InfantSee Examination

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InfantSEE

- No cost comprehensive eye assessment at 6 to 12 months of age
- www.infantsee.org

Sponsored by American Optometric Association and Johnson & Johnson Vision Care Institute

Recommendations for Eye Exams

- American Optometric Association (AOA)
  - 6 months, 3 years, 5 years
- American Academy of Ophthalmology (AAO)
  - Screen until 20 to 29 years

Differences in Recommendations


Difference in Recommendations

- Nurse screeners and lay screeners not significantly different
- Sensitivity of tests (any condition)
  - Autorefraction 61-68%
  - Visual acuity 37-64%
  - Better for single letters than single line
  - Stereoacuity 40-45%

Difference in Recommendations

- American Optometric Association
  "...the limitations of vision screenings support the need for and value of early detection through a comprehensive eye and vision exam by an eye doctor."
- American Academy of Ophthalmology
  "...vision screening is effective when properly performed and effective screenings can be done on a cost effective basis."

Vision is Pervasive

- Vision is involved in everything we do
- Important to identify and intervene as early as possible to ensure appropriate development

Case History

- Full-term?
- Problems with delivery?
- Birth weight?
- Any developmental delays?
- APGAR
  - One minute
  - Five minutes

APGAR Score

- One, five and ten (if problem) minutes after birth
- Activity (muscle tone)
- Pulse
- Grimace (reflex)
- Appearance (skin color)
- Respiration
APGAR Score

- Activity (muscle tone)
  - 0=absent, 1=arms/legs flex, 2=active
- Pulse
  - 0=absent, 1=below 100 bpm, 2=above 100 bpm
- Grimace (reflex)
  - 0=absent, 1=grimace, 2=sees, cough, pull away
- Appearance (skin color)
  - 0=blue/pale all over, 1=normal except extremeties, 2=normal everywhere
- Respiration
  - 0=blue/pale all over, 1=slow/irregular, 2=good/crying

APGAR Score

- 7-10 is normal
- 4-7 some resuscitative measure may be necessary
- 1-3 emergency resuscitative measure necessary
  - Lower score is at higher risk of eye problems

What Do We Examine?

- How well can you see?
- Do your two eyes work together?
- Do you need glasses?
- Are your eyes healthy?

How Well Can You See?

- Medicolesgal reasons
  - Must establish visual acuity prior to manipulating the visual system
- Monitor disease progress/treatment
- Understand level of visual disability

How Well Can You See?

- Use most sophisticated method patient is able to perform
  - The following methods of VA are listed from least to most sophisticated

How Well Can You See?

- Fix and Follow
  - Visual ability, not visual acuity
  - "F&F" for fix and follows
  - "CMS" for central, steady, and maintained
  - Large bright object moved slowly 1-2 feet from patient
  - Monocular

How Well Can You See?

- 10 Base Up Test
  - Visual ability, not visual acuity
  - Place 10^8 BU in front of one eye
  - Should switch fixation between R and L eyes as you move the target side-to-side
  - If prefers to use one eye only, other eye may have reduced acuity
How Well Can You See?

• Optokinetic Nystagmus
  • Resolution acuity
  • Present at birth
    - Monocular is immature (poorer nasal to temporal)
    - Mature at 3-6 months
  • Motion detection so poor central vision may still respond

How Well Can You See?

• Visual Evoked Potential
  • Resolution acuity
  • Electrical signal from occipital
  • “Sweep” versus “steady state”
  • Target is checkerboard or sinusoidal gratings
  • Performed only as specialty
  • Expensive, difficult to interpret

How Well Can You See?

• Teller Visual Acuity
  • Resolution
  • Tester should not know location of stripes
  • Parent holds baby
  • Make noise/fan card to get attention
  • Start with easy to see; flip card to confirm
  • Reinforce with easy to see
  • Test distance = 33, 55, 84 cm
  • Compare to norms chart
  • Not Snellen!
  • Can turn card vertical for astigmatism/nystagmus

How Well Can You See?

• This is not a two-alternative forced choice!
  • Patients do not need to get 4 out of 4 correct to go to next level!!!
How Well Can You See?

- Sjogren Hand Test / Tumbling E / Landolt C
  - Resolution acuity
  - Hand test is poorer because luminance is different on each side of target (palm is big black area)

- Cardiff Cards
  - Resolution acuity

- American Optical Visual Acuity
  - Many POC charts have these symbols
  - Unequal blur, luminance, size
  - Poor!

