

Chapter VII: Visual Impairment

Definition

Based on visual acuity in the better-corrected eye, visual impairment is classified into the following categories:

Category	Visual acuity in the better-corrected eye
Low vision	Less than 6/18 but better than 6/60
Severe low vision	Less than 6/60 but better than 3/60
Blind	Less than 3/60

Causes

Major causes for low vision among age group 50+ are:

Cause	% Of all causes
Refractive errors	53.1
Cataract	24.1
Corneal opacity due to trachoma	10.7
Corneal opacity other than trachoma	5.7
Glaucoma	1.1
Others	5.3

Major causes for blindness among age group 50+ are:

Cause	% Of all causes
Cataract	54.8
Corneal opacity other than trachoma	18.8
Corneal opacity due to trachoma	7.6
Refractive error	7.0
Glaucoma	4.6
Others	7.2

Causes by Age Group

• In Preschool Children:

1. Prenatal phase

- Congenital disorders as cataract of genetic origin, glaucoma and retinoplastoma.
- Congenital cataract of infective origin (rubella)

2. Neonatal phase

- Ophthalmia neonatorum
- Retinopathy of prematurity
- Birth injuries and asphyxia
- Strabismus and/or amblyopia

3. Childhood phase

- Trachoma
- Vitamin A deficiency
- Measles
- Harmful eye practices
- Ocular trauma

• In Adolescents and Adults:

- Refractive errors.
- Corneal opacities either due to infective or traumatic causes.

• In Elders:

- Presbyopia,
- Cataract,
- Diabetic retinopathy,
- Age-related macular degeneration (ARMD), and
- Glaucoma.

Burden

• Global prevalence of visual impairment:

- In industrialized countries is 0.9%,
- In the developing countries ranges from 1.5% to 4.2%.

• Prevalence in Egypt:

- The prevalence of low vision for all ages is 3.1% that is nearly equal to 2.2 million persons.
- The prevalence of blindness is 1.1% that is nearly equal to 737,000 blind persons.

Screening tests

• Children under 3 years

For assessment of distance visual acuity

- Pupillary reactions to light.
- Head turn towards a light source.
- Blink response to a bright light.
- Some of the techniques for this age group have not yet been proven effective, such as:
 - a. Preferential looking,
 - b. Grating acuity cards,
 - c. Refractive screening, and
 - d. Photographic evaluation.

For assessment of near vision

- The Illiterate E or the Landolt C.

For assessment of functional vision.

- The ability of fixation.
- Eye movements.
- Ability to walk around
- Ability to recognize faces.
- Ability to see print.

• Children 3-5-year-old age

Screening tests for detecting strabismus and amblyopia include:

- Simple inspection,
- Cover test,
- Visual acuity tests, and
- Stereovision assessment.

Visual acuity tests for children include:

- The Snellen chart,
- The Landolt C,
- The tumbling E,
- The Allen picture cards,
- Grating cards, and others.
- Test for near vision

- **In School-aged Children:**

- Standard Snellen vision charts with pinhole test.

- **In Adults:**

- Screening for diabetic retinopathy.
- Screening for glaucoma.

- **In Elders:**

- Standard Snellen vision charts with pinhole test.
- Selected questions about vision and visual functions.
- Screening for Age related macular degeneration.

Recommendations for prevention

- Vision screening to detect amblyopia and strabismus is recommended once for all children prior to entering school, preferably between ages 3 and 4.
- Clinicians should be alert for signs of ocular misalignment when examining infants and children.
- Regulations should be made for combating the spread of active stages of trachoma and its blinding sequences. Particularly clinicians at the rural health units in Egypt should be alert with its signs and management.
- Signs for corneal opacities that interfere with visual axis should be considered when examining infants, children and adults.
- Signs for congenital causes of visual impairment as cataract and glaucoma should not be neglected as early detection is crucial in visual prognosis.
- Screening for diminished visual acuity with Snellen visual acuity chart and pinhole test is recommended for elderly persons.
- Screening for diabetic retinopathy should be considered for all diabetics.
- Screening for glaucoma should be considered for those with age 40+ and have positive family history for glaucoma.
- There is insufficient evidence to recommend for or against screening for diminished visual acuity among other asymptomatic persons, but recommendations against routine screening may be made on other grounds (see Clinical Intervention).

Burden of Suffering

Definition¹

- o According to the International Classification of Diseases (ICD), Ninth Revision:
 - Low vision person is one whose corrected visual acuity in the better eye is less than 6/18 but equal to or better than 3/60.
 - For blind person it is less than 3/60.
- o Based on visual acuity in the better-corrected eye, visual impairment is classified into these following categories:

Category	Visual acuity in the better-corrected eye
Low vision	Less than 6/18 but better or equal to 6/60
Severe low vision	Less than 6/60 but better or equal to 3/60
Blind	Less than 3/60

- o The above definition is based solely on visual acuity. However, visual impairment is a functional state rather than a numerical expression of visual acuity. The WHO set a more comprehensive and working definition that is:

"A person with visual impairment is one who has impairment of visual functioning even after treatment and/or standard refractive correction, and has a visual acuity in the better eye of less than (6/18 for low vision and 3/60 for blind), or a visual field of less than 10 degrees from the point of fixation, but who uses or is potentially able to use vision for the planning and/or execution of a task."

