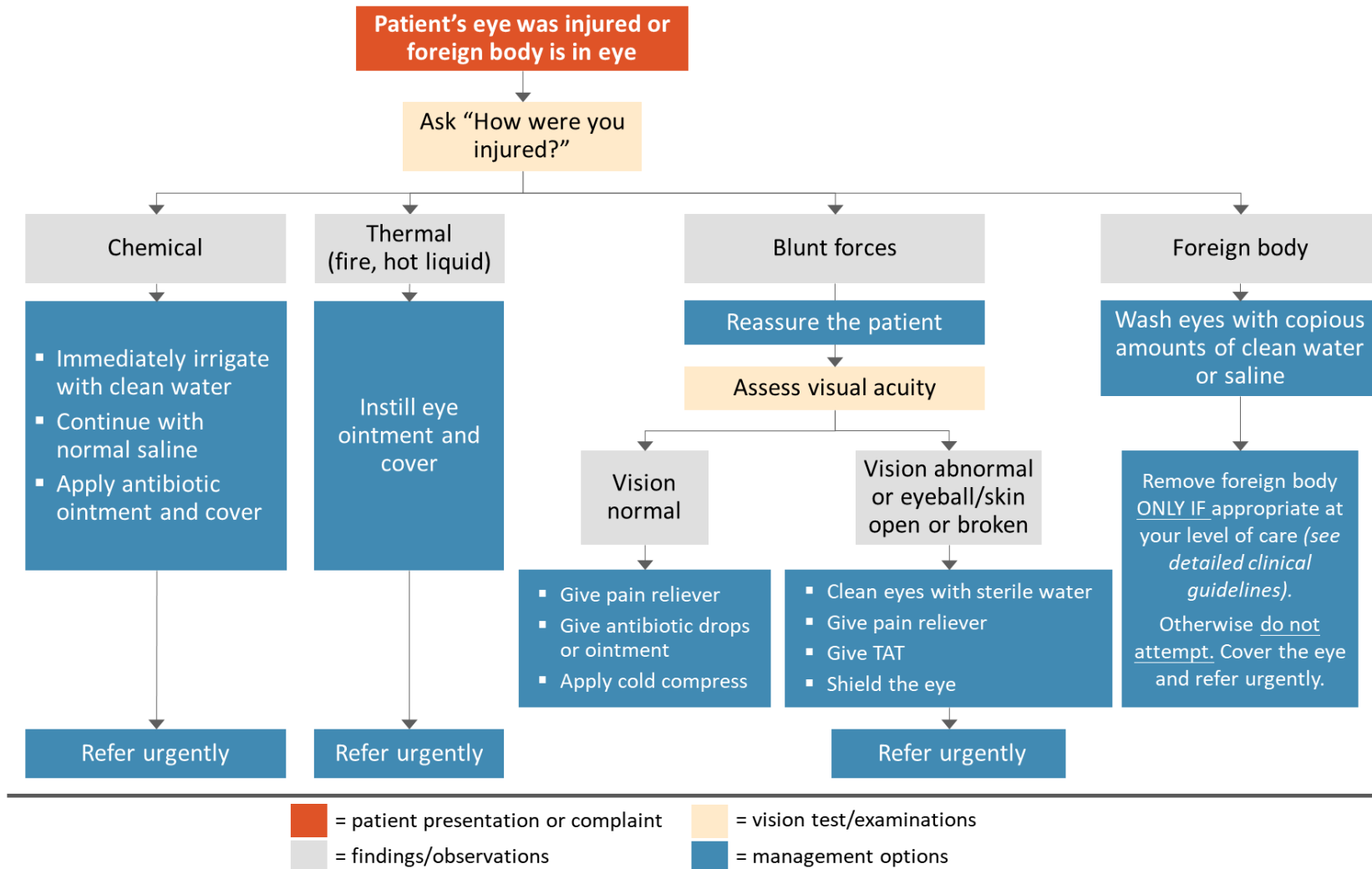
Annex 7. Algorithm 2: If patient has red eye