- Lea Symbols / HOTV
  - Recognition acuity
  - Recognition or matching
  - logMAR
  - Flash cards, full chart (dist and near), crowded symbols, Massachusetts VA test, POC Lea

- Lea Symbols: ATS

Do Your Two Eyes Work Together?

- What are we looking for?
  - Strabismus
  - Phoria

Amblyopia Visual Acuity

- Must be standardized
- Same starting place
- Same stopping rule
- Same chart
Do Your Two Eyes Work Together?

- Epidemiology
  - 42.5% neonates had strabismus
  - 3 months 6.6% premature babies had strabismus
  - 12 months 14.8% premature babies had strabismus
  - 1.3 to 7.1% of first grade children had strabismus

- When to assess?
  - Examination
    - Case history
    - Visual acuity
    - Binocular vision
    - Refractive error
    - Ocular health
  - Prescribe for significant refractive error
  - Not while cyclopleged!

- Direct Observation
  - Head turn
  - Head tilt
  - Tipping chin

- Beware of...
  - Esotropia appearance
  - Epicanthal folds
  - Narrow interpupillary distance (IPD)
  - Splay of eyes
  - Negative angle kappa
  - Exotropia appearance
  - Wide IPD
  - Positive angle kappa

- Hirschberg
  - Must be used with kappa test
  - Hirschberg should be conducted first
  - 33-50 cm from child
  - Binocular
    - "Blow out the light", puppet, blinking
    - Position of light reflex same in binocular and monocular then no strabismus
    - If monocular is different than monocular, then eye with monocular difference is strabismic

- Brückner Test
  - To detect the presence of strabismus
  - Child fixates direct ophthalmoscope in dark room
  - Examiner is ~1 m from child
  - Brighter eye is strabismic
  - Brückner Test
  - False positives
    - Media opacities
    - Posterior pole abnormalities
    - Anisocoria
  - Anisometropia
  - Younger than 2 months do not show fundus reflex dimming when fixation
  - 25% of children 2-8 months will show fundus reflex differences even though not strabismus
  - Don't use on younger than 8 months
Do Your Two Eyes Work Together?

- **Vectographic Stereopsis Tests**
  - Indirect indicators of strab
    - Happy Face Stereopsis
    - MBG Test
    - Lantern Test
    - Crossed or Uncrossed
- **Preschool Randot**

Do Your Two Eyes Work Together?

- **Real Depth Stereopsis Test**
  - No glasses
  - Child or book cannot move
  - Crossed or uncrossed
  - 340, 170, 55 seconds of arc

Do Your Two Eyes Work Together?

- **Prism Stereopsis Test**
  - No glasses
  - Turn 90 degrees to eliminate disparity
  - 200 (moon), 400 (car), 600 (elephant), or monocular (star) seconds of arc

Do Your Two Eyes Work Together?

- **Fusional Vergence**
  - 4-10° OD test
  - 6° OD over preferred eye while looking at distant target
  - Non-preferred eye: Adducts then Abducts
  - If both phases occur, then fusion
  - If only Adduct, then no fusion

Do You Need Glasses?

- **Anesthetic?**
  - 0.4% benoxinate
  - 0.5% proparacaine
- **Decrease pain of dilating agent**
- **May improve corneal penetration**
- **Extra drop (“wash out first drop”)**

Do You Need Glasses?

- **Adrenergic Agonists?**
  - 2.5% phenylephrine
  - Hyoscyamus
  - Paremyd
  - 0.25% tropicamide and 1% hydroxyamphetamine
  - Contraindications
  - Cardiovascular problems
  - Younger than 3 years
  - Need cycloplegia

Do You Need Glasses?

- **Cholinergic Antagonists?**
  - Dilation + cycloplegia
  - Check consistency of retinoscopy reflex
  - More likely to suffer side effects
  - Down syndrome
  - CNS problems
  - Lightly pigmented

### Drug Max Duration Comment

- **Tropicamide**
  - 30 min 6 hrs Not for latent hyperopia
- **Cyclopentolate**
  - 45 min 24 hrs Not for latent hyperopia
- **Atropine**
  - 45 min 1 week Side effects: ungl
Do You Need Glasses?
• Typically
  • 1gt 0.5% tropicamide
  • 1gt 0.5% cyclopentolate

Do You Need Glasses?

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Do You Need Glasses?

