Using a Snellen Visual Acuity Chart

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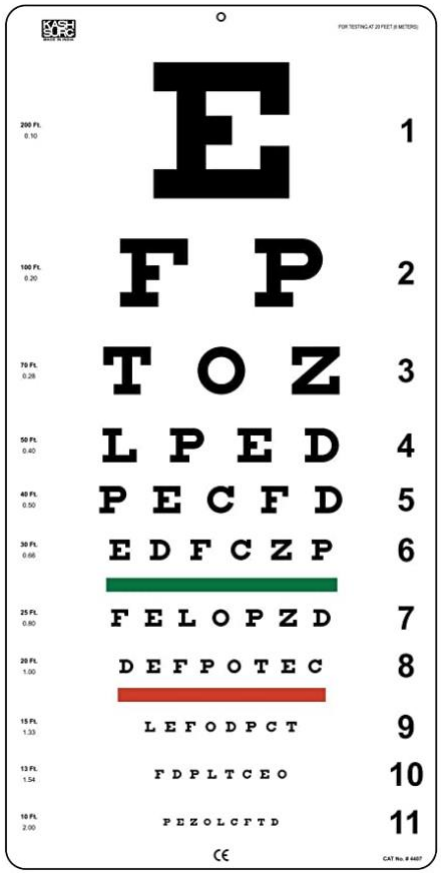
The eye's normal level of visual acuity, or "perfect" vision, is called 20/20 ("twenty-twenty"). Refractive errors like myopia, hyperopia, and astigmatism, as well as ocular pathology, can cause reduced visual acuity. One-third of individuals over the age of 40 are expected to develop refractive error at some point in their lives, and nearly 20% of children will experience refractive error by late adolescence; initial presentation is often with monocular vision loss.[6,7] The Snellen chart is a relatively reliable and cost-effective test to assess a patient's vision.[1] It is widely used for literate children and adults, and helps eye care providers to both identify and quantify vision loss.[8,9,10]



The image seen to the left is the standard Snellen wall chart that hangs in most physicians' offices.[2] It typically shows 11 rows of letters, which progressively decrease in size and increase in quantity as one goes from top to bottom. Providers can display the Snellen chart with a projector or digital screen, allowing for letter alteration and line-by-line presentation to prevent memorization of letters and lines. The row of letters above the red line (Row 8) correlates with 20/20 vision. The arc of the open space in a 20/20 letter corresponds to 1 second of arc that that space subtends on the retina (the physiologic definition of "20/20").

The distance of 20 feet (U.S.) or 6 meters (worldwide) was chosen primarily because light visualized at 20 ft or more is considered to be at "optical infinity." This concept requires further explanation: as we look at an object closer and closer, the eye "accommodates"—that is, the crystalline lens of the eye becomes more rounded—to converge light rays and focus the image on the retina. The opposite occurs as we look at an object from farther away. At 20 feet and beyond, the lens is as thin as it can become; accommodation is minimized.[11] The 20-foot (6-meter) mark is therefore key to minimizing accommodation to get an accurate idea of the degree of refractive error. This is the "gold standard" for determination of ocular function involving central vision.

When a patient successfully reads a row, the adjacent visual acuity (on the chart's left margin in this image) indicates his or her visual acuity. For example: if a patient reads Row 4 perfectly but

cannot read Row 5, then this patient's visual acuity would be 20/40 ("twenty-forty"). The top number indicates the distance a patient stands from the chart, which is the standard 20 ft.[4] The bottom number indicates the distance at which a person with normal visual acuity could see that same line clearly. In other words, a person with "perfect" vision could see Row 4 from 40 feet away, while our hypothetical patient can, at best, see Row 4 from 20 feet away.[2,3]

Additional notation can be used depending on what else the patient can or cannot read. For example: if the patient reads the first two letters "L" and "P" in Row 4 but cannot read the letters "E" and "D," then that patient is said to have 20/40 -2 ("twenty-forty minus two") vision. If the patient can read all of Row 4 plus the "P" and "E" on Row 5, then the visual acuity is recorded as 20/40 +2.[5]

While Snellen charts allow for quick measurements, there are some disadvantages. Some may lack lines of very small letters, decreasing sensitivity to subtle changes in visual acuity.[13] Another disadvantage is a suboptimal ability to detect differences in interocular visual acuity (e.g., monocular vision loss). [13]

In addition to Snellen cards, a pinhole occluder can be used to help determine a possible etiology of decreased visual acuity. The occluder works by allowing light rays to enter the eye through a pinhole, blocking out unfocused rays and allowing for a clearer image to form on the retina; it also decreases accommodation.[14] Improvement in vision with the occluder most likely indicates some sort of a refractive error; no improvement or worsening of vision could indicate other causes, such as macular issues or amblyopia. [12]

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