Major causes

Globally²

- o The leading causes for blindness for all age groups globally are as follows:

Cause	% From all causes
Cataract	41.8
Trachoma	15.5
Glaucoma	13.5
Onchocerciasis	0.9
Others	28.3

In Egypt³

- o Major causes for low vision among age group 50+ are:

Cause	% Of all causes
Refractive errors	53.1
Cataract	24.1
Corneal opacity due to trachoma	10.7
Corneal opacity other than trachoma	5.7
Glaucoma	1.1
Others	5.3

- o Major causes for blindness among age group 50+ are:

Cause	% From all causes
Cataract	54.8
Corneal opacity other than trachoma	18.8
Corneal opacity due to trachoma	7.6
Refractive error	7.0
Glaucoma	4.6
Others	7.2

Burden

Globally²

- o The prevalence of visual impairment in industrialized countries is 0.9%, whereas in the developing countries ranges from 1.5% to 4.2%
- o There are 180 million persons with visual impairment worldwide. Out of those, 135 million have low vision and 45 million are blind.
- o Every year, an additional number of 1-2 million persons go blind. More than 90 % of those persons live in the poorest section of the developing countries.
- o The direct economic cost of the global burden is \$ 25 billion.
- o Nearly 80 % of this visual impairment is avoidable either curable or preventable.
- o Without proper interventions, the number of blind will increase to 75 million by 2020 although restoration of sight is one of the most cost-effective interventions in health care.

In Egypt³

- o Prevalence of low vision for all ages is 3.1% and for blindness is 1.1%. That is nearly equal to 2.2 million persons with low vision and 737,000 blind persons in whole Egypt.
- o Every year, an additional 15, 000 persons go blind.
- o Annual GDP loss from visual impairment is estimated at \$170 million.
- o Prevalence estimated among age group 50+:

Visual impairment	Prevalence %
Low vision	38.4
Blindness	8.2

- o Prevalence extrapolated for all age groups in Egypt,

Visual impairment	Prevalence %
Low vision	3.1
Blindness	1.1

Burden by age categories

Preschool Children

Amblyopia and strabismus

- o Undetected vision problems are common in preschool children.⁴
- o Many children suffer from amblyopia ("lazy eye"; loss of vision due to disuse) and strabismus (ocular misalignment), which, aside from congenital conditions, usually develop between infancy and ages 5-7.⁵⁻⁷
- o In the newborn, risk factors for developing strabismus or amblyopia include:
 - A family history of ocular malformations,
 - Anisometropia (a large difference in refractive power between the two eyes, more than 4 diopters in sphere and/or 2 diopters in astigmatism),
 - Congenital cataracts,
 - Ocular tumors,
 - Premature birth, or
 - Birth to a mother who suffered from infection such as rubella, genital herpes, or toxoplasmosis during pregnancy.
- o Since normal vision from birth is necessary for normal binocular development, failure to detect and treat amblyopia, marked anisometropia, or strabismus at an early age may result in irreversible visual deficits.
- o Resulting permanent amblyopia and cosmetic defects may lead to later restrictions in educational and occupational opportunities.⁸⁻⁹
- o Patients with amblyopia are at increased risk of blindness from loss of vision in their good eye.^{9a}

Other causes for visual impairment in preschool children

- o There is a group of other causes for visual impairment in preschool stage classified as follows:
 - Prenatal phase¹⁰
 - Congenital disorders as cataract of genetic origin, congenital glaucoma and retinoblastoma are not common. Consanguinity is associated with a greater risk of the congenital disorders.
 - Congenital cataract of infective origin (rubella) has a relatively higher incidence in developing countries.
 - Neonatal phase¹⁰
 - Ophthalmia neonatorum:
 - i. The incidence is low when good antenatal care is available.
 - ii. However, it's an ocular emergency due to its aggressive ocular sequelae.
 - Retinopathy of prematurity:
 - i. Recent studies have indicated an increasing incidence despite careful monitoring of oxygen use.
 - ii. This is attributed to the increased survival rate of the immature infants.
 - iii. The lower the weight and gestational age at birth, the higher the incidence.

