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# Preschool and Kindergarten Vision Screening Training Manual

## Book 1



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Developed in collaboration with: National Collaborating Centre for Aboriginal Health (NCCA) Aboriginal Preschool Vision Screening Program; First Nations Health Society; BC Ministry of Healthy living and Sport Preschool Vision Steering Committee



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## 1. Introduction

This vision screening training manual has been developed to provide Aboriginal vision screeners with the skills needed to screen preschool children in order to identify eye conditions such as strabismus (turned eye), amblyopia (lazy eye), and refractive error (decreased vision). This is the first phase of a broader, provincial vision screening training manual and teaches the lay screener basic knowledge about the various levels of eye specialties, describes the anatomy of the eye, discusses vision irregularities and how to read a prescription, and provides a basic introduction to screening tools that will be studied in greater detail in the provincial vision screening training manual. This manual can be used as a standardized approach to training Aboriginal screeners who are new to this field.

### **Objectives of Book 1 training manual:**

Following the one day training session, Aboriginal vision screeners should:

1. Have a clear understanding of eye anatomy
2. Understand refractive errors and visual acuities and the role they play in vision screening
3. Understand vision irregularities that are relevant to the screening program
4. Correctly read a prescription
5. Have a general understanding of screening tools and how they are relevant to the screening program
6. Be confident in starting the second phase of the vision screening training which includes review of the provincial vision screening manual and conducting vision screening on preschool children
7. Be comfortable in proceeding with the objectives of the provincial vision screening manual as listed below

### **Objectives of Provincial Vision Screening Training Manual (2009):**

1. Understand the vision screening services offered to the preschool age and/or kindergarten population by the Health Authorities
2. Understand the purpose of the screening procedures for stereopsis (the ability to blend the images of both eyes together) and refractive errors/visual acuity
3. Accurately carry out the screening procedure for stereopsis and refractive errors/visual acuity
4. Record and interpret the results of the screening procedure
5. Make appropriate referrals if indicated and liaise with other professionals involved in follow up (e.g. eye doctors, teachers, etc.)
6. Record findings of the referrals and complete necessary follow-up

## 2. Background

### Aboriginal Preschool Visual Screening

It has been well documented that the majority of a child's learning is based on vision, yet as many as one in five preschool-aged children have a vision disorder. In response to this health concern, the provincial government announced funding in 2005 for a universal hearing, dental, and vision early-screening program for every child in the province of BC under the age of six years old. Preschool vision screening has been identified as a service that is needed especially in rural, remote, and/or isolated Aboriginal communities.

In 2006, the National Collaborating Centre for Aboriginal Health (NCCAH) received funding from the Provincial Government to support the implementation of an Aboriginal-specific preschool vision screening strategy. The provincial Preschool Visual Screening (PVS) program is working to ensure that all children in this province are screened for vision disorders (such as strabismus, amblyopia, and refractive error) before they start school at the age of six years. This manual was developed in partnership with the NCCAH, the provincial Health Authorities (Vancouver Island Health Authority, Northern Health, Interior Health, Fraser Health, and Vancouver Coastal Health Authority), the First Nations Health Society and the Ministry of Healthy Living and Sport. It is intended to train Aboriginal vision screeners to service their own and surrounding communities. The overall goal of training Aboriginal screeners is to promote program sustainability while building capacity in rural, remote, and/or isolated communities.

In summary, the Aboriginal PVS program will assist parents and early childhood educators in Aboriginal communities in receiving important information about children's eye health and vision and will ensure Aboriginal a greater number of children will receive early intervention and treatment to optimize their ability to adapt and learn throughout their childhood.

### 3. Vision Screening

#### **What is vision screening?**

The overall purpose of vision screening is to identify vision defects and refer the patient onto a vision care professional, such as an ophthalmologist or optometrist, for diagnosis and/or treatment. In the childhood years it is important to detect any vision problems that may impair a child's ability to learn. The screening process can help determine which infants and children may need further diagnostic assessment and referral to a vision professional. <http://www.health.state.mn.us/divs/fh/mch/webcourse/vision/>

Screening is a process by which a large number of asymptomatic and apparently healthy persons are assessed by a fast, efficient method in order to separate them into different groups. Screening is not a diagnostic procedure and does not determine that correction of a possible defect or need for glasses is indicated. Vision screening is administered by lay personnel or health professionals who have received training in screening methods and can identify visual concerns. Once a problem is identified the patient is referred to an eye doctor for diagnosis and treatment. Vision screening is differentiated from eye examinations which are administered to evaluate and/or measure individual visual performance in the general population. These diagnostic eye exams are administered by ophthalmologists and optometrists who are trained eye care professionals in this field.

#### ***Why is vision screening important?***

Vision screening is important because it identifies children with possible vision conditions such as visual acuity and muscle balance problems. If left undiagnosed and/or untreated, permanent vision loss may result. Vision loss in children has proven to impact performance at school and can influence overall health <http://www.health.state.mn.us/divs/fh/mch/webcourse/vision/>.

Children with impaired vision often are not aware of their impairment and are unlikely to complain. If they have always seen things in a blurred or distorted way, they accept the imperfect image without question. It is up to adults responsible for children's health care and educational development to detect children experiencing vision problems.

