Why should we care about ophthalmology?

DON'T YOU ROLL YOUR EYES AT ME, YOUNG MAN.

Why should we care about ophthalmology?

• Visual impairment is a national and global health concern that has a negative impact on physical and mental health
• Visually impaired individuals are at particularly high risk for chronic health conditions, accidents, social withdrawal, depression, and mortality
• The number of people with visual impairment and blindness is increasing due to an overall aging population
• Visual impairment is defined as 20/40 vision, or worse, in the better eye even with eyeglasses
• Whereas a person is legally blind if their visual acuity, with best correction in the better eye, is worse than or equal to 20/200, or their visual field is less than 20 degrees in diameter.

Vision: A Global Concern

Special Thank you

• Sheri Innerarity, RN, PhD, FNP, ACNS, FAANP
  • For connecting me with TNP
• Bella Key
  • Your assistance with organizing the speakers for this program
• Dr. Love Paul
  • My father who practiced family medicine for 40 years and was my inspiration to become a physician

Topics of this talk

• Vision: A Global Concern
• Top 10 Eye Emergencies
• Urgent eye problems and pharmacology
• Why you might need glasses
• Common conditions and their therapeutic treatments
• Eye health and kids
US Eye Disease Statistics – American Academy of Ophthalmology

Visual Impairment and Legal Blindness

<table>
<thead>
<tr>
<th>Causes of Visual Impairment</th>
<th>Causes of Legal Blindness</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Non-Hispanic Whites</strong></td>
<td><strong>Non-Hispanic Whites</strong></td>
</tr>
<tr>
<td>Cataract (42.2%)</td>
<td>Age-related macular degeneration (26.6%)</td>
</tr>
<tr>
<td>Age-related macular degeneration (28.1%)</td>
<td>Glaucoma (13.9%)</td>
</tr>
<tr>
<td>Diabetic retinopathy (22.7%)</td>
<td>Glaucoma (5.9%)</td>
</tr>
<tr>
<td>Others (22.7%)</td>
<td>Age-related macular degeneration (3.2%)</td>
</tr>
<tr>
<td><strong>African Americans</strong></td>
<td><strong>African Americans</strong></td>
</tr>
<tr>
<td>Cataract (41.7%)</td>
<td>Age-related macular degeneration (9.4%)</td>
</tr>
<tr>
<td>Others (27.0%)</td>
<td>Glaucoma (2.2%)</td>
</tr>
<tr>
<td>Diabetic retinopathy (12.2%)</td>
<td>Glaucoma (11.3%)</td>
</tr>
<tr>
<td>Age-related macular degeneration (7.8%)</td>
<td>Glaucoma (2.3%)</td>
</tr>
<tr>
<td><strong>Hispanics</strong></td>
<td><strong>Hispanics</strong></td>
</tr>
<tr>
<td>Cataract (48.0%)</td>
<td>Age-related macular degeneration (23.7%)</td>
</tr>
<tr>
<td>Others (16.2%)</td>
<td>Glaucoma (7.9%)</td>
</tr>
<tr>
<td>Diabetic retinopathy (15.0%)</td>
<td>Glaucoma (6.4%)</td>
</tr>
<tr>
<td>Age-related macular degeneration (14.5%)</td>
<td>Glaucoma (8.1%)</td>
</tr>
</tbody>
</table>

The content on this page is generously provided by the University of Illinois at Chicago (UIC).

Top 10 Eye Emergencies

1. Ischemic optic neuropathy: rule out giant-cell arteritis (GCA)
   - Fundus photo showing a pale, swollen disc with a flame-shaped hemorrhage due to arteritic anterior ischemic optic neuropathy
   - Consult ophthalmology
   - Consult oculoplastics for temporal artery biopsy

2. Central retina artery occlusion: rule out giant cell arteritis and causes of emboli/thrombus
   - Fundus photo showing diffuse retinal whitening and a foveal cherry-red spot
   - Consult ophthalmology
   - Consult oculoplastics for temporal artery biopsy

3. Macula-on rhegmatogenous retinal detachment
   - Fundus photo showing a superior mac-on retinal detachment
   - Call ophthalmology/retina specialist

4. Acute third nerve palsy: rule out intracranial aneurysm
   - Photos of extraocular motility showing complete ptosis, the right eye down and out, inability to adduct, infraduct and supraduct the eye and a dilated pupil
### Top 10 Eye Emergencies