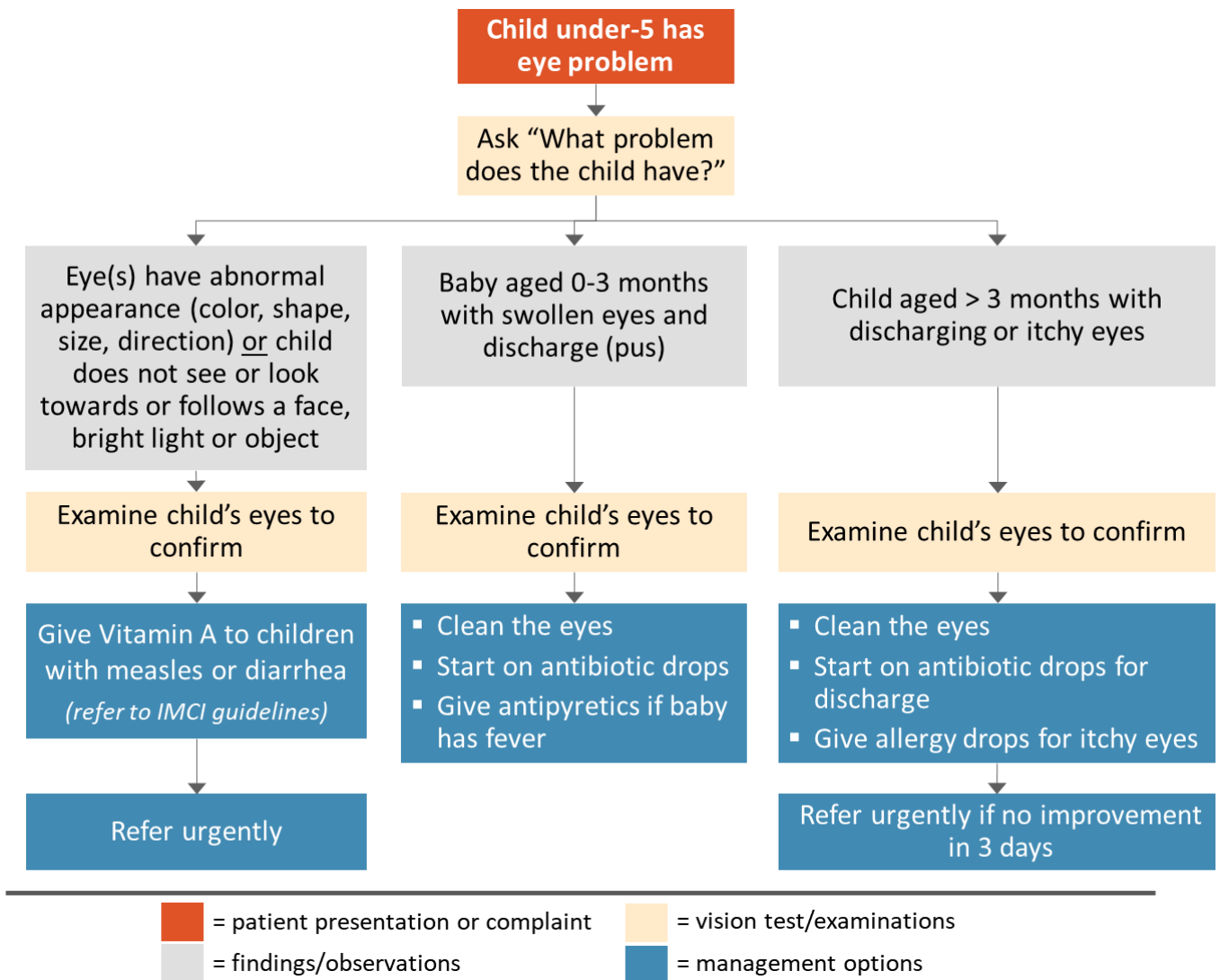
Annex 8. Algorithm 3: If patient has swelling, lump on eye or abnormal eyelashes