## 4. General Information



Figure 1.1 Ophthalmologists at work: Source: <http://www.atpo.org/>

### **Vision Care Personnel and Professional Definitions:**

**Ophthalmologist** - An ophthalmologist (or eye physician or surgeon) is a medical doctor specializing in defects and diseases of the visual system, who diagnoses and treats by medical, optical and surgical techniques.

The eye care team includes the ophthalmologists, nurses and allied health staff. Specifically, within allied health, several areas of expertise exist, including:

ophthalmic assistant

ophthalmic technicians/ technologists

ophthalmic photographers

ophthalmic dispensing opticians

**Optometrist** - An optometrist (or doctor of optometry) is a health care professional who examines the visual system. Patient management includes: prescribing glasses, contact lenses, vision therapy (orthoptics), low vision aids, and referral for consultation to the appropriate medical practitioner for treatment of ocular or systemic disease or eye surgery.

**Optician** - An optician is a technician who grinds, fits, and dispenses corrective lenses on the written prescription of an ophthalmologist or optometrist.

**Orthoptist** - An orthoptist is a medically supervised practitioner who evaluates binocular vision problems and treats such problems with occlusion, exercises, or prisms.

**Screeener** - Lay health personnel who are trained for specific screening programs, are often volunteers, and generally have some experience working in a medical setting.

## Anatomy of the Eye

This picture shows a cross-section of the eye. All the various parts of the eye have to work together for us to see properly. It's just like the rest of our bodies; if something does not work well, our equilibrium is unbalanced. Let's work through each eye part and review what it does.

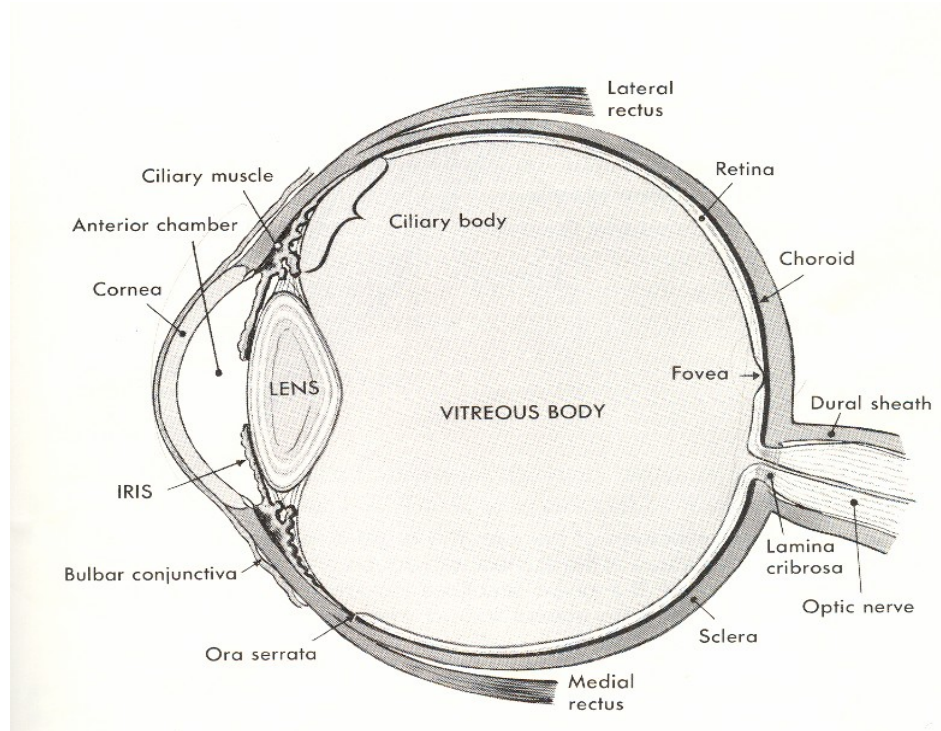


Figure 1.2

### Eye Anatomy Definitions

**Anterior Chamber:** the portion of the eye lying between the cornea and the iris; filled with aqueous humor.

**Choroid:** the dark brown, inner coating of the eye that lies between the sclera and the retina. The function of the choroid is to nourish other parts of the eye

**Ciliary Body:** portion of the inner coating between the iris and the choroid; consists of ciliary processes and the ciliary muscle. This organ changes the convexity (shape) of the lens when a change of accommodation is required.

**Conjunctiva:** mucous membrane which lines the eyelids and covers the front part of the eye.

**Cornea:** clear, transparent portion of the outer coat of the eye through which light enters.

**Crystalline Lens:** a transparent, colorless body suspended in the front part of the eye behind the iris. The function is to bring the rays of light to a focus on the retina.

**Fovea:** small depression in the retina at the back of the eyes; the part of the macular area adapted for most acute vision and colour vision. It consists largely of specialized cone receptors (cells that recognize colour).

**Iris:** coloured, circular membrane; which regulates the amount of light entering the eye by changing the size of the pupil.

