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**?

![Image of a circle with degrees marked]

The Physiology of Visual Acuity (cont.)

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

![Image of a degree with minutes marked]

The Physiology of Visual Acuity (cont.)

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

![Image of a letter subtending 5 minutes of arc]

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**!

The Physiology of Visual Acuity (cont.)

The “**arc**” that the 20/20 letter “**subtends**” remains 5 minutes “**wide**” …no matter the **DISTANCE**!

As you get **farther away**, the letter grows **LARGER** but @ that distance, it is still “**subtending**” 5 min of **arc**, **stimulating** the **SAME AMOUNT OF AREA ON THE RETINA** as when it was 20 feet away.

Measuring Visual Acuity: Distance & Near

- **Visual Acuity** tells us the visual **status** of pt:
  - Nearsighted? Farsighted? Astigmatic?
  - **Amblyopic**?
  - **Presbyopic**?
  - Signs of hetero-**tropia**?
  - 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**!
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.)

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.)

Measuring Visual Acuity: Distance & Near (cont.)

Charts for kids & illiterate folks:

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

Measuring Visual Acuity: Distance & Near (cont.)

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.)

• 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)

**Pt can’t see biggest letter of eye chart?**

**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.)

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.

Measuring Visual Acuity: NEAR

• 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 **20/20X** — Not 14/14 vision or 16/16 vision; but rather **20/20**

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)

Measuring Visual Acuity: NEAR (cont.)

**RULES for Near Visual Acuity (NVA):**
- NVA is done same as distance testing: “Read the smallest line you can without squinting”
- Did they get the **20/20 line**? Awesome!
- If not, go to bigger lines & work them down
- **When pt can’t get more than the 50% of the characters in a line, stop, & record** the VA for the last line they DID get 50% or more correct
- Switch to the other eye; repeat the procedure

**NOTE:** If patient wears a MF or PAL, make sure that they are looking through the lowest segment of the glasses for the near test! They can even lift the glasses up a bit if it will help

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 w/the correct Rx in front of that eye
- Put another way, if pt only has an ametropia (refractive error) the vision should improve w/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 PH 20/— OD 20/20</td>
<td></td>
</tr>
<tr>
<td>OS 20/80+1 PH 20/25+2 OS 20/40</td>
<td></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 PH 20/50+2 OD 20/100</td>
<td></td>
</tr>
<tr>
<td>OS 20/400@15 ft PH 20/NI OS 20/200</td>
<td></td>
</tr>
</tbody>
</table>

**Summary and Conclusion**

- The physiology of visual acuity
- Measuring visual acuity
  - Distance
  - Near
- Pinhole Testing
  - When to do it
  - How to do it
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