

## Pediatric Vision Screening: some General Knowledge for Pediatricians

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### Abstract

Primary vision care is recommended for infants and young children. Childhood is critical time to prevent loss of vision and to optimize treatment so some eye disorders in children must be diagnosed at this time. To detect risk factors and visual abnormalities, the eye screening done by pediatricians and other primary care providers is necessary. The process that should occur at each child visit to identify those patients who require referral to ophthalmologist and can be a preventative health measure. Thus, it is important that pediatricians increased knowledge about the eye conditions that may affect their youngest patients. This article reviews the most important pediatric eye condition that primary care providers may encounter.

**Keywords:** Amblyopia, Childhood, Primary vision care, Strabismus.

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## Introduction

Primary vision care is recommended for infants and young children. Childhood is critical time to prevent loss of vision and to optimize treatment so some eye disorders in children must be diagnosed at this time (1-3).

Most of the time, an accurate screening for eye disorders can be difficult for primary care physicians and pediatricians. Despite these difficulties, many of significant eye problems in these years can be detected with effective screening procedure. Techniques used for the children are different from those used for the adult. Measurement of eye and visual condition is deeply dependent on the examiner's skill and knowledge of normal development and use of observational abilities (4).

The aim of this study is to review detect and referral of children with significant eye abnormality. Some of abnormality that is easily missed during visits to the primary care office are: amblyopia, small-angle strabismus, cataract, glaucoma, ocular, eye trauma and nystagmus.

**1. History:** The patient history is the first and most important part of the examination that determined which type of test should be done during the examination. Some of condition requiring referral such as Down syndrome, premature birth, family history of amblyopia, strabismus, glaucoma, retinoblastoma and cataracts detect in taking history (5). The prevalence of visual or ocular condition must be kept in mind for example visual development is incomplete at birth, particularly in premature infants (6).

**2. Visual acuity:** Visual acuity testing is the clinical procedure used to assess the ability of an individual to discriminate detail or distinguish form. Problems related to visual anomalies are common among young children. Determining visual acuity in infants and toddlers differ from

adults, involves evaluation of fixation, and follow activities. The testing method varies, depending on the ages. By five months of age, infants should regard faces or interesting objects with steady, conjugate gaze through all fields of vision. Toddlers with some speech skills can use Allen object recognition posters, which present a series of simple, idealized pictures. Recognition of each picture at 10 ft (3 m) is roughly equivalent to 20/30 vision. Children aged three and older can usually perform the "tumbling E" test, in which the child indicates the cross-bar direction of a series of progressively smaller "E's" presented with varying orientation. The American Academy of Ophthalmology recommends three years old for using of any chart such as Allen (picture chart) or Snellen (letter chart) to assessment visual acuity. Each eye must be tested separately and other eye occluded (7). The Multi-Ethnic Pediatric Eye Disease Study provided Norms for visual acuity in children. Most children do not have 20/20 vision until after six years of age but at any age; visual acuity should be approximately equal between the eyes(8).

The American Academy of Ophthalmology recommends that children five years or older who cannot realize 20/30 line monocularly, or two lines difference between eyes must be refer, because these are the risk factor of amblyopia (6-9).

**3. Refractive error:** Refractive error that contains hyperopia, myopia, and astigmatism is an important risk factor of amblyopia (10-12). To evaluate the refractive status of infant and preverbal children an objective methods are usually used that do not require many cooperation. Screening for refractive errors starts with red reflex exams (see feature) and continue with testing visual acuity in school-aged children. At all age, pediatricians must look carefully at the red reflex. Any difference in the pupil's color and

intensity, or asymmetry in brightness compared with the other eye likely signals a refractive problem and should be referred (13, 14).

**Red reflex examination:** Some of the neonatal eye condition such as ocular misalignment, refractive errors, retinal abnormalities and cataracts can be evaluate with the red reflex examination (4). To performed this examination using an ophthalmoscope from a distance of approximately 30 to 45 cm in a dark room to view each red reflex individually from the patient's eyes, and then both red reflexes simultaneously at a distance of 0.6 to 0.9 meters. We expect to see an orange-red light from each fundus and this reflex should be symmetric in two eyes. Any abnormal condition such as asymmetric reflex and different colors or dark and white colors must be referred to an ophthalmologist (15).