**Optic Nerve:** the special nerve of the sense of sight which carries messages from the retina to the brain.

**Ora Serrata:** the junction of the retina and ciliary body.

**Retina:** the innermost layer of the eye which receives the image and changes it into nerve impulses which are then transmitted to the brain.

**Sclera:** the white part of the eye – a tough covering that forms the external, protective coat of the eye.

**Vitreous Body (Aqueous Humor):** a jelly-like substance occupying the posterior cavity of the eye. It is transparent and makes up 2/3rds of the eye.

*While it is not important for us to memorize every part of the eye, it is important to understand how each part works together to enable us to see and if one of these parts does not work properly, we experience vision problems.*

## Visual Pathway

This picture shows us the visual pathway. Understanding how an image goes from entering your eye to the brain is important in understanding how a lazy eye works. Let's review the parts of the pathway, what they do, and how a message gets from the cornea to the brain.

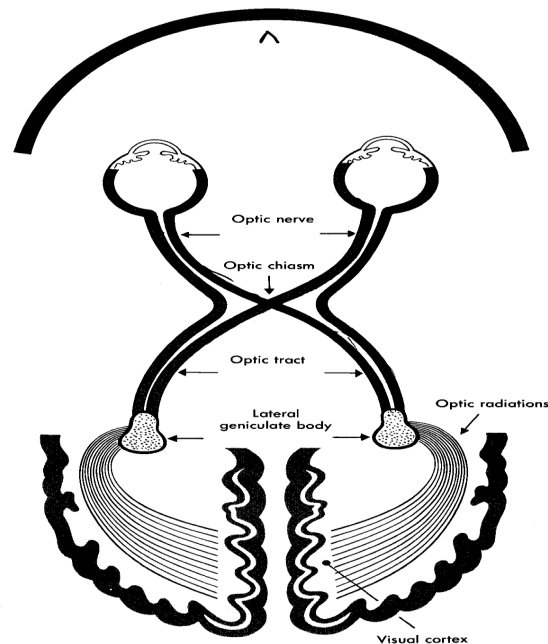


Figure 1.3

### Visual Pathway Definitions

**Optic Chiasm:** the place of crossing in the brain of the fibers from the two eyes.

**Optic Tract:** a band of nerve fibers extending from the optic chiasm to the lateral geniculate body and conducting the nasal half of the nerve fibers of the retina of the opposite eye.

**Lateral Geniculate Body:** the geniculate body is a relay station. Retinal fibres pass from the optic tract to the lateral geniculate body and then spread out in a fan-shaped manner and extend to various parts of the brain before reaching their final destination.

**Visual Cortex:** The outer portion of the brain responsible for visual input.

*Again, it is not important for us to memorize all parts of the visual pathway but it is important to understand the process.*

## Ocular Mobility

Ocular motility is extremely important in understanding turned eyes. There are six muscles on the eye and they each have a very specific job. If they get lazy and don't work hard enough, your eyes will not align but one will start to turn in or out (most common), up or down. Let's review the eye muscles and how they are responsible for turns and rotations of the eye.

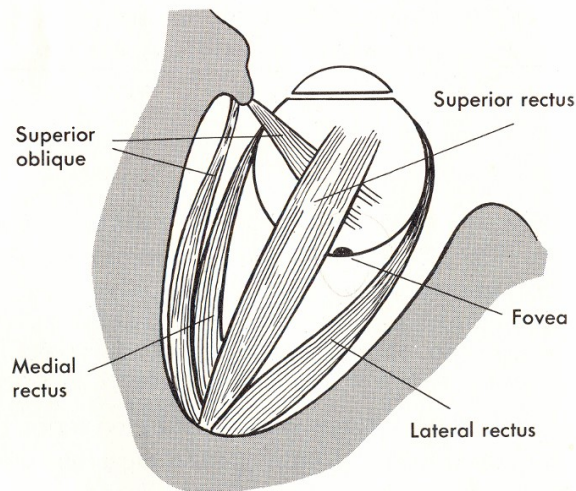


Figure 1.4

## Ocular Mobility Definitions

**Superior Oblique Muscle:** muscle that pulls the eye inward and downward

**Inferior Oblique Muscle:** muscle that pulls the eye outward and upward

**Inferior Rectus Muscle:** muscle that pulls the eye downward

**Superior Rectus Muscle:** muscle that pulls the eye upward

**Medial Rectus Muscle:** muscle that pulls the eye inward

**Lateral Rectus Muscle:** muscle that pulls the eye outward

*These muscles are very complicated and it isn't necessary for you to remember what each muscle does and how that looks on a child who comes to your clinic. It is important to understand that there are many different muscles responsible for eye movement and just a slight misalignment can cause visual disturbances.*

## 5. Introduction to Eye Anomalies

What can go wrong with our vision? We all know someone who has glasses or contacts. When people wear glasses and really need to wear them all the time, their eyes may look a little larger or smaller and this depends on if they are nearsighted or farsighted.

Let's review the different terms you will hear time and again when an eye doctor is talking about refractive error (the need for glasses/contact lenses).

**Refractive Error** refers to a defect in the eye that prevents light rays from being brought to a single focus exactly on the retina.