- Birth injuries and asphyxia: Recent evidence suggests that this is no longer a common cause of childhood blindness with improving the labor and neonatal care.
- Childhood phase
 - Vitamin A deficiency:
 - i. The major global cause of childhood blindness.
 - ii. It causes corneal ulceration and opacity that ends with permanent blindness.
 - iii. Worldwide, some 350 000 new cases occur annually among preschool children, and an estimated 60% of them die within a year of becoming blind.
 - iv. No available data on the burden in Egypt.
 - Trachoma:
 - i. The active stage prevails among preschool children and with repeated infections could lead later to corneal opacity and blindness in adults.
 - ii. Data from recent surveys in Egypt have these following estimates for the prevalence of active trachoma among children of age group 1-6:³

Survey site and date	Prevalence %
Menofiya, 1999	36.5
Menia, 2001	42.0
Fayoum, 2003	47.0

- Measles:
 - i. It's a severe infection in most developing countries with a fatality rate of more than 1%.
 - ii. Blindness in children is due to corneal scarring.
- Harmful eye practices:
 - i. They appear to be of greater significance in developing countries.
 - ii. Studies in East Africa attributed 20-25% of childhood blindness to the use of harmful eye medicines.

School-Aged Children

- o Data are limited regarding the prevalence of uncorrected refractive errors and previously undiagnosed vision problems in elementary school-aged and adolescent children.
- o Refractive errors, which often become manifest during school age, rarely carry any serious prognostic implications.
- o Experts disagree on whether an uncorrected refractive error that would be detected by screening has any adverse effects on academic performance in school-aged children.¹¹⁻¹²

Adolescents and Adults

- o Refractive errors are the most common visual disorder in the adolescent and adult population.
- o There are no data to determine the incremental benefit of routine screening of adults to detect early refractive errors compared to waiting for patients to present with complaints of vision problems.
- o Corneal opacities either due to infective or traumatic causes constitute the third leading cause (16.4 % from all causes) for low vision among adults of age group 50+.³

- o For the same age group corneal opacities constitute the second leading cause for blindness (26.4 % from all causes).³

Elders

- o Visual impairment is a common and potentially serious problem among older people.
- o Personal safety may be compromised; the risk of falling is increased.¹³
- o While a reduction in visual acuity may be noticed by an individual, underreporting is common.¹⁴
- o Data on visual acuity has the following figures:³

Visual acuity	% Of adults age 50+
Normal	52.8
Low vision	39.0
Blind	8.2

- o The most common causes of visual impairment in the elderly include:¹⁵⁻¹⁷
 - Presbyopia,
 - Cataract,
 - Age-related macular degeneration (ARMD)
 - Glaucoma.
 - Diabetic retinopathy.
 - Corneal opacity.
- o Cataract burden in Egypt: The second leading cause for low vision (24.1 %from all causes) among adults of age group 50+ and the first leading cause for blindness (54.9 % from all causes) among the same age group.³
- o Glaucoma burden in Egypt: Data estimates burden of glaucoma in adults of age group 50+ to be 1.1% as a cause for low vision and 4.6 % as a cause for blindness from all causes of visual impairment.³
- o Diabetic retinopathy burden in Egypt
 - The risk of blindness is about 25 times greater in diabetics than in non-diabetics.
 - Diabetic retinopathy (D.R.) is the commonest cause of legal blindness in individuals between the ages of 20 and 65 years.
 - The incidence of D.R. is related more to the duration of diabetes than to any other factor.
 - 50 % of diabetic patients of age less than 30 years will have D.R. after 10 years.
- o Age related macular degeneration (ARMD)
 - The leading cause of blindness in the western world.
 - No available data on a national scale for Egypt.
 - The average age of visual loss in the first eye is 65 years with about a 12% incidence of involvement of the second eye each year.²

Accuracy of Screening Tests

Preschool Children

Children under 3 years

- o Early identification of children with visual impairment has important implications as it can prevent or minimize the developmental delay that may follow the visual impairment and give the child the chance to learn how to compensate or adapt.
- o Patterns of presentation:⁴
 - An ocular abnormality is noticed during routine postnatal screening.
 - Abnormal visual behavior.
 - Child complains of symptoms.
- o Patterns of detection:¹⁸
 - Children with obvious structural ocular abnormalities or nystagmus are likely to be identified early, although delay in referral to the appropriate specialist may jeopardize the outcome of visual rehabilitation.
 - Children with severe visual loss, but without obvious external structural abnormalities are likely to present early because of abnormal visual behavior.
- o Despite the importance of early childhood screening for strabismus and amblyopia, detecting occult visual disorders by screening tests in children less than 3 years of age has generally been unsuccessful. Obstacles to screening include:¹⁹⁻²⁰
 - The child's inability to cooperate,
 - The time required for testing, and
 - Inaccuracy of the tests.
- o Some of the techniques for this age group have not yet been proven effective, such as:²¹⁻²²
 - Preferential looking, (This is based on the interest shown to a patterned card in favor of a non-patterned card).
 - Grating acuity cards,
 - Refractive screening, and
 - Photographic evaluation.

Children 3-5-year-old age

- o Screening to assess the distance visual acuity, near visual acuity and visual function should be done as follows:¹⁸
 - Assessment of distance visual acuity:
 - Innate reflexes can be used to test visual function.
 - Although the following tests do not reflect the resolving power of the eye, i.e. visual acuity, they can indicate whether an abnormality is present or not:
 - i. Pupillary reactions to light.
 - ii. Head turn towards a light source.
 - iii. Blink response to a bright light.
 - Assessment of near vision:
 - The Illiterate E or the Landolt C is used, as they require naming or matching of letters with independency to reading skills.

