Modifying Primary Eyecare Exams for Patients with Visual Impairment

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Learning Objectives

1. Properly adapt examination procedures for patients with visual impairment.
2. Correlate ocular disease conditions with potential visual outcomes.
3. Identify appropriate patients for low vision rehabilitation referrals.

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- No conflicts of interest to disclose

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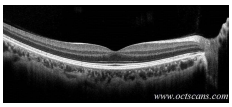
Introduction

- Primary Eyecare Providers
  - ODs identify, manage, and treat various ocular conditions
    - Refer for additional care if needed
    - i.e. cataract surgery, LASIK, vision therapy, **low vision rehabilitation**



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Examination Components and Modifications

76-year-old, male, new patient Hx: Dry AMD OU dx 2012

• Patient History →	"I just need stronger glasses"
• Visual Acuity →	Cannot read largest letter on chart
• Entrance Testing →	Cannot see target for cover test
• Refractions →	Does not notice any changes in +0.25/-0.25 lenses
• Ocular Health Evaluation →	Eye constantly moving and cannot fixate on target

Adapt or Skip?

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Visual Impairment

- Low Vision
  - Vision cannot be fully corrected with glasses, contact lenses, or medical means
    - Vision affecting daily living activities
  - Ocular disease diagnosis

AMERICAN OPTOMETRIC ASSOCIATION →

20/30 to 20/60	Mild visual impairment
20/70 to 20/160	Moderate visual impairment
20/200 or worse	Severe visual impairment
No light perception	Total visual impairment

*Also consider reduced visual fields, reduced contrast sensitivity, etc.

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Patient History

Additional History:

- Activities of Daily Living (ADLs)
  - Work tasks
  - Hobbies
  - Reading mail
  - Grocery shopping
  - Signing name on paperwork
  - Preparing meals

Case Example: 76 yo, AMD
"I just need stronger glasses"
Additional History:
- Cannot read paperback books
- Easier to read on daughter's tablet
- Cannot read oven dials or recipes
- Difficulty matching clothes
- Magnifiers from drug store don't work

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Visual Acuity

- Measuring high contrast, detail vision
  - Often overestimates visual function if visually impaired
- May vary with different charts
  - LCD screens vs. projector charts

- ***Disclaimer on "count fingers" and "hand motion"***
  - Valid VA measurement, but…
  - Large variability- consider contrast of target and background
  - Careful comparing visit to visit

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Visual Acuity

Case Example: Converting to Standard Snellen Acuity
- Chart: Wall-mounted screen
- OD: Read labeled "20/200"
- OS: Cannot read largest letter on screen (20/400)

Options:
- > 20/400
- CF @ 10 feet
- Move patient closer and convert
  - 10 ft room
  - Read 20/400 letter 5 feet away →

- Moved patient twice as close
- Snellen equivalent twice as big
- Already converted if at 10 feet
- **20/800** equivalent

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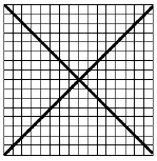
Entrance Testing

Cover Test
- Demonstrate larger target

EOMs
- Transilluminator light

Confrontation Visual Fields
- Transilluminator light
- Amsler grid with "X"



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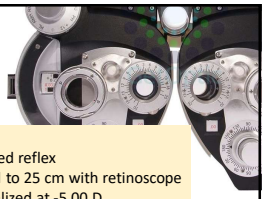
Refraction

- Retinoscopy
  - If dim red reflex
    - Attempt large lens changes
    - Move closer
  - Corneal opacities
    - Attempt off axis retinoscopy



Example:
- Faint red reflex
- Moved to 25 cm with retinoscope
- Neutralized at -5.00 D
- Must take out (1/0.25) = 4.00 D
- -5.00 D -4.00 D = **-9.00 D total**

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Refraction

- Subjective Refraction
  - Trial Frame?
  - Just Noticeable Difference (JND) concept → Worse acuity requires larger change in lenses
  - Disclaimer about JND