**Emmetropia** refers to a normal eye. When rays of light enter the cornea, they merge directly on the retina. There is no need for visual correction for the normal eye

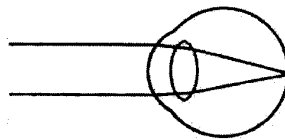


Figure 1.5

**Myopia: 'nearsighted'.** That is, a refractive error in which the eye focuses rays of light so that the focal point is in front of the retina. The myopic eye is not able to see objects that are far away.

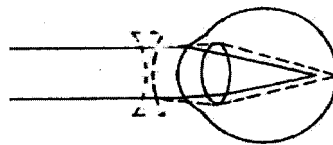


Figure 1.6

If a person is nearsighted it means that when the rays of light enter the cornea, they merge before they get to the retina. Usually, it's because the eyeball is a little longer in length than the normal eye. When this happens, a lens is needed to help merge the rays of light directly on the retina. When a person is nearsighted they can see at near but distance becomes blurry.

**Hyperopia: 'farsighted'.** That is, refractive error in which the eye focuses rays of light so that the focal point is behind the retina. The hyperopic eye is not able to see objects that are nearby.

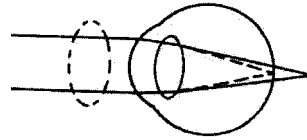


Figure 1.7

If a person is farsighted it is the exact opposite of being nearsighted. When the rays of light enter the cornea, they merge after the retina because the eyeball is shorter than in the normal eye. When this happens, a lens is needed to help merge the rays of light directly on the retina. When a person is farsighted they can see at a distance but have difficulty seeing objects up close.

**Astigmatism:** The fourth type of eye condition is known as astigmatism. If a person has either of the other types of eye conditions (nearsightedness, farsightedness) they can also have astigmatism or you can have a normal eye with astigmatism. However, you can't be nearsighted and farsighted at the same time.

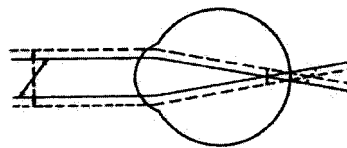


Figure 1.8

For example, a person with astigmatism will complain of blurry vision at any given point. The ray of light does not focus anywhere. A lens that has a cylindrical shape is needed to sharpen the vision. For a person with a high astigmatism, if they are looking at a telephone pole, the pole will be slanted but not necessarily blurry. Putting a lens on the eye at a certain angle (or axis) will straighten the object and clear their vision to 20/20.

## Visual acuity

Acuity refers to the clarity of vision, specifically, the ability to distinguish fine details. Visual acuity is often measured on vision testing such as the HOTV test.

### Defining 20/20 vision:

20/20 refers to normal distance visual acuity. The top number refers to the distance, in feet, between an eye being tested and the eye chart. The bottom number indicates that a line of letters or symbols of a small specific size can be read from 20 feet away. For example, if a patient has perfect vision, he/she has 20/20 vision; they see an object (the eye chart) at the actual distance of 20 feet. If a person has less than perfect vision, i.e. 20/40, they see the object as if it is 40 feet away from them although it is actually only 20 feet away.

For this vision screening project, we will measure vision at 10 feet so we will refer to perfect vision as 10/10.

1800 Myopia Clinic  
Salem, Massachusetts 01970  
Tel: (508) 250-2000  
Fax: (508) 250-2000

**SPECTACLE PRESCRIPTION ONLY**

FOR James J. Smith DATE 3 OCT 94

ADDRESS \_\_\_\_\_

Rx		SPHERICAL	CYLINDRICAL	AXIS	PRISM	BASE
D.V.	O.D.	-3.25	-.25	130		
	O.S.	+1.50	-1.00	80		
N.V.	O.D.	+2.00	add			
	O.S.	+2.00				

REMARKS \_\_\_\_\_ P.D. 72, 60

DATE OF EXAM 3 OCT 94 EXPIRATION DATE 3 OCT 95

DR. James J. Smith LIC. # 2281

Figure 1.9: Example of eyeglass prescription: Source: [http://en.wikipedia.org/wiki/Eyeglass\\_prescription](http://en.wikipedia.org/wiki/Eyeglass_prescription)

### Strabismus

Often referred to as 'crossed eyes', this condition occurs when one or both eyes turns in, out, up, or down, and is usually caused by poor eye muscle control. This misalignment often first appears before age 21 months but can develop as late as age 6. A child will not outgrow strabismus. In fact, the condition may get worse without treatment (Provincial Vision Screening Training Manual, 2009).

Figure 2.0 Child with Straight Eyes



Figure 2.1 Types of Strabismus

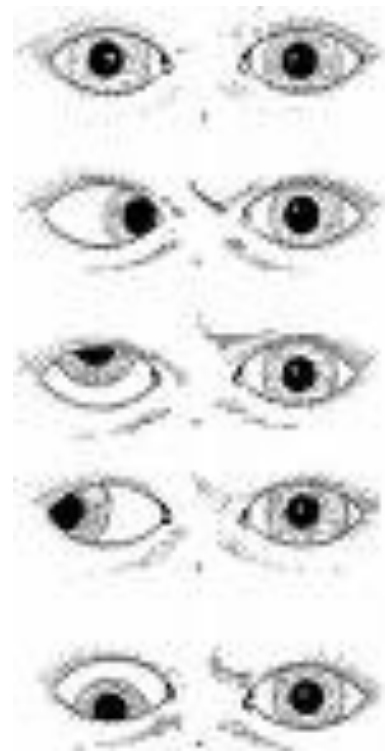


Figure 2.2. Children with Strabismus



### **Pseudostrabismus**

A condition in which there is an apparent strabismus to the observer but no true strabismus. It may be produced by the presence of epicanthal folds that cover the inner angle of the junction of the eyelid.

