Young Pediatric Patient Eye Exams: The ABCs and 123s

Michelle J. Buckland, OD, MS
buckland.14@osu.edu
The Ohio State University College of Optometry
Columbus, OH 43210

- Course Objectives:
  - To learn common techniques and strategies for examining younger and non-verbal patients.
  - Diagnosis of pediatric eye disease and management will be discussed.
  - Tips on making your office pediatric friendly and visible as a pediatric office.

- Pediatric Population: US Census Data
  6.2% population is under age 5
  22.9% US population is under age 18

- Vision problems in US kids
  1 in 3 preschool children
  1 in 4 school age children

  Increase prevalence in children with developmental and intellectual disabilities
  Vision problems can affect development

- Most ODs want to get more comfortable examining young children

- Most ODs think it requires office modifications

- May believe it requires a change in office protocol

- Adult Eye exam Vs. Child Eye Exam
  History
  Visual Acuity
  Ocular Motility/Pupils
  Binocularity/Accommodation
  Refractive Error
  Visual Field
  Ocular Health

- What to bring
  Bottle, treats, pacifier, finger food
  Favorite toys, security blanket
What not to bring
   Siblings (unless accompanied by a designated babysitter)

Special Equipment

History
   Chief Complaint
   Observed vision status

General Health History

Medications/Sensitivities/Allergies

Family ocular and medical history

Developmental history

Review of Systems

Gestation:  Premature if < 37 weeks
Birth Weight:  5 lb 8 oz is normal
Prenatal complications
Birth complications
Postnatal complications:  APGAR scores, NICU
Mother’s age during pregnancy/Age adopted
Exposure
   Teratogens
   Infections:  Rubella, venereal disease, AIDS
   Fetal Alcohol/Drug Exposure
High Fevers

What We Really Want to Know?
   Does the history suggest a problem?
   Can the child see?
   Are the eyes straight?
   Assure a healthy eye!
   Is intervention necessary?

So What Do We Do?
   Be prepared to work quickly with flexibility
   Allow cool down period if the child becomes too fussy
   Watch the child’s reaction to your voice, tone & movement
“Bad” words: test, drops and hurt
Talk to the child at their eye level where it is easiest for them
Use their name (nickname if appropriate)

- Parents present: seeing is believing
  Explain to Mom or Dad as you go along
  Reassure parent and CHILD as the child is doing well during the exam
  Answer ?s but don’t stop
  Tactfully control the parent’s comments
  Use parents as targets or as puppet masters to hold the child’s attention during certain procedures

- Introduction of Equipment
  Laugh/Act excited when you introduce it
  Put a toy on it
  Give it a fun name
  Play the game with Mom/Dad/toy first if they hesitate

- Visual Acuity Methods
  Preferential Looking
    Teller Preferential Looking
    Patti Stripes
    Lea Grating Paddles
    Richmond Paddles
    Cardiff
  Fixation Preference (10 vertical)
    Alternates fixation equally
    Holds briefly but one eye dominates
    Can be done at the same time as binocularity testing (10 BO for gross convergence)

Fix and Follow
  Perform Monocular
  Silent toy/light
  Look to see if can maintain steady fixation
  Look to see if can steadily track

2 Alternative Force Choice: Ceiling is 4/4 or 4/5 correct
  Broken Wheel
  Lea
4 Alternative Force Choice Ceiling is 4/4 or 3/4 correct
Lea
HOTV matching
Crowded single letter
Use matching card

Distant ATS protocol for 3-6 year olds
Screening phase
Phase 1 (3 out of 4)
Reinforcement
Phase 2 (3 out of 4)

- Occlusion Methods
  Opticlude, occluder specs, cover paddle

- Expected Infant Visual Acuity
  Visual cortex capable of achieving 20/20 by 6 months of age (objective)
  Response (subjective) visual acuity is reduced

- BINOCULARITY
  Angle Kappa/Hirschberg
  Krimsky
  Bruckner
  1-4m away in dim illumination
  Ophthalmoscope light on both eyes simultaneously
  Observe color, brightness of retinal reflex
  10 BO test: Look for Gross Convergence
  If normal: Should see version in direction of prism apex of each eye, then
  convergence of the eye not behind the prism
  Cover Test: Interesting Targets
  Near Point of Convergence: Objectively watch eyes turn out

- Stereoacuity
  PASS
  Lang
  Randot
  Preschool Randot

- Suppression
  Worth Targets
• Versions
• Color vision
• Pupils
• Visual Field
  Confrontations
  If using an opticlude, perform at same time as VA
  Hold a noisy or quiet toy/parent in front of child
  Introduce a **silent** toy in the four principle quadrants
  Child should make a gaze shift toward the target
  Non-seeing to seeing field
  More sophisticated can start to do finger wiggle or counting with limited options

• Accommodation
  MEM
  NOTT
  Amplitudes of Accommodation
  Push up
  Pull away

• Refraction
  Dry retinoscopy
  Static
  Dynamic
  Wet retinoscopy
  Autorefraction

• Refractive Errors
  **Hyperopia**
  20% of young children have refractive error over 2.00 D
  4.4-14.1% of preschool children have 3.00D or more hyperopia
  Children with Hyperopia greater than +3.25 had a higher proportion of amblyopia (34.5%) and Strabismus (17%).
  Higher proportions of amblyopia, strabismus, anisometropia and astigmatism with worse stereoaucuity even in nonstrabismic/nonamblyopic preschoolers.