Myopia
• Rare in infancy
  • Premature birth, systemic disease
• Amblyopia more than -8.00 D
• Vision loss due to high myopia due to
  • Retinal detachment, macular problems, chorioretinal degeneration, increased spacing between photoreceptors
• Infants’ world within 33 cm
  • Don’t need to prescribe until over -3.00 D

Hyperopia

Hyperopia

Hyperopia

Hyperopia

• BIBS Study
  • Less than 1 year, more than +5.00 D
  • 1 year to 3 years, more than +3.50 D
  • Older than 3 years, more than +2.00 D
  • Complaints
  • Needs

Reasons to Rx Glasses
• Myopia
• Hyperopia
• Astigmatism
• Anisometropia
• Some not prescribe for moderate hyperopia because believe child will emmetropize
  • Children with +2.00 D or more hyperopia not emmetropize

• Emmetropization not affected by specs

<table>
<thead>
<tr>
<th>Hyperopia</th>
<th>Astigmatism</th>
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</thead>
<tbody>
<tr>
<td>OD MD</td>
<td>OD MD</td>
</tr>
<tr>
<td>1/3</td>
<td>1.3</td>
</tr>
<tr>
<td>3/3</td>
<td>23.8</td>
</tr>
<tr>
<td>5/3</td>
<td>41.9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Anisometropia</th>
<th>Do You Need Glasses?</th>
</tr>
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</table>
| Considered visually disturbing with difference 1.00 D or greater
  • 3% of preschool children have anisometropia
  • Examined every 6 months
    • Amblyopia can occur even if child has no symptoms
    • Definitely Rx if hyperopia OU

<table>
<thead>
<tr>
<th>Anisometropia</th>
<th>Do You Need Glasses?</th>
</tr>
</thead>
</table>
| Both eyes myopic
  • Amblyopia less likely
  • More myopic eye for near; less myopic eye for distance

<table>
<thead>
<tr>
<th>Anisometropia</th>
<th>Do You Need Glasses?</th>
</tr>
</thead>
</table>
| Both eyes hyperopic
  • Amblyopia likely
  • More hyperopic eye rarely used due to accommodative demand
  • Correct immediately

<table>
<thead>
<tr>
<th>Do You Need Glasses?</th>
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</table>
| Typically not too upset
  • May try to pull glasses off out of curiosity

<table>
<thead>
<tr>
<th>Do You Need Glasses?</th>
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</thead>
<tbody>
<tr>
<td>Fisher-Price Frame</td>
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</tbody>
</table>
Do You Need Glasses?

Are Your Eyes Healthy?
• Anterior Segment Assessment
  • Slit lamp
  • Easy for children
  • Useful for children 3-4 years or more
• Portable slit lamp ($4,200 and $500)
  • For younger kids
  • Direct and 20 D

Are Your Eyes Healthy?
• Congenital glaucoma
• Trauma, uveitis, aphakia (12%)
• Congenital
  • 50% male, 50% bilateral
  • Tearing, photophobia, cloudy cornea, buphthalmos, megalecoria, retinal detachment
  • Topography, trabeculography, ultrasound
• Referral for treatment

Are Your Eyes Healthy?
• Nasolacrimal Duct Obstruction (NDO)
  • Failure of nasolacrimal duct to open to nose
  • Epiphora, recurrent conjunctivitis, skin rash
  • Most cases resolve spontaneously
  • 3 months, 80% by 12 months
  • 6 months, 70% by 12 months
• 6 months; 72% by 12 months

Are Your Eyes Healthy?
• Treatment for NDO
  • Ask OMD when they want to see NDO patients
  • After one year
  • Nasolacrimal massage
  • Index finger on medial palpebral ligament (nodule) with fingernail on lid
  • Press nodule then press in toward eye firmly 5-10 per day
• Prophylactic antibiotics
  • Nasolacrimal duct probing
  • 95% success
  • May insert silicone tubes for 4-6 months

Are Your Eyes Healthy?
• Leukocoria
• Congenital cataract
• Coats disease
• Retinoblastoma
• Retinal detachment
• Retinopathy of Prematurity
• PHPV
• Posterior uveitis
• Toxocariasis

Are Your Eyes Healthy?
• Congenital Esotropia
  • Approximately 1/3 of all ET
  • Approximately 1% of general population
  • Typical onset 6 months
  • Large-angle, constant, unilateral esotropia
  • Amblyopia

Are Your Eyes Healthy?
• Hemangioma
  • Present at birth or within months
  • Reddish, purple raised lumps
  • More common female, white
• Capillary
  • Red, superficial
• Cavernous
  • Purple, deeper
• Treatment
  • Often involutes on own (6 years)
  • Steroids, injections or laser
Are Your Eyes Healthy?