Figure: 2.3 Example of a child with Pseudostrabismus of the left eye



## Amblyopia

Amblyopia, often referred to as a 'lazy eye' and exists when there is a difference of two or more lines in the visual acuity of the eyes (20/40 or less). Amblyopia represents a loss of vision in which there is no pathologic condition seen in the eye or the optic tract and is usually the result of a longstanding suppression of the turned eye. Amblyopia also occurs when there is a large refractive error in one eye that has gone undetected for some time (Stein et al., 1988).

A child with strabismus suppresses the image from a turned eye to avoid seeing double. The constant habit of suppression is amblyopia (Stein et al., 1988).

Amblyopia can develop in infancy, as a result of strabismus, or at any period during life. It can be caused by myopia, hyperopia, or astigmatism. More rarely, amblyopia can result from eye disease or conditions such as cataracts. The types which develop during later years are usually from toxic sources (alcohol, tobacco, drugs, or disease). The type usually affecting children results from disuse of the macular area. It is estimated that approximately 2 – 4 percent of all children in Canada are affected to some extent. The following discussion will center on amblyopia in children and its causative factors.

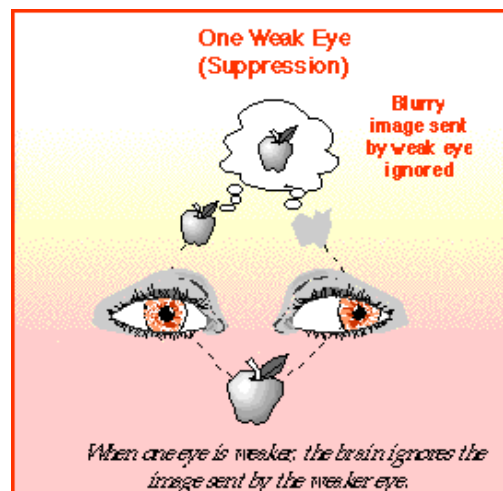
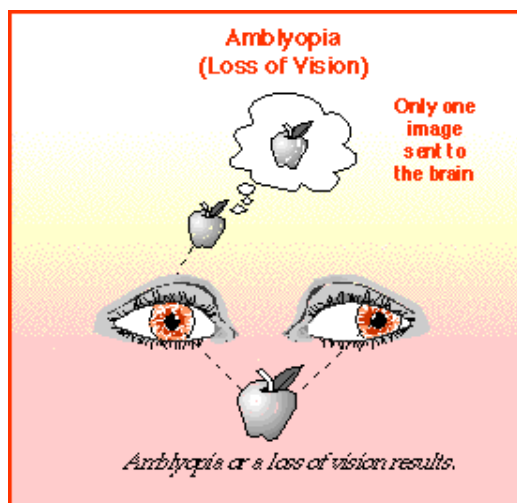
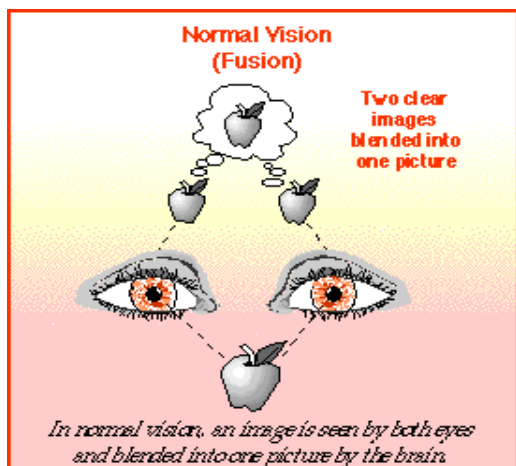
Differences between the images the two eyes send to the brain can occur if there is:

1. a large difference in visual acuity;
2. a marked unilateral refractive error;
3. muscle imbalance; or
4. a combination of the above.

This difference between the two eyes interferes with proper binocular vision often giving a blurred or double image. The brain, not capable of dealing with double vision (diplopia), will turn off (suppress) the offending image. If the condition is detected and treated early, significant improvement may occur. Prognosis is most favorable when treatment is begun by the age of 18 months. The type of treatment depends on the age of the patient and the visual acuity at the onset of the disorder. Patching, corrective refraction, eye exercises, or a combination of these procedures usually constitutes treatment (Provincial Vision Screening Training Manual, 2009).

Example of Amblyopia:

Source: <http://www.webeca.com/vision%20problems/amblyo>



## 6. Tests and Administration of Tests

There are a number of different tools used for screening children between the ages of 3 to 6. Outlined below are methods of screening that have been used successfully in multiple project types and settings.