• Literacy and Hyperopia
  VIP-HIP Study: Uncorrected Hyperopia and Preschool Early Literacy
  Compared early literacy of 4 and 5 year old uncorrected hyperopic children (+3.00D to +6.00D) to emmetropic (+1.00D or less) peers.
Conclusion: Uncorrected hyperopia of >+4.00D or hyperopia +3.00+-6.00D with reduced near VA or stereoacuity was associated with significantly worse performance on a test of early literacy.

**Astigmatism** is variable
- 30-50% of infants have significant astigmatism (1.00D or more)
- Often declines and becomes stable between 2.5-5 years of age
- 10% have significant astigmatism by age 5

**Myopia** is more common in the early school years
- 1 in 6 five to seventeen year olds developed myopia (CLEERE study)

- Emmetropization
  - Majority of emmetropization is completed during the first year, resulting in reduction of the amount of hyperopia and astigmatism common in infancy
  - Emmetropization may be delayed in ROP and other at-risk babies such as those with Down Syndrome

- Amblyogenic Risk Factors

- External Examination
  - 20 D lens and penlight
  - Burton Lamp
  - Slit Lamp
    - Use chair/stand
  - Blue Light 20 D

- PD stick
  - HVID: Micro/megalocornea
  - MRD-1: ptosis

- IOP measurement
  - Palpations
  - Tonopen
  - NCT
  - iCare tonometer
**Tips for Making Drops Less Dramatic**
- Do Not Make a Big Deal about them
- Show them on their hand with artificial tears
- Perform with their eyes closed and then open
- Give 2 ACCEPTABLE “choices”
- Have Spray available if needed.

**Internal Examination**
- BIO
- Direct ophthalmoscopy
- Panoptic ophthalmoscopy
- Fundoscopy

**Pediatric Ocular Disease: Nasolacrimal Duct Obstruction (NLDO)**

* Nasolacrimal Duct Obstruction Study 3

  In infants 6 to <10 months more than 66% of eyes resolved within 6 months with nonsurgical management of nasolacrimal massage and topical antibiotics as needed. (2012 PEDIG in Arch. Ophthalmology)

  - Both the immediate office probing and observation were successful and reasonable treatment options for bilateral NLDO. (2013 Lee et al. Am J. Ophthalmology)

  - In office probing with topical anesthesia successfully treated 75% of cases (6 to <15 months). (2014 Miller et al. JAAPPOS)

**Pediatric Ocular Disease: bacterial Conjunctivitis**
- Polytrim: 2 months and older
- Erythromycin ung: neonate
- Azasite: 1 yo and older
  - Advantage of bid x2 days, then qd x 5days

**Pediatric Ocular Disease: Internal Hordeolums and Preseptal Cellulitis**

**Prescribing Oral Antibiotics**

2.2lb = 1 kg

Need to look what concentration is available in liquid form
- **Ptosis**
  Marcus Gunn Jaw Winking Syndrome
  Is Visual Axis blocked?

- **Glaucoma**
  2.29 per 100,000 persons younger than 20.
  **Symptoms**
  - Light sensitivity
  - Watery eyes
  **Signs**
  - Myopia
  - Corneal Edema
  - Increased IOP
  - Increased HVID
  - Enlarged C/D ratio
  **Treatment:** Surgical referral

- **Leukocoria**
  Retinoblastoma
  - 300 children in the US each year
  - 1 in 15,000 births
  **Signs**
  - Leukocoria: most common presenting sign
  - Strabismus
  - Red painful eye with glaucoma
  **Treatment:** irradiation, cryotherapy and chemotherapy

- **Cataract**
  Incidence: 1-4 infants per 10,000 live births

- **Persistent Hyperplastic Vitreous (PHPV)**
- **Retinopathy of Prematurity (ROP)**
  - Retinal vascular disease
  - Premature infants higher rates of amblyopia, strabismus, optic atrophy and refractive errors.
  - Common with Birth Weight less than 1,251 g and gestational age less than 28 weeks.

- **Toxocariasis**
- **Coloboma**
- **Retinal Detachment**
- **Coat’s disease**
  **Signs**
  - Reduced vision
  - Exudates
Retinal telangiectasia
Retinal detachment
Treatment: Laser photocoagulation and cryotherapy

Trauma
Periorbital ecchymosis
Orbital Blow out Fractures
Eyelid laceration
Corneal abrasions/lacerations
Hyphemia
Uveitis
Traumatic cataract/Dislocated lens
Commotio Retinae
Retinal hemorrhages
Retinal Detachment

Marketing
Internal
Pediatric friendly waiting area
Kids frame lines
Flexible frame lines
   Training staff for fitting young pediatric patients in frames
Pediatric friendly exam rooms
Staff Education
   InfantSee
   Pediatric Eye Exam ACA benefit

External
   Letters to schools, daycare, preschools
   Letters to pediatricians, family doctors and OBs
   Local Mom groups
   Social Media

Optometrist Are Primary Eye Care Providers
Who is the best trained and most knowledgeable provider to do an eye and vision examination on an infant or young child?

YOU ARE!!

Early Detection is Key!