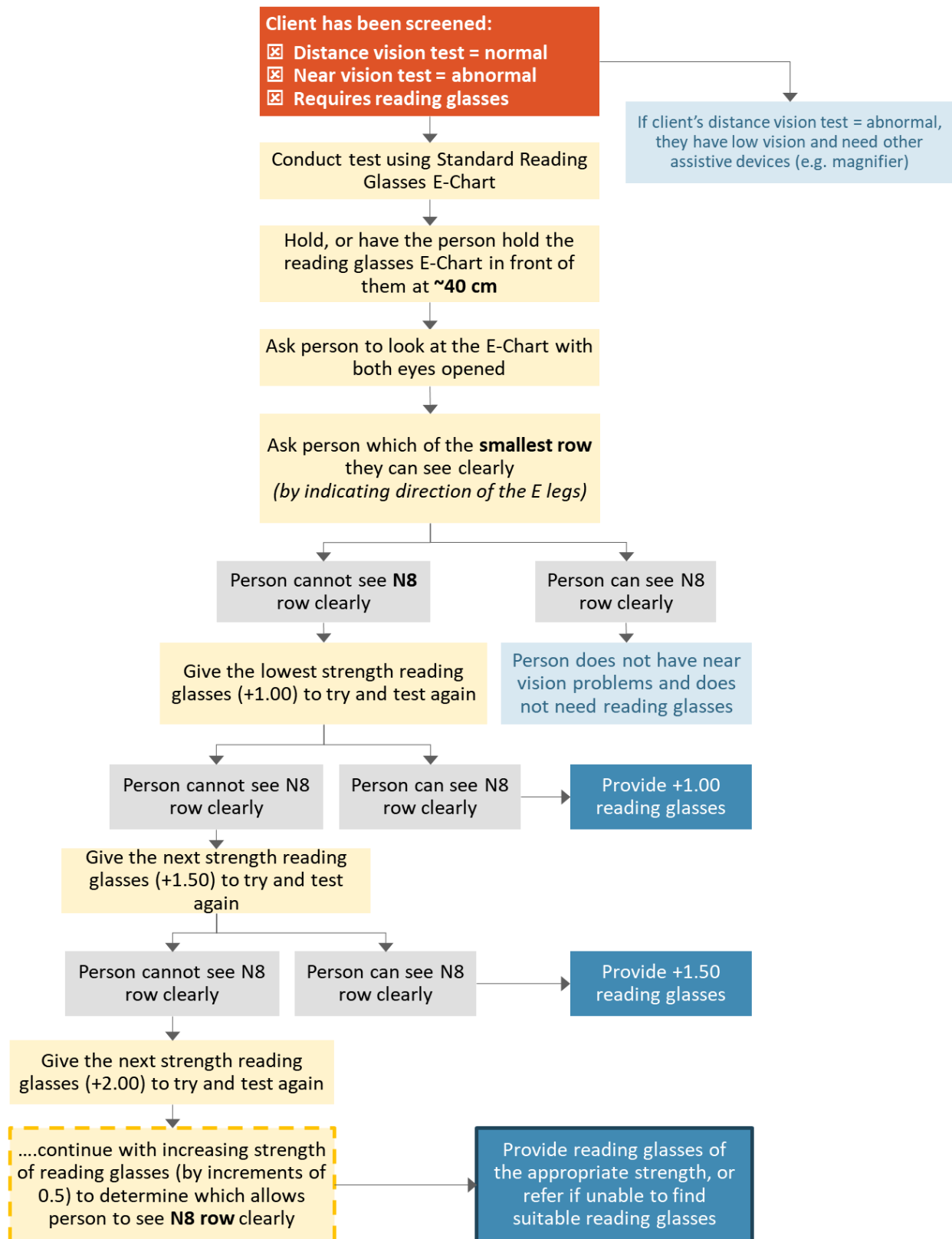
Annex 9. Algorithm 4: If patient has injured eyes or foreign body in the eye