### Randot Stereotest



Source: BC Provincial Vision Screening Manual, 2009

The Randot Stereotest is a useful screening tool for young children who may be nonverbal and is used to measure stereopsis or the ability to judge depth perception (Stein, et al. 1987).

In each booklet, the left-hand page shows two-dimensional black-and-white silhouettes of test shapes. The right-hand page contains two sets of randomly placed shapes in different sequences and different levels that are like the shapes on the left-hand page. While wearing Stereoglasses the child must correctly identify at least two of the three test shapes at each disparity level (Provincial Vision Screening Training Manual, 2009).

#### Referral Criteria for Randot Stereotest

For children 36 months to Kindergarten age—refer if unable to determine stereopsis at 100 seconds of Arc

For older children—refer to eye specialist if symptomatic

(Provincial Vision Screening Training Manual, 2009, p.20).

## HOTV Test

The HOTV is a matching test used in vision screening for young preverbal children or for those who do not know letters (Hansen, 1986).



Source: <http://65.160.159.85/800004%20HOTVInfantAcuityTest.htm>

The HOTV test uses letters similar to those found on a typical (Snellen) eye chart. The patient holds a card with the possible choices of letters and is instructed to match the letter on the big chart with one exactly like it on his/her card. For screening purposes, the test is held at 10 feet from the patient. This test can be tiring for younger patients and it is recommended that only 4-6 letters on each line be tested. This will ensure you hold the attention of the child while being able to accurately test the child's visual acuity.

### Referral Criteria for HOTV Test

For children 36 months to Kindergarten age—refer if 10/20 or worse in one or both eyes; refer if other symptoms are present; refer if unequal acuity (i.e. where there is a 2 line difference between each eye)

For older children—refer if 10/15 or worse in one or both eyes; refer if other symptoms are present; refer if unequal acuity (where there is a 2 line difference between each eye)

(Provincial Vision Screening Training Manual, 2009, p. 58).

## SureSight Vision Screener



Source: <http://www.welchallyn.com/products/>

The SureSight Vision Screener is used to measure common vision problems in children such as myopia, hyperopia, astigmatism (asymmetrical focus), and Anisometropia (unequal power between eyes). It is an acceptable screening tool as it is an objective test that requires little input from the child. The only requirement is that they look at the red light and remain still while the test is being completed. The test is performed at approximately 14 inches away from the child's eyes, has lights and sounds that tend to attract the child's attention, and automatically measures the readings (Provincial Vision Screening Training Manual, 2009).

### Referral Criteria for SureSight Vision Screener

For children 36 months to Kindergarten age:

Sphere  $\leq -1.0$  D or  $\geq +3.0$  D

Cylinder  $\geq 1.5$  D

Difference  $\geq 1.5$  D

(Provincial Vision Screening Training Manual, 2009, p. 20).

## 7. Appendices

### Appendix A: Screening Protocol

Screening protocol will be reviewed in detail in the second phase of training. However, here is an overview of the screening process from beginning to end provided for your review.

- Arrange screening date and time with community contact
- Identify the site for vision screening and outline to the community contact the room requirements:
  - Require a room with the ability to control lighting
  - Require a room that is quiet
  - Require a room that is at least 10 feet long
- Check list
  - Occluders
  - Vision screener, HOTV, Randot Stereo Test
  - Measuring tape
  - Pens, pencils, notepads
  - Visual acuity checklist
  - Vision screener checklist
  - Stereopsis checklist
- Record screening results and complete referral forms as appropriate
- Not everyone makes an appointment so be willing to accept walk-in patients but explain that they may have to wait
- Respect peoples privacy and do not discuss the results of a screening test with others in the screening area or in the community in general
- Before the child leaves the screening area, ensure that the parent/guardian understands the next steps (ie: referred or not referred) and provide them with any information they require in how to access an ophthalmologist or optometrist in their area.
- Ensure your work station is tidy and the room is put back in its original condition before leaving at the end of the day

### Appendix B: General Technique Tips (Rovick, 2007)

Children, as a rule, are reluctant to guess when identifying letters or figures on an eye chart and, if not obvious, may refuse to tell you what the letters or figures might be. It is important to encourage the child to think hard and study the picture or letter and tell you what they think it is. Encouragement and confidence building is very important with small children.

A child with poor vision in one or both eyes may need special consideration and it will sometimes take longer to complete the screening. Patience is required. Keep in mind that a child can easily become tense and non-responsive if the screener is unfriendly or appears to be unapproachable.

Remember that children like to get the answers right! They will do anything to avoid seeming like they cannot see the chart. Peeking around an occluder to use the better-seeing eye seems like the most reasonable response to a child who is reluctant to make mistakes. Be on the lookout for the peekers! It is a huge disservice to the patient to perform a vision screening test and unknowingly examine the same eye twice. Amblyopia is only treatable in a child less than eight years old. When missed during early vision screening, it may never get treated.



Preschoolers in Gitwangak, BC Photo by Dr. Barry Lester

## Appendix C: Glossary of Ophthalmic Terms

**ACCOMMODATION** - The adjustment of the eye for seeing at different distances, accomplished by changing the shape of the crystalline lens through action of the ciliary muscle, thus focusing a clear image on the retina.