- Could show *very* large steps in lenses
  - Bracket
  - Ex: +6.00 D vs. plano, then -6.00 D vs. plano

Example:
JND = Snellen denominator ÷ 100
If 20/250
250 ÷ 100 = 2.5
Could show +1.25/-1.25D lens steps

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Refraction

Case Example:
45 year old patient, Hx: Stargardts Disease
CC: "My vision is getting worse and now I can't read"
Distance BCVA: 20/200 OU
Refraction: +0.25 sph OD, +0.25 sph OS
Most appreciated +1.50 add and comfortably read magazine print
Rx: +1.75D reading glasses

- Reminder→ low vision patients still undergo presbyopia

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Legal Blindness Qualification

- Visual Acuity:
  - Traditional definition: **20/200 or worse** in better seeing eye with correction
  - Recent definitions: **Worse than "20/100"** (i.e. cannot read a single letter on the 20/100 line) in fully corrected, better seeing eye
    - Ability to measure 20/125 and 20/160 with computerized and logMAR charts
- Visual Field:
  - 20 degrees or less in the better seeing eye
  - Visual field **30-2** requires a **MD worse than -22dB** in the better seeing eye

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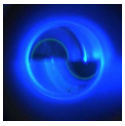
Ocular Health Evaluation

- Goldmann tonometry
  - Consider fixation directly on blue light→ brighter
  - Alternative methods: i.e., iCare
- Fundus evaluation
  - May not be able to fixate on your ear or slit lamp dial
  - Look directly at light and move your target briskly



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Referring to Low Vision Rehabilitation

Checklist for LV referrals
- ✓Updated comprehensive eye examination
- ✓Diagnosed ocular disease
- ✓ Attempt at correcting with glasses, contact lenses, and/or medical means
- ✓Patient is still symptomatic with activities of daily living

- Note: No visual acuity requirement

- Low Vision Optometrist comanages with Primary OD or OMD
  - *The patient is still your patient!*

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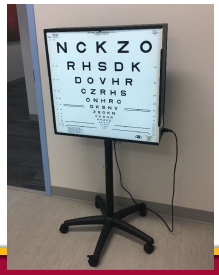
Low Vision Evaluation: Visual Acuity



- Movable charts:
  - ETDRS and Bailey-Lovie charts
    - Back-lit option
  - Feinbloom
- May test under variable lighting conditions

Example:
26 year old, retinitis pigmentosa
LCD Screen → 20 / 80
Back-lit ETDRS → 20 / 100
Light off ETDRS → 20/ 200
w/ 4% transmission grey filters → black/white perception only

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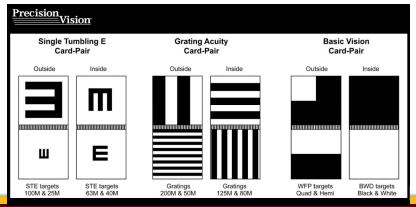
Low Vision Evaluation: Visual Acuity

- Assessing very low vision
  - Berkeley Rudimentary Vision Test (BRVT)



Example:
Patient identifies **200 M size** gratings **1 meter away**

"DISTANCE / SIZE"
"1 / 200" = "20 / x"
x = 4000

20/4000

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Low Vision Evaluation: Reading Acuity

- Continuous text charts
- Can calculate required add or power of hand held magnifier

Example: Equivalent Viewing Distance
Pt reads 4.0 M size print at 40 cm
Wants to read 1.0 M size text (~8 pt print) on mail

0.40 / 4.0 = x / 1.0
x = 10 cm

1 / 0.10 = **+10D readers or hand held magnifier**

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Low Vision Evaluation: Contrast Sensitivity

- Importance of determining contrast sensitivity

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Low Vision Evaluation: Contrast Sensitivity

- Pelli-Robson
- Mars
- Hiding Heidi contrast

- Note: Not the same as a 10% contrast acuity

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Low Vision Evaluation: Contrast Sensitivity

Example:
85 year old, AMD
CS: 1.20 log (moderately reduced)
CS w/ 4% grey filter: 0.80 log (profoundly reduced)