<table>
<thead>
<tr>
<th>Emergency</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>5. Corneal microbial keratitis: (Corneal ulcer)</td>
<td>Ophthalmology to culture and treat with empiric antibiotics and follow closely</td>
</tr>
<tr>
<td></td>
<td>Slit-lamp photo showing conjunctival injection and focal white infiltrates with hypopyon</td>
</tr>
<tr>
<td>6. Open globe: rule out intraocular foreign body</td>
<td>Slit-lamp photo showing a peaked pupil pointing toward an inferotemporal, perilimbal corneal perforation with iris prolapse</td>
</tr>
<tr>
<td>7. Acute angle closure glaucoma</td>
<td>Slit-lamp photo showing conjunctival injection, corneal haze with microcystic edema, a fixed, mid-dilated pupil and a shallow anterior chamber</td>
</tr>
<tr>
<td>8. Endophthalmitis</td>
<td>Slit-lamp photo showing conjunctival injection, mild corneal edema and haze and anterior chamber hypopyon</td>
</tr>
<tr>
<td>9. Alkali injury: requires urgent and copious irrigation</td>
<td>Slit-lamp photo showing perilimbal conjunctival blanching, conjunctival injection and diffuse corneal haze</td>
</tr>
<tr>
<td>10. Orbital cellulitis</td>
<td>External photo (top) showing lid swelling and erythema with proptosis, and CT scan (bottom) showing signs of orbital inflammation — other signs, such as pain with eye movement, ophthalmoplegia, optic nerve involvement, fever and leukocytosis, confirm the diagnosis</td>
</tr>
</tbody>
</table>
### Other Urgent Eye Issues and Pharmacology

- **Eyelid Blepharitis and Chalazion**
  - Bacitracin or erythromycin oph ointment BID
  - Doxycycline 100mg po qdaily
  - Hypochlorous acid (Neutrox)
  - Warm compresses initially may help drain and relieve inflammation
  - Referral to oculoplastics

- **Unknown Chemical Burn**
  - Flush eye
  - Check pH
  - Consult Ophthalmology

- **Corneal Abrasion**
  - Use fluorescein dye to diagnose
  - Antibiotics (topical) - erythromycin oph ointment or polymyxin B/trimethoprim drops, consider fluoroquinolone drop for contact lens or fingernails
  - Close follow up with ophthalmology

- **Traumatic iritis**
  - Dilating drops - Cycloplegic (Tropicamide 1%, Cyclopentalate 1%, Homatropine 2%, Scopolamine 0.25%, Atropine 1%)
  - Steroid (prednisolone acetate 1% - after discussion with Ophthalmology)

- **Hyphema**
  - Dilating drops - Cycloplegic (Tropicamide 1%, Cyclopentalate 1%, Homatropine 2%, Scopolamine 0.25%, Atropine 1%)
  - Steroid (prednisolone acetate 1% - after discussion with Ophthalmology)
  - Avoid antplatelet treatment
Orbital blowout fracture

- Consult oculoplastic surgery – possible
- Rule out open globe injury
- Broad spectrum oral antibiotics (amoxicillin/clavulanate, doxycycline, or cephalaxin)
- Nasal decongestants (oxymetazoline)

Questions about these eye emergencies and management?

Basics of Ophthalmology

The Healthy Eye

Refractive errors

- In myopia (nearsightedness), the distance between the cornea and the retina may be too long.
- Light rays focus in front of the retina instead of on it.

Refractive errors

- In hyperopia (farsightedness), the distance between the cornea and the retina may be too short.
- Light rays are focused behind the retina instead of on it.
Refractive errors

- In astigmatism, the cornea is curved unevenly—shaped more like a football than a basketball.
- Light passing through the uneven cornea is not properly focused on the retina.
- Distance and close vision may appear blurry.
- All of these can generally be corrected with glasses!

Presbyopia

- At age 40 – 42, the eye’s focusing system becomes less flexible.
- This means that it becomes more difficult to accommodate for near vision targets.
- This process continues until your 60s when not much is left.

OTC Readers

<table>
<thead>
<tr>
<th>Age</th>
<th>Strength</th>
</tr>
</thead>
<tbody>
<tr>
<td>40 - 45</td>
<td>+1.00 or +1.25</td>
</tr>
<tr>
<td>45 - 50</td>
<td>+1.50</td>
</tr>
<tr>
<td>50 - 55</td>
<td>+2.00</td>
</tr>
<tr>
<td>55 - 60</td>
<td>+2.50</td>
</tr>
<tr>
<td>60+</td>
<td>+2.75</td>
</tr>
</tbody>
</table>

It never hurts to try before you buy!

Correcting refractive errors

- Refractive surgery: surgical procedure that alters the shape of your cornea to refocus light rays on the retina to improve vision.