**AMBLYOPIA** - Reduced visual acuity not correctable by refractive means and not attributable to obvious structural or pathological ocular anomalies.

**AMETROPIA** - Imperfection in the refractive powers of the eye so that images are not brought to a proper focus on the retina; includes hyperopia, myopia, and astigmatism.

**ANISOMETROPIA** - A condition in which there is a different type of refractive error between the two eyes, i.e., one eye is hyperopic while the other eye is myopic.

**AQUEOUS HUMOR** - A water-like fluid which is manufactured by the ciliary body and which fills the anterior and posterior chambers of the eye located in front of the lens.

**ASTIGMATISM** - A defect of curvature of the cornea or lens of the eye as a result of which a ray of light is not sharply focused.

**BINOCULAR** - Using both eyes simultaneously.

**BINOCULAR VISION** - The ability to use the two eyes simultaneously to focus on the same object and to fuse the two images into a single image.

**BLINDNESS** - In Canada, the legal definition of blindness is: central visual acuity of 10/100 or less in the better eye after correction; or visual acuity of more than 10/100 if there is a field defect in which the widest diameter of the visual field subtends an angle no greater than 20 degrees.

**BLIND SPOT (Physiological)** - An area which has no nerve receptors located at the back of the eye where the optic nerve enters the eye to supply nerve fibers and blood vessels to the retina. The blind spot in one eye does not "correspond" to the other so that the vision of one eye "fills in" the blind spot of the other, and vice versa.

**CHOROID** -The dark brown, vascular coat of the eye, between the sclera and the retina, whose function it is to nourish the retina and lens and to absorb light rays not absorbed by the retina.

**CILIARY BODY** - Portion of the vascular coat between the iris and the choroid. It consists of ciliary processes and the ciliary muscle. This organ changes the convexity of the lens when a change of accommodation is required.

**CONCAVE LENS** – Lens having the power to diverge parallel rays of light; also known as diverging, reducing, negative, myopic, or minus lens, denoted by the sign “-”.

**CONES** - One of the two types of light-sensitive nerve endings that are scattered over the surface of the retina making it possible to transmit visual impulses to the brain. Cones perceive fine detail and colour and are more numerous at the macula.

**CONGENITAL** - Present at birth.

**CONJUNCTIVA** - Mucous membrane which lines the eyelids and covers the front part of the eyeball.

**CONVERGENCE** - The process of directing the visual axes of the two eyes to a near point, with the result that the pupils of the two eyes are closer together. The eyes are turned inward.

**CONVEX LENS** - Lens having power to converge parallel rays of light and to bring them to a focus; also known as converging, magnifying, hyperopic, or plus lens, denoted by the sign “+”.

**CORNEA** - The anterior transparent portion of the outer coat of the eye through which light enters.

**CRYSTALLINE LENS** - A transparent colourless body suspended in the anterior portion of the eyeball, between the aqueous and vitreous chambers, the function of which is to help bring the rays of light to a focus.

**CYLINDER** - A measure of the power of astigmatism, or irregular focus of the eye. A display unit on autorefractor device.

**DEPTH PERCEPTION** - The ability to perceive the solidity of objects and their relative position in space.

**DIFFERENCE:** The difference in mean spherical power between the two eyes.

**DIOPTER** - A unit of measurement denoting the amount a lens can bend a light ray.

**DIPLOPIA** - Double vision.

**DIVERGENCE** - The ability to relax convergence or the ability to turn the eyes out.

**EYE DOMINANCE** - Tendency of one eye to assume the major function of seeing, being assisted by the less dominant eye.

**FIELD OF VISION** - The entire area which can be seen at one time without shifting the head or eyes.

**FOCUS** - Point at which rays are converged after passing through a refractive substance.

**FUSION** - Coordination of the images seen by each eye individually into one picture.

**HYPEROPIA** - A refractive error in which the eyeball is too short from front to back or the refractive power of the eye is too weak, so that parallel rays of light are brought to a focus behind the retina. Far sightedness is a condition requiring a convex (plus) lens to correct.

**IRIS** - Coloured, circular membrane; which regulates the amount of light entering the eye by changing the size of the pupil.

**LACRIMAL GLAND** - A gland which secretes tears. It lies just above the outer corner of the eye.

**LENS** - A refractive medium of colourless transparent substance so shaped as to converge or scatter rays of light.

**MONOCULAR** - Pertaining to or having one eye.

**MYOPIC** - A refractive error in which the eyeball is too long or the refractive power is too strong, so that parallel rays of light are focused in front of the retina. Near-sightedness is a condition requiring a concave (minus) lens to correct.

**NEAR VISION** - The ability to perceive distinctly objects at normal reading distances, or about fourteen inches from the eyes.