Annex 10. Algorithm 5: Eye problems in children


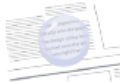




Annex 11. Algorithm 6: Selecting the right reading glasses

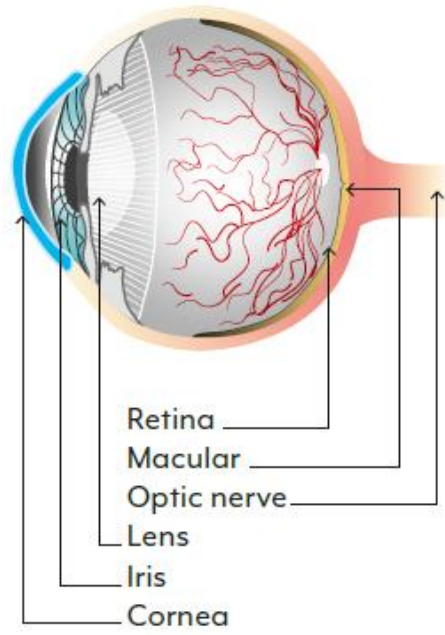


Annex 12. Selecting Magnifiers and Telescopes

From: World Health Organization. (2022). Training in Assistive Products (TAP). Retrieve from: <https://www.gate-tap.org/>

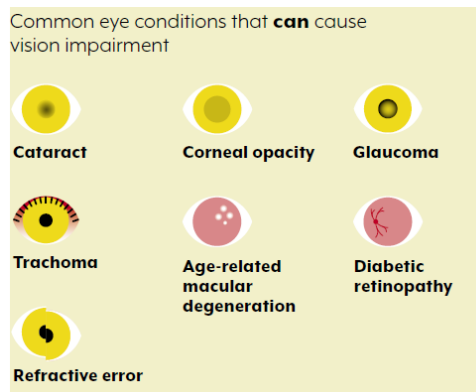
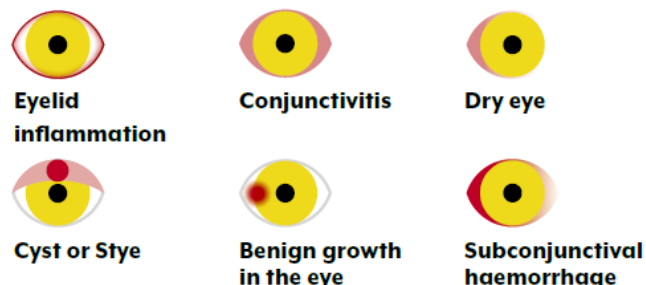
Selection of low vision product Always select the product with the person, taking into account their health, ability, environment and preference.		Hand held magnifier 	Dome magnifier 	Stand, around the neck, or sheet magnifier with adjustable stand 	Telescope 
Eye health	Healthy eyes	✓	✓	✓	✓
Distance vision test result	Cannot see medium or large E after assessment and provision of prescription glasses	✓	✓	✓	✓
Near vision test result	Cannot see small E AND distance vision medium and large E	✓	✓	✓	✓
Findings from vision screen and eye care professional	Avoidable distance and/or near vision problem	✗	✗	✗	✗
	Central visual field loss	✓	✓	✓	✗
	Peripheral field loss	✓	✓	✓	✗
	Diagnosed low vision	✓	✓	✓	✓
Hand function	Cannot use hands / or needs hands for work	✗	✓	✓	✗
Activities	Needs to do near vision activities	✓	✓	✓	✗
	Needs to do distance vision activities	✗	✗	✗	✓
Lighting	Requires extra light built in	✓	✓	✓	N/A