Common causes of vision loss

- Cataracts = a cloudy lens
  - A clear lens refracts light onto the retina and fine-tunes our focusing ability.
  - A cloudy lens prevents light from focusing sharply on the retina.
What is a cataract?

- Clouding of the normally clear lens of the eye.
- Can be compared to a window that is frosted or yellowed.

What is a cataract?

Healthy lens

Lens with a cataract

Cataracts

Nuclear sclerotic

Traumatic

Common causes of vision loss

Cataract
- Age-related – everybody gets this!
  - (But not everyone needs surgery...)
- Things that speed it up: prednisone use, diabetes, sun exposure
- Symptoms: blurry vision; glare or sensitivity; poor night vision; yellowing or fading of colors.
- Treatment: surgery that removes the cloudy lens and replaces it with an artificial lens implant (IOL).

How is cataract surgery performed?

- Outpatient procedure.
  - Surgery generally < 1 hour.
  - Expect to spend about half a day.
- Local or topical anesthesia.
  - No breathing tube or paralysis
- Recommend light duty only for about 2 weeks after surgery
- Postoperative medications
  - Steroid drops
  - Antibiotic drops
  - Occasional NSAID drops

How is cataract surgery performed?

- A small incision is made close to the edge of the cornea.
- A tiny, high-frequency ultrasound instrument is inserted that breaks up center of the lens.
- Broken-up cloudy lens material is removed through the instrument.

How is cataract surgery performed?

- Intraocular lens (IOL) implant is inserted into your eye to replace the cloudy lens.
- IOL is customized for your eye; restores focusing power.
Common causes of vision loss - Diabetes

Diabetic retinopathy

• Diabetes Mellitus: body can't use and store sugar properly, resulting in high blood sugar levels.
  ▪ High sugars cause damage to the blood vessels inside the retina.

• Symptoms: may be none early in disease, need annual eye exams

• Treatment: usually laser surgery, intra-vitreal injections; occasionally conventional surgery.
  ▪ Can avoid any eye disease if you keep your sugars well controlled.

Diabetic retinopathy

Two types of diabetic retinopathy:

• Nonproliferative diabetic retinopathy (NPDR)
  ▪ Early stage diabetic retinopathy

• Proliferative diabetic retinopathy (PDR)
  ▪ Later stage diabetic retinopathy

Nonproliferative diabetic retinopathy (NPDR)

• Earliest stage of diabetic retinopathy.

• Damaged blood vessels in the retina leak extra fluid and small amounts of blood into the eye.

• Cholesterol or other fat deposits from blood, called hard exudates, may leak into retina.

With NPDR, your central vision is affected by any of the following:

• Hard exudates on the central retina (macula).

• Retinal hemorrhages (tiny spots of blood that leak into the retina).

• Macular edema (swelling/thickening of macula).

• Macular ischemia (closing of small blood vessels/capillaries).

Nonproliferative diabetic retinopathy

Proliferative diabetic retinopathy (PDR)

• Later stages of diabetic retinopathy.

• Abnormal blood vessels begin to grow on surface of retina or optic nerve; can't provide retina with normal blood flow (neovascularization).

• PDR can cause severe visual loss and other serious complications including loss of the eye!

With PDR, vision is affected when any of the following occur:

• Vitreous hemorrhage (new, abnormal blood vessels bleed into vitreous gel in center of eye, preventing light rays from reaching the retina).

• Traction retinal detachment (new, abnormal blood vessels begin to shrink and tug on retina; may cause retina to detach).

• Neovascular glaucoma (neovascularization occurs in the iris, causing pressure to build up in the eye, damaging the optic nerve).
Treating diabetic retinopathy

Intravitreal injections for diabetic swelling of the retina:

- Targeted therapy to “soak-up” the chemicals causing the problem
- anti-VEGF intravitreal injections
- Used as a repeat treatment
  - Often must be repeated for many months

Laser surgery for PDR (Proliferative Diabetic Retinopathy)

- Laser is focused on all parts of the retina except the center.
- This “panretinal” photocoagulation treatment causes abnormal new vessels to shrink; often prevents them from growing again.
- Treatment decreases the chance that vitreous bleeding or retinal distortion will occur.
- Multiple laser treatments over time are sometimes necessary.

Treating diabetic retinopathy

Laser panretinal photocoagulation treatment (arrows show laser spots on the retina)

Glaucoma

Two main categories of glaucoma:

- Open-angle glaucoma: the most common form of glaucoma.
- Closed-angle glaucoma: a less common and more urgent form of glaucoma.