- Assessment of functional vision:
 - When children are not able to be assessed using distance and near acuity tests, then an assessment of functional vision should be carried out to obtain qualitative data on the level and use of vision.
 - The aim is to assess:
 - i. The ability of fixation (the ability of the eyes to fixate a target and maintain steady fixation),
 - ii. Eye movements (tracking; the ability to follow moving objects),
 - iii. Shifting gaze from one object to another (scanning to find objects).
 - It should be performed with both eyes together, and with spectacles if these are normally worn.
 - Observation and comment should be done for these following capacities;
 - i. Child can see to walk around:
 1. Place two chairs 1 meter apart in a well-lit room.
 2. Ask the child to walk in and out of, or between the obstacles without assistance.
 - ii. Child can recognize faces:
Is the child able to identify a person known to them e.g. a teacher or a relative by visual recognition of the face alone at a distance of 3 meters?
 - iii. Child can see print:
 1. Clearly draw a cross, square or circle approximately 2 cm in size.
 2. Ask the child to describe the shape or draw it.

This test can be performed at any distance within ½ meter.
 - Repeated testing over time with the previous tools may be necessary to assess the level of vision.
- o Screening tests for detecting strabismus and amblyopia include:
 - Simple inspection,
 - Cover test,
 - Visual acuity tests, and
 - Stereovision assessment.
- o Visual acuity tests for children include:²³
 - The Snellen chart,
 - The Landolt C,
 - The tumbling E,
 - The Allen picture cards,
 - Grating cards, and
 - Test for near vision
- o The specificity of any acuity test for detecting strabismus or amblyopia is imperfect as other conditions may be the cause of the diminished acuity.
- o Testing for visual acuity should include testing visual acuity with pinhole to detect the correctable refractive errors.
- o Refractive screening is not a test for strabismus or amblyopia per se, but may be used to identify amblyogenic risk factors (e.g., anisometropia, or severe hyperopia [farsightedness]).²⁴
- o The Modified Clinical Technique (MCT) includes:²⁵
 - Retinoscopy,

- Cover testing,
 - Quantifying ocular misalignment,
 - Snellen acuity,
 - Color vision assessment, and
 - External observation.
- o Preferential looking (PL) has been substituted for Snellen acuity in the MCT without loss of predictive power of the MCT but with increase in percentage of young children who were able to complete the test.²²
 - o The MCT, despite a high sensitivity and specificity, cannot be used routinely by primary care physicians for screening because:
 - It takes on average about 12 minutes to perform. and
 - Requires skills and instrumentation not typically found in this setting.
 - o Stereograms such as the Random Dot E (RDE) have been proposed as more effective than visual acuity tests in detecting strabismus and amblyopia.^{23,26}
 - The test, in which the child wears Polaroid glasses while viewing the test cards, takes about 1 minute.
 - o Screening for active trachoma by eversion of the upper lid and examining for follicles is very simple and effective in identifying active cases. Although it's not a blinding disease in children, however it's a potentially blinding.
 - o The same previous test is valuable in detecting active cases with spring catarrh and allergic conjunctivitis that prevailed in hot dry climates as in Egypt. It could interfere with proper vision due to induced allergy and astigmatism.¹⁸
 - o Screening for corneal opacities is done through examining the cornea after staining with fluorescein stain as follows:
 - A drop of the stain is put in the conjunctival sac,
 - Then washed with saline,
 - Corneal epithelial defects and ulcers will be stained with a green color.
 - o External eye examination using a light source and /or simple magnifier can verify the congenital cataract as a lenticular opacity that interferes with red reflex and pupillary reflex.¹⁸
 - o The same examination could verify congenital glaucoma with abnormal increased corneal diameters, epiphora and photophobia.

School-Aged Children

- o Screening of visual acuity is generally accomplished with standard Snellen vision charts.
- o Although referral criteria and procedures vary widely, school screening may have a false-positive rate of 30% or more.^{27,28}
- o Near and distance vision are not always affected to the same degree in all eye conditions. In children, near vision is often not as severely affected as distance vision.
- o Tests of visual acuity and visual field do not show how a person can use his/her vision. It gives a starting point in the assessment of visual impairment.

- o Visual acuity can be used to identify children who have low vision or blindness and who need a further examination to see if their eye conditions are curable. If the condition is not curable, the effect of low vision should be assessed.¹⁰

Techniques for visual acuity tests:¹⁸

Distance visual acuity test

- o Visual loss is categorized according to the International Classification of Disease (ICD) as listed before.

Category	Visual acuity
Low Vision	Less than 6/18 but better or equal to 6/60
Severe Low Vision	Less than 6/60 but better or equal to 3/60
Blind	Less than 3/60

- o Check that you have the best lighting available during testing. The normal test distance is 6 meters.
- o The vision should be tested separately for each eye and then with both eyes.
- o The criteria for vision at a certain level are: 4 correct consecutive showings or 5 correct out of 6 showings or 6 correct out of 8 showings.