Annex 13. Basic Eye Physiology and Anatomy



Annex 14. Common Eye Conditions: Definitions

Common eye conditions that **do not** typically cause vision impairment



(from WHO, 2019)

Common eye conditions that do not typically cause vision impairment include:

- Blepharitis – **Eyelid inflammation** near the base of the eyelashes, characterized by redness and irritation of the eye and eyelid.
- Chalazion and hordeolum (**cyst or stye**) – Common eyelid disorders resulting from a blocked gland or localized infection that can cause pain.
- **Conjunctivitis** – Inflammation of the conjunctiva (the clear membrane lining the inside of the eyelids and covers the white part of the eye) most commonly caused by allergy or infection.
- **Dry eye** – Due to an inadequate tear production that can result in irritation and/or blurred vision.
- Pterygium and pinguecula (**benign growth in the eye**) – Abnormal growths on the conjunctiva that can cause pain. In advanced cases, pterygium can encroach on the cornea and cause vision loss.
- **Subconjunctival hemorrhage** – Broken blood vessels underneath the conjunctiva.

Common eye conditions that do cause vision impairment include:

- **Age-related macular degeneration** – Damage to the central part of the retina responsible for detailed vision leads to dark patches, shadows, or distortion of the central vision. The risk of developing macular degeneration increases with age.
- **Cataract** – Cloudiness in the lens of the eye, leading to increasingly blurred vision. The risk of developing cataract increases with age.
- **Corneal opacity** – A group of conditions causing the cornea to become scarred or cloudy. Opacity is most commonly caused by injury, infection, or vitamin A deficiency in children.
- **Retinopathy** – A group of diseases of the retina involving small retinal blood vessels. **Hypertensive retinopathy** is retinal vascular damage caused by hypertension. **Diabetic retinopathy** is damage to blood vessels in the retina which become leaky or blocked. Vision loss most commonly occurs due to swelling in the central part of the retina which can lead to vision impairment. Abnormal blood vessels can also grow from the retina, which can bleed or cause scarring of the retina and blindness.
- **Glaucoma** – Progressive damage to the optic nerve. Initially, loss of vision occurs in the periphery and can progress to severe vision impairment (this is known as open angle glaucoma, the most common type).
- **Trachoma** – Caused by infection with the bacterium *Chlamydia trachomatis*. After many years of repeated infections, the eyelashes can turn inwards (known as trichiasis) which can lead to corneal scarring and, in some cases, blindness.
- **Refractive error** – Due to an abnormal shape or length of the eyeball; light does not focus on the retina resulting in blurred vision.
- **Uveitis** – An inflammation of the uvea of the eye (i.e., the iris + the ciliary body + the choroid); may be anterior uveitis (more common), intermediate, or posterior uveitis.

Annex 15. Signs of Eye Problems

Signs of healthy eyes:

- The white part of the eye is clear.
- The center of the eye (pupil) is black and round.
- There is no redness or swelling around the eyes.
- Both eyes are looking straight ahead and are not crossed. No excessive tearing or discharge from the eye.

Initial signs that a person may have eye health problems include:

- Redness or swelling anywhere on or around the eye



- Growths, lumps or bumps anywhere on or around the eye



- Eyelids that are very droopy



- One eye, or both eyes turn inwards or outwards (squint)