Types of glaucoma

Open-angle glaucoma

- Trabecular meshwork (aka eye filter) becomes less efficient at draining aqueous humor (aka eye fluid).
- Intraocular pressure (IOP) builds up, which leads to damage of the optic nerve.
- Damage to the optic nerve occurs at different eye pressures among different patients.
- Typically, glaucoma has no symptoms in its early stages.

Glaucoma risk factors

Risk factors for glaucoma include:

- Age
- Family history
- Elevated eye pressure (IOP)
- African, Hispanic or Asian ancestry
- Diabetes
- Previous eye injury

Medical Treatment of Glaucoma

<table>
<thead>
<tr>
<th>Therapy</th>
<th>Indications</th>
<th>Purpose</th>
<th>Method</th>
<th>Side Effects / Drug Interactions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Beta Blockers</td>
<td>1st line therapy; reduce IOP</td>
<td>Reduce aqueous humor production</td>
<td>IOP</td>
<td>Decrease heart rate, blood pressure, prostate enlargement, erectile dysfunction.</td>
</tr>
<tr>
<td>Carbonic anhydrase inhibitors</td>
<td>1st line therapy; reduce IOP</td>
<td>Reduce aqueous humor production, increase paracentral macular fluid absorption through hypoosmotic effect</td>
<td>IOP</td>
<td>Reduce intraocular pressure, increase risk of cataract development, glaucoma, hypertension.</td>
</tr>
<tr>
<td>alpha 2 agonists</td>
<td>2nd line agents; reduce IOP</td>
<td>Reduce aqueous humor production, decrease paracentral macular fluid absorption through osmotic effect</td>
<td>IOP</td>
<td>Reduce intraocular pressure, increase risk of cataract development, glaucoma, hypertension.</td>
</tr>
<tr>
<td>Prostaglandins</td>
<td>2nd line therapy; reduce IOP</td>
<td>Increase outflow through nasal passages and generally lower IOP.</td>
<td>IOP</td>
<td>May worsen inflammatory and hemorrhage risk of congestive heart failure, heart failure, dehydration.</td>
</tr>
<tr>
<td>Hyperosmotic agents</td>
<td>2nd line therapy; reduce IOP</td>
<td>Dilate the choroid and reduce intraocular pressure.</td>
<td>IOP</td>
<td>Risk of intraocular fluid overload in patients with suppurative IV rigidity.</td>
</tr>
</tbody>
</table>
What happens during an exam

- Optic nerve exam, in which ophthalmologist dilates your pupils to detect optic nerve damage
- Unusual optic nerve exam reveals early signs of glaucoma
- Further testing identifies subtle changes before you can
  - Visual field test and optic nerve imaging
- Treatment:
  - Drops → laser → surgery

Types of glaucoma

Closed-angle (or acute or narrow-angle) glaucoma

- The drainage angle of trabecular meshwork becomes blocked by the iris (the colored part of the eye).
- Pressure builds up very fast.
- Symptoms include severe eye or brow pain, redness of the eye, decreased or blurred vision.
- Must be treated as a medical emergency—see your ophthalmologist immediately.

Acute Angle Treatment

Acute glaucoma attacks are not always full blown. Sometimes a patient may have a series of minor attacks. A slight blurring of vision and halos (rainbow-colored rings around lights) may be experienced, but without pain or redness. These attacks may end when the patient enters a well lit room or goes to sleep—two situations which naturally cause the pupil to constrict, thereby allowing the iris to pull away from the drain. An acute attack may be stopped with a combination of drops which constrict the pupil, and drugs that help reduce the eye’s fluid production. As soon as the IOP has dropped to a safe level, your ophthalmologist will perform a laser iridotomy. A laser iridotomy is an outpatient procedure in which a laser beam is used to make a small opening in the iris, which allows the fluid to flow more freely. Laser surgery may be performed prophylactically on the other eye, as well. Since it is common for both eyes to suffer from narrowed angles, operating on the unaffected eye is done as a preventive measure.

Common causes of vision loss

Age-related macular degeneration (AMD)

- A leading cause of severe vision loss in people over 65 years of age.
- Part of the natural aging process
- Symptoms: blurry vision; dark or empty areas in central vision; straight lines look wavy.

With AMD, dark areas may appear in your central vision

Types of AMD

Atrophic (“dry”) AMD

- Caused by aging and thinning of macular tissues when drusen are present.
- Vision loss is usually gradual but may be asymptomatic.
- Most common form.
- Eye vitamins may be beneficial.

