Course Objectives:
You will be able to…
• Explain what visual acuity is & how it is measured
• Determine when the pinhole test should be performed and how to do it
• Properly record the visual acuity of a patient

Introduction & Overview
• The physiology of visual acuity
• Measuring visual acuity
  – Distance
  – Near
• Pinhole Testing
  – When to do it
  – How to do it
• Recording visual acuity
• Summary and conclusion

The Physiology of Visual Acuity
QUESTION:
On which patients should you measure Visual Acuity (VA)?

The Physiology of Visual Acuity (cont.)

What is Visual Acuity?
Visual acuity is a measure of the resolving power of the visual system; it measures your ability to receive, transmit, and interpret visual images.

The Physiology of Visual Acuity (cont.)

• The most common test targets of a visual acuity chart are the Snellen letters.
• The Snellen letters have a specific construction (height & width)
• They are designed to measure visual acuity in a repeatable & consistent manner via a Snellen Test Chart.
The Physiology of Visual Acuity (cont.)

**How many DEGREES are in a CIRCLE?**

- 360 degrees

**How many “MINUTES” are in a DEGREE?**

- 60 minutes

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The 20/20 letter “subtends” 5 minutes of arc @ 20 ft

The image stimulates a SMALL area of CONES in the MACULAR area of the retina. If pt can separate out EACH MINUTE of difference, they have 20/20 vision!

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Measuring Visual Acuity: Distance & Near

- **Visual Acuity** tells us the visual status of pt:
  - Nearsighted? Farsighted? Astigmatic?
  - Amblyopic?
  - Presbyopic?
  - Signs of heterotropia?
  - Has a cataract progressed since last visit?
  - Is there corneal damage, foreign matter in the aqueous or vitreous, or even retinal damage?
  - Visual acuity is essential to an eye exam! You must measure it correctly!

WHERE SHOULD YOU BE LOOKING WHEN CHECKING a Visual Acuity (VA)?

- 20 feet
- 100 feet
- 200 feet
Measuring Visual Acuity: Distance & Near (cont.)

Some “rules” for checking visual acuity:

- Vision is tested **monocularly** (one eye at a time)
  - *Do right eye first* (unless reason not to…)
- Patient wears **appropriate Rx for test distance**
  - Driving glasses on for DVA
  - Reading glasses on for NVA
- Does Pt wear MF or PAL? Wear for DVA & NVA!
- Sometimes we test VA without the Rx. How do we indicate that?
  - Put "sc" for testing **WITHOUT CORRECTION**
  - Put "cc" to indicate tested **WITH CORRECTION**.
  - If the doc wants you to test patients both ways, do **WITHOUT first**.

Measuring Visual Acuity: Distance & Near (cont.)

“Rules” for checking visual acuity:

- **Children?** Test “good” eye first!
  - WHY? Children frustrate easily!
  - Use an eye chart appropriate for the child’s ability
  - An object chart for a 2 to 4 year old
  - A Tumbling E or Landolt C chart for a 5 or 6 year old
  - Save the Snellen letter or number chart for kids 7 and older

Measuring Visual Acuity: Distance & Near (cont.)

**QUIZ TIME!**

- Q: Squinting - Is this a problem?

- Q: You notice the patient trying to **turn their head** or **move the occluder** to see w/the “covered” eye. What’s the deal?!

- Q: The patient keeps trying to move the NVA card farther away or closer to them. Is that okay?

Measuring Visual Acuity: Distance & Near (cont.)

Which type OCCLUDER do you use?

Charts for kids & illiterate folks:

Object Chart  Tumbling “E” chart  Landolt “C” chart

Measuring Visual Acuity: Distance & Near (cont.)

**QUICK TIP:**

- Before you check **DISTANT** visual acuity, make sure your letter size(s) are correct!

**RULE?** 20/200 “E” = 4.4mm for every foot of test distance

<table>
<thead>
<tr>
<th>Chair-screen distance</th>
<th>20/200 “E” height</th>
</tr>
</thead>
<tbody>
<tr>
<td>20’</td>
<td>88 mm</td>
</tr>
<tr>
<td>15’</td>
<td>66 mm</td>
</tr>
<tr>
<td>10’</td>
<td>44 mm</td>
</tr>
</tbody>
</table>
Measuring Visual Acuity: DISTANCE (cont.)

Once the patient is "occluded"...
- Expose lines 20/20 through 20/40 (or whatever ‘block’ of test letters your projector uses) to **put the 20/20 line on the bottom**
- Ask patient to read the smallest line possible, **without squinting**
- If patient unable to read largest line shown, adjust the chart to give them even bigger letters (or objects)
- Give the patient credit for any line in which they get **50% or more** of the letters correct

**EXAMPLE #1:**
- Patient gets three letters correct on the 20/30 line, which contains six letters.
- They get credit for seeing 20/30
  - Ask them to try the next smaller line (20/25).
- If the patient couldn't see any of the letters on the 20/25 line, you would record the patient’s visual acuity as: 20/30–3
- The "30" indicates the patient read at least 50% of the 20/30 line; the " – 3" indicates patient missed three letters

**EXAMPLE #2:**
- Pt reads all the letters on the 20/40 line
- They get two letters correct on the 20/30 line (which has 6 letters.)
- Record the VA as: 20/40+2
  - The “40” indicates the patient read at least 50% of the 20/40 line
  - The “+2” tells us the patient was able to read two of the letters on the 20/30 line

**QUESTION:**
What if the patient can’t see the biggest letter of your eye chart from 20 feet away? (…usually the 20/400 “E” is our biggest letter)

**ANSWER:** Turn on the lights; grab a printed out **20/400 “E”** (you do have one in each eye lane, don’t you?) & walk toward the patient until they can see it
- Note the distance @ which Pt saw the printed 20/400 “E”; record that for their VA.
For EXAMPLE:
- Pt was able to see the 20/400 “E” when you were **five feet** from them.
- Record their vision as: 20/400 @ 5 feet

**QUESTION:**
You got THREE (3) FEET from the patient & they still couldn’t see the printed “20/400 E” you were carrying toward them…**NOW WHAT?**
Measuring Visual Acuity: DISTANCE (cont.)