- Center of the eye is white or cloudy



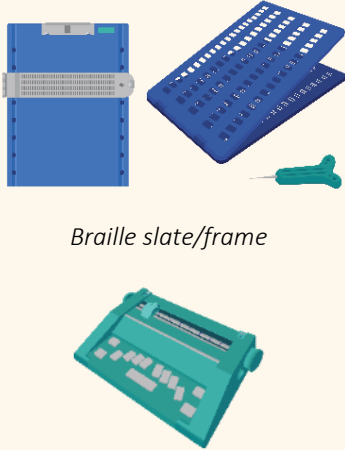







- Discharge from the eye or eyelids





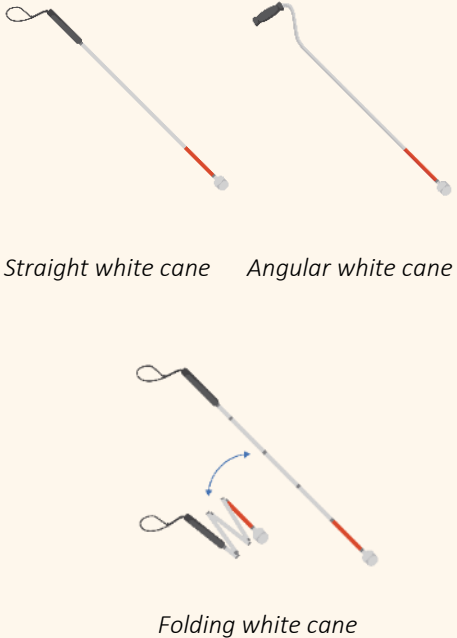
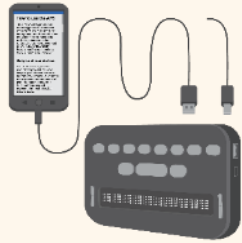
- Dry, gritty, or itchy eyes
- Frequent uncontrollable or jerky movement of the eyes
- The pupils (black center of the eye) do not change size in response to light, are different sizes, or are not round.
- Headaches
- Loss of vision

Annex 16. National Priority Assistive Products List (APL): Vision Assistive Devices

Name of product and ISO 9999:2016 code	General description, features, and intended use	
Vision		
<p>Audio players with DAISY capability ISO 22 18 03 Sound recording and playing devices</p>		<p>Devices that are able to read contents out-loud, such as a MP3 player or an audio book, which help persons with low vision or blindness understand contents such as written words or music.</p>
<p>Braille displays (note-takers) ISO 22.39.05 Tactile computer displays</p>		<p>Devices used by persons with low vision or blindness to read and write. The device displays Braille characters, usually by means of round-tipped pins raised through holes in a flat surface.</p>
<p>Braille writing equipment / Braillers ISO 22 12 12 Manual Braille writing equipment</p> <p><i>This ISO code includes:</i></p> <ul style="list-style-type: none"> • Braille slates/frames • Interline Braille writing slates/frames • Interpoint Braille writing slates/frames • Small pocket frames • Stylus of different types <p>ISO 22 12 15 Typewriters</p>	 <p style="text-align: center;"><i>Braille slate/frame</i></p> <p style="text-align: center;"><i>Braille typewriter</i></p>	<p>Braille writing equipment and braillers are used to either manually (the former) or mechanically (the latter) produce embossed Braille characters on paper.</p> <p>Braille writing equipment and braillers have different features.</p> <ul style="list-style-type: none"> • The equipment consists of a manually operated slate or frame with Braille cells and a special-tipped object called a stylus. The slate or frame has two plates hinged together to hold papers for writing Braille. The stylus is a short rod with a blunted point and is used to emboss the Braille dot into the page by hand. • A Brailler has a hard casing and a keypad. Braille letters are indented into Braille paper by pressing on one of the six Braille keys. <p>They are intended to support communication for children and adults with blindness or low vision and for Braille transcribers to write in Braille.</p>