**4. Amblyopia:** Lazy eye or amblyopia refers to reduced vision. In best-corrected visual acuity without any structural abnormality of the eye or visual pathway. However the brain because of a problem such as cataract, ptosis, strabismus, or a major difference in refractive error between the eyes choose one eye. Most of the time this condition affected only one eye but it can be bilateral (13). Visual acuity testing should be done for each eye because the better eye hides unilateral amblyopia when children are tested binocularly. Success of amblyopia treatment is depended on children's age; children younger than 7 years old have better chance of treatment (16).

**5. Strabismus:** Pediatricians must refer any constant ocular misalignment (strabismus) to an ophthalmologist but we have an exception because a brief eye misalignment seen in babies younger than 4 months of age not need to refer. This is diagnosed with observation right away

after birth and continues with constant testing throughout the preschool years (13). In spite of many children that their strabismus is clear, others may be having small deviations or intermittent deviation that it is difficult to detect(17). Incidence of strabismus among children younger than 6 is up to 3 percent. About 40 percent of this strabismus in early years of life can develop amblyopia, or secondary vision loss and causes psychological effect in term of self confidence in future (18, 19).

**6. Childhood Glaucoma:** Childhood glaucoma is a rare condition that most of the time connected with considerable visual loss(20). When pediatricians visit Children, who are sensitive to light (photophobia), have larger-than-normal cornea and rub their eyes most of the time should be referred these cases to ophthalmologist. Many of these children maybe related with other ocular abnormality and systemic diseases such as Sturge-Weber syndrome (13).

**7. Childhood Cataracts:** Cataract is an opaque area in the lens. Many of detected cataracts in newborns are small and must be followed but more extensive cataract cause loss of visions severally. Congenital cataracts have difference aetiology, but autosomal dominant is an important cause and expected in children with metabolic disease, intrauterine infection, trauma, and family history of pediatric cataract (21). Early diagnosis is critical for visual rehabilitation and prevention of amblyopia. The timing of congenital cataract surgery is critical (22). The early examination for detect cataract at any age is evaluation of red reflex(13).

**8. Nystagmus:** Nystagmus is characterized by a rhythmical movement and oscillation of the eyes. This condition causes a number of complications such as amblyopia, strabismus, and torticollis. Nystagmus can be discovering by a simple

observation. Children with nystagmus need to be promptly evaluated and potentially treated for a related condition such as albinism, septo-optic dysplasia, or strabismus (23).

Abnormality of the eye or the central nervous system can lead the nystagmus. Albinism, that most of the time associates with hypopigmentation of the skin, hair, and irides is one of the causes of nystagmus. Other diseases that connect to nastagmus are Morsier's syndrome, usher syndrome and bilateral media opacities or achromatopsia (17).

#### **9. Nasolacrimal Duct Obstruction:**

Obstruction of the tear drainage opens during the first months of life spontaneously. Some of infants maybe have tear pathway obstruction but maybe tearing because of glaucoma and this must be rule out by pediatricians. In condition, that obstruction is associated with dacryocystitis or dacryocystocele, the patient must be referring. If congenital nasolacrimal duct obstruction, do not treatment it can lead to anisometropic amblyopia (24).

**10. Retinoblastoma:** Retinoblastoma is a pediatric intraocular malignancy and usually rare condition while survival rates for this disease exceed 90% these days, but delays in diagnosis can cause loss of vision (25). Pediatricians must often identify the presence of retinoblastoma upon routine eye examination and visual outcome are dependent on early detection and referral. Retinoblastoma in infant and children can be associated with strabismus, abnormal white reflex, or vision loss (26).

**11. Retinopathy of Prematurity:** Infants that born before 37 weeks of gestation are addressed as premature. Premature births increase in the world and because of it Retinopathy of prematurity (ROP) increases too. ROP is one of the causes of childhood blindness, because these

children are at risk for retinal detachment, blindness, and functional abnormalities (27). Incidence of ROP in high-income countries decrease over the last few decades but in middle-income countries, increasing premature birth turned ROP to third epidemic. Neonatal care and ROP screening for middle-income countries necessary to control this third epidemic (28). Premature infants are examined for Retinopathy of prematurity (ROP) in the Neonatal intensive care unit (NICU).

#### **Conclusion**

Pediatricians have an important role in early detection of eye problems in children. Because childhood is sensitive period for eye development, vision screening is a necessary part of routine care in children. It could be done even with simple equipment such as an interesting toy for fixation, an eye chart, a penlight, a Wood's lamp, fluorescein strips, and an ophthalmoscope, so pediatricians can identify most important causes of vision loss.

**Conflict of interest:** None.

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