Pinhole test

- o A special test using the pinhole mask should be considered to identify those with poor vision who may need spectacles to improve their vision.
- o It should be used when distance visual acuity is less than 6/18.
- o It is performed using a simple mask that has multiple tiny holes to allow examined person to look through at the test chart.
- o People who have their visual acuity improved with the pinhole should be referred for prescription of glasses.

Test for near vision

- o Near vision tests show a person's ability to discriminate the details of near object (within arm's distance from the body)
- o Children who cannot recognize the smallest symbols should be referred to check if spectacles or low vision devices might be helpful.

Testing instructions

- o No standard distance is required.
- o The test card is held at the distance preferred by the person.
- o Young children may see better when the card is held close to the eyes.
- o Start with the largest Es. If a person cannot see these, tell him or her to hold the card closer to his or her eyes.

Adults²⁹

Screening for diabetic retinopathy

- o Screening for diabetic retinopathy should be done for any case with diabetes.
- o Fundus examination is done with dilating drops.
- o The clinical picture in the background phase has one or more of the following features:
 - Microaneurysms,
 - Blot-dot and/or flame hemorrhages,
 - Hard exudates, and
 - Retinal oedema.

Screening for glaucoma

- o Screening for glaucoma should be considered when there is family history of glaucoma or the age is 40+.
- o It is done through:
 - Fundus examination by ophthalmoscopes to assess cup/disc ratio for each eye and then comparing the two eyes. A vertical cup/disc ratio of greater than 0.3 is suspicious.
 - Measuring the Intra-ocular pressure: Intraocular pressure of 23 mm Hg or greater is suspicious.
 - Visual field assessment by field analyzers and if not available gross defects might be verified by confrontation method.

Technique of confrontation visual field test

- o A rough test for gross defects used when special instruments are not available.
- o The observer and the patient face each other at arm's length.
- o The patient covers the left eye and look with the right eye at the examiner's left eye.
- o The examiner then holds a target (a pen or the examiner's finger) as far to the side as possible.
- o The target is then slowly brought into the line of sight, and the patient is instructed to respond as soon as be able to identify the target.
- o This is repeated at intervals of 30-45 degrees around the 360-degree periphery.
- o The fullness of the patient's field is compared to that of the observer's.
- o The test is then repeated for the other eye.
- o Gross field defects can be detected.
- o However, the test should not be considered a substitute for the other careful visual field analyzers.

Elders

- o Asking screening questions about visual function has yielded mixed results when compared to use of a Snellen acuity chart.³⁰⁻³³
- o Impaired visual acuity is readily detected by use of a Snellen chart and pinhole test.

- o Cataracts are detectable by ophthalmoscopy, even by relatively inexperienced health professionals.
- o Funduscopy may reveal characteristic changes of ARMD and Diabetic retinopathy.
- o Case reports support the usefulness of the Amsler grid to detect early detachment of the retinal pigment epithelium at a point when immediate treatment may be beneficial, but compliance with testing is poor.^{34,35}
- o Tonopen test proved reliable in measuring intra ocular pressure and screening for glaucoma.
- o Funduscopy for observing the cup/disc ratio in both eyes is helpful in following up prognosis of glaucoma process.

Effectiveness of Early Detection

Preschool Vision Problems

- o Early detection and treatment of amblyopia and strabismus in infants and young children improves the prognosis for normal eye development.³⁶⁻⁴²
- o The success of intervention may be dependent on age, with increased likelihood of attaining normal or near-normal vision with earlier detection and treatment; the older the patient, the longer the duration of treatment needed.⁴³

Vision Problems in School-Aged Children, Adolescents, and Nonelderly Adults

- o There is little evidence that early detection of refractive errors is associated with important clinical benefits, compared with testing based on symptoms.
- o A common justification for regular screening in school-aged children is the concern that undetected vision problems are an important cause of academic difficulty, but there is no evidence that routine screening has important benefits in terms of academic performance.⁴⁴⁻⁴⁵

Vision Problems in Elders

- o Refractive errors are readily correctable with eye glasses or contact lenses.
- o While the impact on physical and social function of these improvements is unknown, it has been demonstrated that restoration of vision following cataract surgery leads to:⁴⁶
 - Subjective improvements in a variety of vision-related functions, as well as
 - Improvements in objective measures of physical and intellectual function.
- o Although ophthalmologists use differing criteria to determine the optimal time to remove cataracts, a general rule is that surgery should be considered when an otherwise well patient feels that there is a significant impairment to daily life caused by the vision loss.
- o While there are theoretical reasons to believe that earlier referral to an ophthalmologist is desirable for assessment of retinal disease prior to obliteration of the view of the fundus by advancing cataract, in practice most individuals will complain of visual loss and be treated before this occurs.
- o The beneficial effect of argon laser photocoagulation of choroidal neovascular membranes in selected cases of ARMD has been shown in many studies.⁴⁷