- Low Luminance CS Testing
- Testing vision with dark gray filters:
  - Decreasing retinal illumination *does not change contrast of target*
- 4% transmission dark gray filters:
  - Some quantification of sensitivity to reduced illumination
  - Expect **0.1 log unit decrease** in CS

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Low Vision Evaluation: Trial Frame Refraction

- Free space refraction
  - Allows patient to move head around
- JND or similar technique

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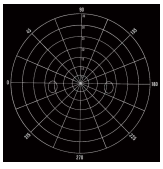
Low Vision Evaluation: Visual Fields



- Tangent Screen
- Goldmann Perimetry
  - Manual, kinetic
- Octopus
  - Automatic, kinetic

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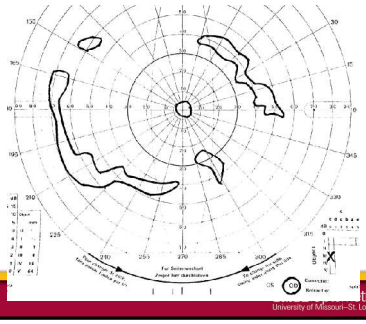
Low Vision Evaluation: Visual Fields

Case Example:
24 year old, retinitis pigmentosa
- Central vision
- Multiple islands of vision



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Low Vision Device Evaluation

Optical aids:
- Prism readers
- Monocular telescopes
- Bioptic telescopes
- Hand held magnifiers
- Stand magnifiers

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Low Vision Device Evaluation

- Electronic aids
  - Desktop and portable CCTVs
  - Tablets and computers
  - OCR (optical character recognition)
- Technology adaptations
  - Smart Phone apps
    - Ex: Seeing AI
  - Meta glasses

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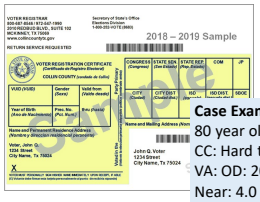

Case Example: LV Devices
80 year old, AMD
CC: Hard to see mail
VA: OD: 20/120, OS: 20/120
Near: 4.0 M print at 40 cm
CS: 1.20 log units (mod decreased)

Device: +10D hand held magnifier
With LED light

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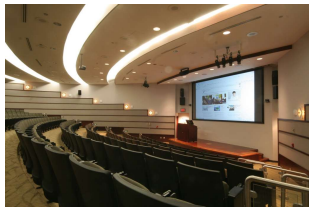
Case Example: LV Devices
28 year old, retinitis pigmentosa
CC: cannot see board in lecture hall
VA: OD: 20/200, OS: 20/400
Near: 1.0 M print at 20 cm
CS: 0.80 log units (severely decreased)
VF: 15 degrees remaining OD and OS

Device: JoinMe app for tablet
Connects Smartboard to current iPad



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Tint Evaluation

- Decreases photophobia indoors and/or outdoors
- Contrast enhancement if needed
  - Color filters affect contrast
  - Neutral (grey) filters do not change contrast

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Home Adaptations

- Contrast enhancements
- Line writing guides
- Bump dot stickers
- Large print playing cards
- Talking watches
- Flashlights

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Potential Visual Difficulties

AMD
- Poor VA (near > distance)
- Decreased CS
- Central scotoma

Ex: Reading, identifying faces, ADLs

Diabetic Retinopathy
- Poor VA
- Decreased CS
- Possible scotoma

Ex: Reading, vision fluctuations, ADLs

Glaucoma
- Poor VA (late stage)
- Decreased CS
- Reduced visual fields

Ex: Reading, orientation and mobility

Retinitis Pigmentosa
- Poor dark adaptation
- Reduced visual fields
- Poor VA (late stage) and CS

Ex: Night vision, mobility, reading

Oculocutaneous Albinism
- Poor distance VA
- Photophobia

Ex: Seeing street signs, light sensitivity

Optic Nerve Atrophy
- Poor VA
- Decreased CS
- Reduced visual fields

Ex: Reading, identifying faces

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