With AMD, drusen are seen in the retina

Glaucoma is controllable

- Vision loss from glaucoma usually can be prevented if detected and treated early.
- If you are prescribed eyedrops for glaucoma, you must take them regularly.
- If you are at risk for glaucoma, visit your ophthalmologist regularly.
Types of AMD

Exudative ("wet") AMD
- Caused when abnormal blood vessels form underneath the retina.
- These vessels leak blood/fluid and blur central vision.
- Vision loss may be rapid and severe.
- Treated with eye injections (anti-VEGF intravitreal injections)

Make the most of your vision

- If you have been diagnosed with AMD, you must monitor your vision every day with an Amsler Grid.
- With AMD, Amsler Grid may contain blurry or wavy lines.

Chalazion (aka stye)
- Small lump on eyelid when oil gland becomes clogged with secretions.
- Not caused by infection.
  - Instead "inflammation"
- Treatment includes:
  - Warm compress applied for 10-15 minutes, 3-4 times daily.
  - If bacteria infects chalazion, antibiotic may be prescribed.
  - Hypocholous acid - newer treatment.
  - Surgery to drain if necessary.

Preseptal cellulitis
- Red, painful swelling of tissues around eye; usually occurs in one eye, which may be swollen shut.
- Person with preseptal cellulitis may have a fever.
- Usually caused by:
  - Trauma
  - Upper respiratory infection
- Although preseptal cellulitis is generally treated with antibiotics, hospitalization may be necessary
- Treatment: gram + coverage and can add gram - coverage if no improvement

Conjunctivitis
- Allergic conjunctivitis: eye itchy, red and tearing; treatment may include eliminate agent, cool compresses and allergy eye drops.
  - Not contagious!
  - Anti-histamine or mast cell stabilizer drops (olopatadine 0.2%, BID)
- Infectious conjunctivitis, whether viral or bacterial, can be quite contagious.
- Practice good hygiene to prevent spread:
  - Avoid reuseing towels after infected eye has been wiped.
  - Wash hands frequently.
  - Keep hands away from face and eyes.
- Common sources: day care, workplace, sick contacts

Viral conjunctivitis aka "pink eye"
### What are floaters?

- Floaters are specks or clouds moving in your field of vision.
- Most often seen when looking at a plain background, like a wall or sky.
- While floaters look as if they are moving outside the eye, they are actually tiny clumps of gel or cells in the vitreous (clear, gel-like fluid inside the eye).

### What causes floaters?

- Posterior vitreous detachment: As you age, vitreous gel thins or shrinks, forming clumps inside the eye and pulling away from the back wall of the eye.
- Call your doctor if:
  - Associated with flashes of light
  - Floaters are numerous
  - Losing a portion of vision like a curtain sweeping through

### Visual development in children

- If a child cannot use his or her eyes normally, vision does not develop properly and may even decrease.
- An infant’s eyes may drift in or out a small amount at times, which is perfectly normal during the first few months.
- At two or three months of age, when a baby begins to focus on the world around him or her, the eyes should be straight nearly all the time.

### Warning signs in children

- Children usually don’t complain about their eyesight; watch for the following signs:
  - Any misalignment of the eyes, even if intermittent
  - Persistent head turn
  - A jiggle (nystagmus) in one or both eyes
  - Unusual sensitivity to light
  - Frequent rubbing of the eyes
  - Redness or discharge of the eyes
  - Tearing
  - Squinting
  - Droopy eyelids

### Vision screening for children

- An ophthalmologist should examine your child’s eyes earlier than age 3 if there is:
  - Family history of strabismus (misaligned eyes) or amblyopia ("lazy eye").
  - Known medical condition that increases the chances of strabismus or amblyopia.
- No child is too young to have an eye examination.
- All children at age 3 should have an eye examination by an eye physician

### Amblyopia

- Amblyopia: poor vision in an eye that did not develop normal sight during early childhood; sometimes called "lazy eye."
- While usually only one eye is affected by amblyopia, both eyes can be "lazy."
- Best time to correct amblyopia is during infancy/early childhood.
Causes of amblyopia (aka lazy eye)

- Strabismus (misaligned eyes).
- Unequal focus/refractive error (didn’t get glasses in time).
- Cloudiness in the normally clear eye tissues.

Sports Eye Injuries - Youth

- Eye injuries are the leading cause of blindness in children in the United States and most injuries occurring in school-aged children are sports-related.
- These injuries account for an estimated 100,000 physician visits per year at a cost of more than $175 million.
- Ninety percent of sports-related eye injuries can be avoided with the use of protective eyewear.
- Protective eyewear includes safety glasses and goggles, safety shields, and eye guards designed for a particular sport.
- Ordinary prescription glasses, contact lenses, and sunglasses do not protect against eye injuries.
- It is especially important for student athletes who have vision in only one eye or a history of eye injury or eye surgery to use protective eyewear.

Thank you!