- o Medical therapy for ARMD, with zinc supplements or interferon, has been reported as case series, but it has not yet been evaluated more rigorously.^{48,49}
- o Specific groups of elderly people are considered at high risk of visual impairment. Those include:²⁹
 - People of age 70 years and over.
 - Family history of visual loss.
 - People with systemic disease and /or other disabilities.
 - People living in underserved areas.
- o Screening tests for elderly people include;
 - Standard Snellen vision charts with pinhole test.
 - Selected questions about vision and visual functions.
 - Screening for Age related macular degeneration
- o Screening for age related macular degeneration is done by examination with the slit lamp biomicroscopy.
 - The earliest clinical manifestations are the appearance of small, discrete, yellow-white spots called drusen in the macular area of the retina.
 - Should be better verified and confirmed by fluorescein angiography.

Clinical intervention

Screening

- o Vision screening for amblyopia and strabismus is recommended for all children once before entering school, preferably between ages 3 and 4 years.
 - Clinicians should be alert for signs of ocular misalignment when examining all infants and children.
 - Stereoacuity testing may be more effective than visual acuity testing in detecting these conditions.
- o Trachoma infection has been proved to be a significant public health problem in at least three different governorates in Egypt (Menofiya, Menia and Fayoum).
 - Regulations should be made for combating the spread of active stages among children and its blinding sequences among adults.
 - Particularly clinicians at the rural health units in Egypt should be alert with its signs and management.
- o There is insufficient evidence to recommend for or against routine screening for diminished visual acuity among asymptomatic schoolchildren and nonelderly adults.
 - Recommendations against such screening may be made on other grounds, including:
 - a. The inconvenience and cost of routine screening, and
 - b. The fact that refractive errors can be readily corrected when they produce symptoms.
- o Routine vision screening with Snellen acuity testing is recommended for elderly persons.
 - The optimal frequency for screening is not known and is left to clinical discretion.

- Selected questions about vision may also be helpful in detecting vision problems in elderly persons, but they do not appear as sensitive or specific as direct assessment of acuity.
- o Screening for diabetic retinopathy should be considered for all diabetics.
- o Screening for glaucoma should be considered for all persons age 40 and above particularly with positive family history.
- o There is insufficient evidence to recommend for or against routine screening with ophthalmoscopy by the primary care physician in asymptomatic elderly patients.

Prevention

- o The main preventable causes for visual impairment are:
 - Trachoma
 - Ocular infections
 - Vitamin A deficiency
 - Ocular trauma
 - Harmful eye medications
- o In Egypt, Trachoma and ocular opacities due to infections and trauma have higher prevalence.
- o Available data don't support considering "Vitamin A deficiency" as a major contributor to visual impairment in Egypt.
- o As preventive measures are so effective in eliminating of the preventable causes of visual impairment, a full data is listed here in the following table to highlight the basic preventive and primary curative measures. Causes are listed in the table according to age of onset to simplify the reading. However the priority for the above mentioned group of causes should not be overwhelmed.⁵⁰

Basic Preventive And Primary Curative Measures

Primary	Secondary	Tertiary
<ul style="list-style-type: none"> • Prevention of prenatal causes 		
o Congenital cataract & congenital glaucoma of genetic origin		
<ul style="list-style-type: none"> - Genetic counseling. - Avoidance of consanguineous marriage. 	<ul style="list-style-type: none"> - Early diagnosis. - Early surgical treatment. 	<ul style="list-style-type: none"> - Low vision care for those with poor visual outcome.
o Congenital cataract of infective origin (rubella)		
<ul style="list-style-type: none"> - Rubella immunization. 	<ul style="list-style-type: none"> - Early diagnosis. - Early surgical treatment. 	<ul style="list-style-type: none"> - Low vision care for those with poor visual outcome.
o Retinoblastoma		
<ul style="list-style-type: none"> - Genetic counseling. 	<ul style="list-style-type: none"> - Early detection. 	<ul style="list-style-type: none"> - Low vision care.
o Other prenatal determined conditions		
<ul style="list-style-type: none"> - Education regarding use of drugs, smoking, and alcohol in pregnancy. 	<ul style="list-style-type: none"> - Early detection 	<ul style="list-style-type: none"> - Low vision care.
<ul style="list-style-type: none"> • Prevention of neonatal causes 		
o Ophthalmia neonatorum		
<ul style="list-style-type: none"> - Recognition and treatment of maternal infection - Cleansing of lid margins and application of prophylactic tetracycline 1% eye ointment. 	<ul style="list-style-type: none"> - Early diagnosis - Ceftriaxone, 50 mg/kg of body weight intramuscularly as a single dose. 	<ul style="list-style-type: none"> - Surgical treatment for corneal opacification.
o Retinopathy of prematurity		
<ul style="list-style-type: none"> - Measure to prevent low birth weight / premature birth. - Monitoring of oxygen therapy. 	<ul style="list-style-type: none"> - If oxygen treatment given without monitoring: Screen all babies < 2000 g, < 36 weeks. 	<ul style="list-style-type: none"> - Treatment of complications (glaucoma, retinal detachment) - Low vision services
o Birth asphyxia		
<ul style="list-style-type: none"> - Improve obstetric care. 	<ul style="list-style-type: none"> - Early detection of visual disturbance in anoxic infants. 	<ul style="list-style-type: none"> - Low vision care.
<ul style="list-style-type: none"> • Prevention of childhood causes of blindness 		
o Vitamin A deficiency		
<ul style="list-style-type: none"> - Increase maternal vitamin A supply, encourage breast-feeding and proper weaning. - Prevent and control measles, diarrheal diseases, acute respiratory infections, and protein-energy malnutrition. - Vitamin A supplements. 	<ul style="list-style-type: none"> - Identify and treat signs and symptoms of vitamin A deficiency. - For children over one year: <ol style="list-style-type: none"> a. Immediately on diagnosis 200 000 IU of vit.A orally. b. Repeat the same dose the next day and 4 weeks later. - For children under one year or 	<ul style="list-style-type: none"> - Low vision care.