**OCCLUDE** - To cover.

**OCCLUSION** - The method of obscuring the vision of one eye, so as to force the use of the other eye.

**OCULUS DEXTER (O.D.)** - Right eye.

**OCULUS SINISTER (O.S.)** - Left eye.

**OCULUS UTERQUE (O.U.)** - Both eyes.

**OPTIC NERVE** - Second cranial nerve; the special nerve of the sense of sight which carries messages from the retina to the brain

**PERIPHERAL VISION** - Ability to perceive presence, motion or colour of objects outside of the direct line of vision.

**PUPIL** - The opening at the center of the iris of the eye for the transmission of light.

**REFRACTION** - a) Deviation of the course of rays of light in passing from one transparent medium into another of different density. b) Determination of refractive errors of the eye and correction by glasses.

**REFRACTIVE ERROR** - A defect in the eye that prevents light rays from being brought to a single focus exactly on the retina.

**RELIABILITY NUMBER** - indicates the number of good readings obtained and their consistency, based on a 1 to 9 scale. The higher the number, the better the reliability.

**RETINA** - The innermost coat of the eye which receives the image and changes it into nerve impulses which are transmitted to the brain.

**RODS** - One of the two types of light-sensitive nerve endings that are scattered over the surface of the retina making it possible to transmit visual impulses to the brain. Rods perceive light and motion.

**SCLERA** - The white part of the eye -- a tough covering which, with the cornea, forms the external, protective coat of the eye.

**STEREOPSIS** - Binocular visual perception of three dimensional space.

**STEREOSCOPIC VISION** - Ability to perceive relative position of objects in space without such clues as shadow, size, and overlapping.

**STRABISMUS** - Tropia or squint.

**VISUAL ACUITY** - Sharpness of vision in respect to ability of the eye to distinguish detail as an object is placed further away or as it becomes smaller in size.

#### **Appendix D: Glossary of Health Care Personnel**

**FAMILY PHYSICIAN** - A family physician (or general practitioner) is a medical doctor who assesses diseases and problems of the eye in relation to other health problems. Treatment includes eye drops and ointments. Family physicians refer patients to ophthalmologists or optometrists, when appropriate.

**OPHTHALMOLOGIST** - An ophthalmologist (or eye physician or surgeon) is a medical doctor specializing in defects and diseases of the visual system, who diagnoses and treats by medical, optical and surgical techniques.

**OPTOMETRIST** - An optometrist (or doctor of optometry) is a health care professional who examines the visual system. Patient management includes: prescribing glasses, contact lenses, vision therapy (orthoptics), low vision aids, and referral for consultation to the appropriate medical practitioner for treatment of ocular or systemic disease or eye surgery.

**OPTICIAN** - An optician is a technician who grinds, fits, and dispenses corrective lenses on the written prescription of an ophthalmologist or optometrist.

**ORTHOPTIST** - An orthoptist is a medically supervised practitioner who evaluates binocular vision problems and treats such problems with occlusion, exercises, or prisms.

## Appendix E: Infection Control

Eye infections can be bacterial, viral, chlamydial, fungal or acanthamoebic and can be easily passed to others through contaminated instruments, hands, discharge or other bodily fluids (Seewoodhary & Stevens, 1999). Other types of communicable diseases such as influenza are also easily spread in health care settings where patients, health care staff and visitors are interacting. The following infection control guidelines can help reduce the spread of eye infection and other communicable disease.

### Basic Hand Hygiene

Hand hygiene is the most effective way to prevent the spread of infections and communicable diseases. Handwashing is required *before and after* significant contact with any patient and after activities likely to cause contamination including:

- handling food or medication
  - going to the toilet
  - coughing, sneezing, blowing one's nose
- (Lakkis, Lian, Napper, Kiely, 2007).

Effective hand hygiene procedures include using alcohol based hand rub and washing with soap and water for at least 20 seconds. Other recommendations include the removal of jewellery, ensuring cuts and abrasions are covered with water-resistant bandages, keeping fingernails clean and short, and using non-perfumed hand lotion to maintain skin integrity. The use of gloves is not a substitute for basic hand hygiene. Hand hygiene must be performed before and after using gloves. When seeing patients, you should also avoid touching your own face, mouth, nose and eyes. Please see : "How to hand wash" and "How to hand rub" posters in the resources section of this binder for more detail.

### Cleaning of Equipment

Cleaning of vision screening equipment is critical to the prevention of common eye infections such as conjunctivitis (pink eye). Each instrument is cleaned differently and includes:

Randot Stereotest: use a regular eye glass cleaning cloth (dry or dampened with water/ glass cleaner) to clean the Randot booklet and glasses. Plain soap and water may be used to clean glasses in exceptional cases (i.e. contact with purulent discharge)

SureSight Vision Screener: clean windows with soft cloth dampened with 70% isopropyl alcohol or standard window cleaner; housing, straps etc can be wiped with isopropyl alcohol, 10% Clorox, alcohol pads, standard window cleaner or soapy water

HOTV: Wipe occluder with alcohol pads between patients and allow to air dry

(Provincial Vision Screening Training Manual, 2009)

Other considerations

Ensure waste is disposed of frequently and in appropriate containers depending on the type of waste

Room hygiene: ensure counters, sinks, door handles, computers, phones, and other high-touch surface areas are cleaned on a regular basis with the appropriate cleaning solution for the surface type.

Screen patients for symptoms when booking appointments. If patients are exhibiting flu-like symptoms and their visit is not urgent, ask to reschedule their appointment when they are feeling better.