Pt can’t see the 20/400 “E” from 3 ft away?

**ANSWER:** Time for “Count Fingers” (CF) test!

With room lights still **ON**...

- **Start 3 ft away:** hold up a few fingers & see if Pt can tell you how many you are showing
- Can’t see them? **Move closer (2 ft away)**
- *Still nothing? Get 1 ft away*
- **Nothing yet? Try 6 inches from pt’s eye**
- Let’s say the patient responded with the correct number of fingers @ 6 inches
- Record the results as: **CF @ 6 inches**

**QUESTION:** What if the Patient could NOT “Count Fingers” 6 inches away…

NOW WHAT?!

Measuring Visual Acuity: DISTANCE (cont.)

**QUESTIONS:**

Patient could NOT detect “Hand Motion (HM) @ 1 ft”?

**ANSWER:** Do the Light Localization (LL) test!

How?

- Turn the room lights **OFF**
- Shine a penlight towards the pt’s eye & see if they can tell you where the light is coming from.
  - Try different locations & see if they can identify WHERE the light is coming from (i.e., “straight ahead”; “temporally”; “nasally”; or “from above”)
  - Obviously, the untested eye needs to be thoroughly covered so it can’t see ANYTHING!
  - If the pt can tell you where the light is shining from, you will record “LL” for light localization.

NOW WHAT?!
Measuring Visual Acuity: **DISTANCE** (cont.)

Pt couldn’t detect DIRECTION during Light Localization test?

**ANSWER:** Do the Light Perception (LP) test!

How do you do it? Lights still **OFF**...

- If pt couldn’t tell which **direction** the light was coming from but COULD tell that there was a light shining in their eye, you would record the results as “**LP**” (for Light Perception.)
- If pt can’t tell whether you had a light shining in their eye or not, you would record “**NLP**”, which stands for No Light Perception.

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Measuring Visual Acuity: **NEAR**

**RULES for Near Visual Acuity (NVA):**

- Near VA is usually measured w/a Jaeger Acuity Card or a “reduced” Snellen Acuity Card - see example
- The proper distance for NVA testing will be printed on the near point card.
- It is usually 14” or 16”, but don’t assume! Check first.
- No matter the test distance, the vision will still be recorded as **20/20**
  - Not 14/14 vision or 16/16 vision; but rather **20/20**

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**Measuring Visual Acuity: NEAR (cont.)**

**RULES for Near Visual Acuity (NVA):**

- Done in **normal room lighting**
- Test distance = **determined by the card!**
  - **TIP:** cut a piece of string the correct length & attach it to the card.
- If the pt wears a NVO, a MF (PAL), or a pair of glasses that they wear all the time (habitual Rx), use them for NVA testing
- If the patient only wears glasses for driving or distance vision, remove them for NVA testing
- Test **MONOCULARLY** (one eye at a time)

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**Pinhole Testing:** When to do it & How to do it

- The pinhole (PH) test is done when a patient’s best visual acuity (BVA) is found to be 20/40 or worse at distance & near in one eye
  - **Example #1:** patient’s VA in the OD was 20/70 in the distance & 20/80 at near
    - The “pinhole test” **SHOULD** be performed for that eye
  - **Example #2:** patient’s VA in the OS was found to be 20/100 in the distance & 20/30 at near
    - The “pinhole test” would **not** need to be performed! Near VA was **better than 20/40**
- You must measure a pt’s **distant & near VA** to determine if you need to do the pinhole test
- The “pinhole test” is only done in the **DISTANCE** (not up close!)
Pinhole Testing: When to do it & How to do it (cont.)

Q: What does the “pinhole test” tell the doctor?
A: If a pt’s decreased visual acuity (VA) can be improved with corrective lenses (glasses or CLs)…or not!

• If the pt sees BETTER when looking through the pinholes, they will probably see better with the correct Rx in front of that eye
• Put another way, if pt only has an ametropia (refractive error) the vision should improve with the pinhole

Q: What if vision did NOT improve when looking through the pinhole?
A: More than likely, corrective lenses won’t help either
• “No improvement” (NI) when looking through the pinholes can indicate amblyopia, or an eye disease, or some other disorder

Recording Visual Acuity

• VA results are recorded by indicating the:
  – Tested distance (i.e., DVA or NVA)
  – Eye tested (i.e., OD or OS)
  – Whether test was done w/corrective lenses (cc) or w/o corrective lenses (sc)
  – What was the measured acuity, using Snellen notation (i.e., 20/20, 20/50, 20/400, etc.)
  – Include pinhole (PH) test results, if performed.

Example #1:

<table>
<thead>
<tr>
<th>DVA sc</th>
<th>NVA cc</th>
</tr>
</thead>
<tbody>
<tr>
<td>OD 20/30−1</td>
<td>PH 20/−</td>
</tr>
<tr>
<td>OS 20/80+1</td>
<td>PH 20/25+2</td>
</tr>
</tbody>
</table>

Example #2:

<table>
<thead>
<tr>
<th>DVA cc</th>
<th>NVA cc</th>
</tr>
</thead>
<tbody>
<tr>
<td>OD 20/200−2</td>
<td>PH 20/50+2</td>
</tr>
<tr>
<td>OS 20/400@15 ft</td>
<td>PH 20/NI</td>
</tr>
</tbody>
</table>