Primary	Secondary	Tertiary
	less than 8 Kg: a. Treat with half the above dose.	
o Measles		
- Promote and provide measles immunization.	- Vitamin A (200 000 IU) and topical antibiotic particularly when cornea is affected.	
o Harmful eye practices		
- Health education - Community awareness - Primary eye care facilities	- Appropriate treatment of ocular complications.	
o Trachoma		
- Improved community and individual hygiene, including regular face washing	- Mass treatment with topical tetracycline 1% twice daily for 6 weeks in endemic areas. - Treatment with a single dose of Zithromax based on body weight. 25 mg/kg. - Surgical correction of trichiasis (uncommon in childhood)	
o Ocular trauma		
- Legislative measures e.g. seat belts, fireworks. - Public health education	- Early detection and primary treatment - Speedy referral for definite treatment.	

References

1. World Health organization 'Assessment of low vision in developing countries' Book 1.
2. B.Thylefors, A-D Negrel, R.Pararajasegaram, K.Y.Dadzie 'Global data on blindness' Bulletin of the World Health Organization, 1995 73 (1) 115-121
3. Ezz El Arab, Gamal, Nagah Tawfik, Reda el Gendy, Wagida Anwar and Paul Courtright, 2001. The burden of trachoma in the rural Nile Delta of Egypt: a survey of Menofiya governorate. British Journal of Ophthalmology, 85: 1406-1410
4. National Center for Health Statistics. Refraction status and motility defects of persons 4-74 years, U.S. 1971-72: Vital health statistics, Series 11, 1978.
5. Ehrlich MI, Reinecke RD, Simons K. Preschool vision screening for amblyopia and strabismus: programs, methods, guidelines. Surv Ophthalmol 1983;28:145-163.
6. Cross AW. Health screening in schools: part I. J Pediatr 1985;107:487-494.
7. Thompson JR, Woodruff G, Hiscox FA, Strong N, Minshull C. The incidence and prevalence of amblyopia detected in childhood. Public Health 1991;105:455-462.
8. Campbell LR, Charney E. Factors associated with delay in diagnosis of childhood amblyopia. Pediatrics 1991;87:178-185.
9. Magrann I. Amblyopia: etiology, detection, and treatment. Pediatr Rev 1992;13:7-14.
- a. Woodruff G. Amblyopia: could we do better? BMJ 1995;310:1153-1154.
10. World Health organization 'Management of low vision in children' 1992
11. Helveston EM, Weber JC, Miller K, et al. Visual function and academic performance. Am J Ophthalmol 1985;99:346-355.
12. Rosner J, Rosner J. Comparison of visual characteristics in children with and without learning difficulties. Am J Optom Physiol Optics 1987;84:531-533.
13. Hindmarsh JA, Estes EH. Falls in older persons: etiology and interventions. In: Goldbloom RB, Lawrence RS, eds. Preventing disease. Beyond the rhetoric. New York: Springer-Verlag, 1990.
14. McMurdo ME, Baines PS. The detection of visual disability in the elderly. Health Bull 1988;46: 327-329.
15. Klein R, Klein BE, Linton KL. Prevalence of age-related maculopathy. The Beaver Dam eye study. Ophthalmology 1992;99:933-943.
16. Klein BE, Klein R, Linton KL. Prevalence of age-related lens opacities in a population. The Beaver Dam eye study. Ophthalmology 1992;99:546-552.
17. Klein BE, Klein R, Sponsel WE, et al. Prevalence of glaucoma. The Beaver Dam eye study. Ophthalmology 1992;99:1499-1504.
18. World Health organization 'WHO/PBL eye examination record for children with blindness and low vision'
19. Jacobson SG, Mohindra I, Held R. Visual acuity of infants with ocular disease. Am J Ophthalmol 1982;93:198-209.
20. Hall SM, Pugh AG, Hall DMB. Vision screening in the under-5s. BMJ 1982;285:1096-1098.
21. Jarvis SN, Tamhne RC, Thompson L, Francis PM, Anderson J, Colver AF. Preschool vision screening. Arch Dis Child 1991;66:288-294.
22. Schmidt PP. Effectiveness of vision-screening in pre-school populations with preferential-looking cards used for assessment of visual acuity. Optom Vision Sci 1991;68:210- 219.
23. Fern KD, Manny RE. Visual acuity of the preschool child: a review. Am J Optom Physiol Optics 1986; 63:319-345.
24. Sjostrand J, Abrahamsson M. Risk factors in amblyopia. Eye 1990;4:787-793.
25. Peters HB. The Orinda study. Am J Optom Physiol Optics 1984;61:361-363.
26. Ruttum MS, Bence SM, Alcorn D. Stereopsis testing in a preschool vision screening program. J Pediatr Ophthalmol Strabismus 1986;23:298-302.