**Congenital Cataracts**
- 1.2 to 6 cases per 10,000 births
- ½ to ½ bilateral
- Treatment is excision
  - Optimal time: 6 weeks to 3 months
  - Spectacles
  - Contact lens
  - IOL implant

**Unilateral ≥ 3 mm central opacity**
- 28 to 210 days at surgery
- PHPV allowed if not affect ciliary body, retina, optic nerve
- Corneal diameter ≥ 9 mm
- >36 weeks gestation
- No problems that might affect VA

**Surgery (n = 57)**
- 8.00 D undercorrection if 4-6 weeks
- 6.00 D undercorrection if >6 weeks
- After 1 month, Rx spectacles if more than +1.00 DS, -3.00 DS, or 1.50 DC
- 2.00 D overcorrection

**Coloboma**
- Incomplete closure of fetal fissure
- Symptoms vary widely

**Glaucoma**
- 9/57 (16%) with IOL
- 11/57 (19%) with CL
- 5/57 (9%) with IOL
- 11/57 (19%) with CL
- Total *p = 0.55

**Patch 2 weeks post-op**
- 1 hour per day for each month of age until 8 months
- All waking hours every other day or ½ waking hours every day

**20 / 114 (18%)**
- Glaucoma
  - 9/57 (16%) with CL
  - 11/57 (19%) with IOL
- Glaucoma suspect
  - 11/57 (19%) with CL
  - 5/57 (9%) with IOL
- Total
  - *p = 0.55

**Total patient costs**

<table>
<thead>
<tr>
<th>IOL</th>
<th>CL</th>
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<tbody>
<tr>
<td>Total patient costs</td>
<td>$648,875</td>
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<tr>
<td>Mean Medicaid cost</td>
<td>$14,752</td>
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<tr>
<td>Maximum patient cost</td>
<td>$50,473</td>
</tr>
<tr>
<td>Minimum patient cost</td>
<td>$9,412</td>
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</tbody>
</table>

Are Your Eyes Healthy?

- Posterior Segment Assessment
  - Binocular indirect ophthalmoscope
  - Monocular indirect ophthalmoscope
  - Direct ophthalmoscope
- During sleep, anesthesia, lunch

Are Your Eyes Healthy?

- Retinal hem
  - Younger than 2 years
    - 60% abused had retinal hem vs 30% accidental
    - Bilateral in 40% abused vs 2% accidental
  - May be pathognomonic for abuse
    - Consider hemes caused by birth (resolve within one month), falls, accidents

Are Your Eyes Healthy?

- Signs of ROP
  - Avascular peripheral retina
  - Dilated, tortuous retinal vessels ("plus")
  - Poor dilatation
  - Engorged iris vessels
  - Typically bilateral
  - Neovascularization, hemorrhage, RD, leukocoria

Are Your Eyes Healthy?

- Location
  - Zone 1 — disc to twice distance from disc to macula
  - Zone 2 — 3 to 6 o’clock
  - Zone 3 — 6 to 12 o’clock
  - Zone 4 — nasal to ora serrata
  - Zone 5 — 12 to macula
  - Extent
    - Clock hour
  - Severity
    - Stage 1 — Discоварiation line
    - Stage 2 — Line with plus
    - Stage 3 — Line with plus extending in vitreous
    - Stage 4 — Shallow vitreous detachment
    - Stage 5 — Total retinal detachment
  - Plus Disease
    - Dilated, tortuous blood vessels

Are Your Eyes Healthy?

- Retinoblastoma
  - 1 in 20,000 births
  - Most common intraocular malignancy in children
  - May present with white pupil or strabismus
  - Mean age at diagnosis 1–2 months, almost all before 4 years
  - Begin as gray elevations and proceed to whitish elevation with telangiectasia
  - High calcium content so very reflective on b-scan
  - Survival rates >90%
  - 30% bilateral

Are Your Eyes Healthy?

- Treatment for Retinoblastoma
  - Enucleation
  - Radiation
  - Cryotherapy
  - Photocoagulation
  - Chemotherapy

Are Your Eyes Healthy?

- Prematurity
  - Birth < 36 weeks gestation
  - Birthweight <3200 g (7 lb 3 oz), especially <2500 g (5 lb 12 oz)
  - Supplemental oxygen therapy
    - Supplemental oxygen so peripheral vessels don't develop
  - Supplemental oxygen reduced scneovascularization occurs

Are Your Eyes Healthy?

- Onset 32-42 weeks after conception
- If less than 2 lb 12 oz, follow 2 weeks until 14 weeks, q 1 month until 6 months, q 6 months
- Refer for laser or cryo (SIC, scleral buckle (SV), or vitrectomy (V))
  - Peripheral ablation if 5 contiguous hours of stage 1 or 3 hours of stage 3 (birth with plus disease)