Name of product and ISO 9999:2016 code	General description, features, and intended use	
<p>Gesture to voice technology No ISO code</p>		<p>Technology that converts speech into sign language, and vice-versa.</p>
<p>Liquid level indicator No ISO code</p>		<p>Devices used by persons who are visually impaired to monitor the amount or level of liquid in a cup or glass, by sounding a tone or vibrating (or both) when the liquid level touches the tip of the device's prongs as the container becomes full or nearly full.</p>
<p>Magnifiers, handheld/optical ISO 22 03 09 Magnifier glasses, lenses and lens systems for magnification <i>This ISO code includes:</i></p> <ul style="list-style-type: none"> • Handheld, stand magnifiers, pocket, dome, sheet, spectacle and other portable magnifiers • Magnifiers with or without illumination 	 <p><i>Hand-held magnifier</i></p>  <p><i>Stand magnifier</i></p>  <p><i>Dome magnifier</i></p>	<p>Optical magnifiers are lenses that can produce enlarged images of close objects and print.</p> <p>An optical magnifier uses positive power lens to produce a magnifying effect. It comprises a single lens or more than one lens (called a lens system). The range of magnifying power (magnification) is measured in dioptres (D). Magnifiers most commonly have a lens power range from +4D to +76D. Some magnifiers include a built-in light source and are called “illuminated magnifiers”.</p> <p>Magnifiers can be held in a person’s hand, stand on its own, or be worn in front of a person’s eyes.</p> <p>They are intended for use by children and adults with low vision that cannot be fully corrected with spectacles or other treatment such as surgery.</p>

Name of product and ISO 9999:2016 code	General description, features, and intended use	
<p>Spectacles ISO 22 03 03 Light filters (absorption filters) ISO 22 03 06 Spectacles and contact lenses</p> <p><i>This ISO code includes:</i></p> <ul style="list-style-type: none"> • Low vision spectacles • Short distance spectacles • Long distance spectacles • Eye protection 		<p>Spectacles, also commonly referred to as glasses or reading glasses, are lenses mounted into a spectacle frame. They are placed in front of a person’s eyes to help a person see things that are close by or far away more clearly. Spectacles for nearsightedness (myopia) and presbyopia have negative-powered (concave) lenses; spectacles for farsightedness (hyperopia) have positive-powered (convex) lenses; spectacles for astigmatism have a special cylindrical lens; and spectacles for low vision can include telescopic or magnifying components. Frames are available in a variety of sizes, styles, materials, and colors.</p> <p>Spectacles are intended for use by adults and children with myopia, presbyopia, hyperopia, and astigmatism.</p> <p>Filters, commonly called sunglasses, are glare control lenses that absorb ultraviolet (UV) light and enhance contrast. They are intended for use by children and adults with various ocular conditions that cause visual impairment.</p>
<p>Watches, talking/touching ISO 22 27 12 Clocks and timepieces</p>	 <p><i>talking watch touching watch</i></p>	<p>A timepiece either carried or worn at the wrist, which allows persons with low vision or blindness to hear or feel the time.</p>

Name of product and ISO 9999:2016 code	General description, features, and intended use	
<p>White canes ISO 12 39 03 Tactile sticks or white canes</p> <p><i>This ISO code includes:</i></p> <ul style="list-style-type: none"> • Straight canes • Angular canes • Folding white canes 	 <p><i>Straight white cane Angular white cane</i></p> <p><i>Folding white cane</i></p>	<p>White canes are long sticks with a handle on one end and a tip or roller on the other. The handle may have a wrist loop to hang the cane up when not in use. The body of the white cane is covered with reflective tape to make the user visible. Some white canes have a section of red or yellow paint or reflective tape at the tip to indicate the user is blind. Some canes have alternating colors of white and red indicating both vision and hearing loss.</p> <p>The devices give users information about the environment they are moving through, such as obstacles in their path, stairs they are coming to, curb edges they are approaching, and various other aspects of their environment. The device also helps to tell others that the user has low vision or is blind.</p> <p>White canes are intended for use by children and adults with low vision or blindness to help with walking.</p>
<p>Deafblind communicators <i>No ISO code</i></p>		<p>Devices that help deaf-blind persons to communicate. The devices consist of Braille keys and a refreshable Braille display. Braille keystrokes are transmitted to a smartphone where they are displayed as text, and text entered into the smartphone is displayed as Braille on the communicator.</p>

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