27. Appelboom TM. A history of vision screening. *J School Health* 1985;55:138-141.
28. Romano PE. Summary and conclusions. Symposium on preschool/school vision and eye screening: current techniques and future trends. *Am Orthop J* 1988;38:73-80.
29. World Health organization 'Low vision care for the elderly' 1996.
30. Stone DH, Shannon DJ. Screening for impaired visual acuity in middle age in general practice. *BMJ* 1978;2:859-861.
31. Haase KW, Bryant EE. Development of a scale designed to measure functional distance vision loss using an interview technique. *Proc Am Stat Assoc* 1973;(SS):274-279.
32. Hiller R, Krueger DE. Validity of a survey question as a measure of visual acuity impairment. *Am J Public Health* 1983;73:93-96.
33. Fryback DG, Martin PA, Klein R, Klein BEK. Short questionnaires about visual function to proxy for measured best-corrected visual acuity. *Invest Ophthalmol Visual Sci* 1993;34:1422.
34. Fine SL. Early detection of extrafoveal neovascular membranes by daily central field evaluation. *Ophthalmology* 1985;92:603-609.
35. Fine AM, Elman MJ, Ebert JE, Prestia PA, Starr JS, Fine SL. Earliest symptoms caused by neovascular membranes in the macula. *Arch Ophthalmol* 1986;104:513-514.
36. Day S, Eggers H, Gammon JA, Spivey BE. Early strabismus/amblyopia screening. *Patient Care* 1990;24:83-105.
37. Epelbaum M, Milleret C, Buisseret P, Dufier JL. The sensitive period for strabismic amblyopia in humans. *Ophthalmology* 1993;100:323-327.
38. Lithander J, Sjostrand J. Anisometropic and strabismic amblyopia in the age group 2 years and above: a prospective study of the results of treatment. *Br J Ophthalmol* 1991;75:111- 116.
39. Hiscox F, Strong N, Thompson JR, Minshull C, Woodruff G. Occlusion for amblyopia: a comprehensive survey of outcome. *Eye* 1992;6:300-304.
40. Levartovsky S, Gottesman N, Shimshoni M, Oliver M. Factors affecting long-term results of successfully treated amblyopia: age at beginning of treatment and age at cessation of monitoring. *J Pediatr Ophthalmol Strabismus* 1992;29:219-223.
41. Rutstein RP, Fuhr PS. Efficacy and stability of amblyopia therapy. *Optom Vision Sci* 1992;69:747-754.
42. Rubin SE, Nelson LB. Amblyopia. Diagnosis and management. *Pediatr Clin North Am* 1993;40: 727-735.
43. Feldman W, Milner RA, Sackett B, Gilbert S. Effects of preschool screening for vision and hearing on prevalence of vision and hearing problems 6-12 months later. *Lancet* 1980;2:1014-1016.
44. Hulme C. The implausibility of low-level visual deficits as a cause of children's reading difficulties. *Cogn Neuropsychol* 1988;5:369-374.
45. Lovegrove W, Martin F, Slaghuis W. A theoretical and experimental case for a visual deficit in specific reading disability. *Cogn Neuropsychol* 1986;3:225-267.
46. Applegate WB, Miller ST, Elam JT, Freeman JM, Wood TO, Gettlefinger TC. Impact of cataract surgery with lens implantation on vision and physical function in elderly patients. *JAMA* 1987;257:1064-1066.
47. Argon laser photocoagulation for senile macular degeneration. Results of a randomized clinical trial. *Arch Ophthalmol* 1982;100:912-918.
48. Newsome DA, Swartz M, Leone NC, Elston RC, Miller E. Oral zinc in macular degeneration. *Arch Ophthalmol* 1988;106:192-198.
49. Fung WE. Interferon alpha 2a for treatment of age-related macular degeneration [letter]. *Am J Ophthalmol* 1991; 112:349-350.
50. World Health organization 'Prevention of childhood blindness' 1992.