COMPARING VISUAL ACUITIES IN THE LOW VISION PATIENT

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PURPOSE:

The purpose of this paper is to compare the results obtained when visual acuity is measured in the low vision patient using two acuity charts: the Projecto-Chart snellen letters and the Feinbloom Designs for Vision Chart. Data was compiled over a three month period in the same examination room under the following conditions:

Projecto chart illuminance was held constant at 14 foot candles; this illuminance was matched on the Feinbloom chart by using a goose-neck lamp with silver backing and a 60 watt bulb. Monocular visual acuities were obtained on 16 patients who were corrected to their best acuity (spectacles only). No filters or telescopes were used. Acuities were measured at 14 feet with the projecto chart (calibrated to be a 20 foot equivalent) and at 10 feet for the Feinbloom chart. A summary of the ocular conditions of the patients can be found in Table 1.

RESULTS:

In comparing the 14 foot projecto chart to the 10 foot Feinbloom chart, it cannot be concluded that one chart gives consistantly better visual acuities than the other over the range of acuity which was measured. (See acuity comparisons in Table 2).

Where the Feinbloom acuity at 10 feet was found to be 10/100 (equivalent to 20/200) the projecto chart at 14 feet (20 foot equivalent) gave poorer acuities in every case. (see Table 3)

Where acuities on the projecto chart were measured at 20/200 there was no significant difference in acuities obtained with either the projecto chart or Feinbloom chart. (see Table 4)

Unfortunately the projecto chart gives a large jump in the area most critical for assessing acuity in the low vision patient (20/100 - 20/200). This area is valuable when categorizing a patient as legally blind. When Feinbloom acuities between 10/50 and 10/100 were compared to their measured projecto chart acuities, no significant difference was found between the two charts.1 (see Table 5)

1) Taylor, S.P., The measurement of acuity as a test of visual ability in low vision patients, presented at the Applied Vision Association meeting, UWIST, Cardiff, July 1980, page 20.

Previous research has shown that the "ideal" acuity chart is one in which:

1. The degree of difficulty is the same at all letter sizes therefore "this means that as the viewing distances are changed the patient will read to a different row of letters, but as the difficulty of the task and the scaling remains unaltered so the measured acuity should directly equivalent". 1

2. The number of characters per line is constant.

3. The letter spacing between individual letters and between lines is set so as to minimize contour interaction.

4. The letters should be of equal legibility.

Problems with the snellen visual acuity chart are as follows:

1. The letter size ranges; a large gap exixts between 20/100 and 20/200.

2. The numbers of letters per row is not constant - 20/20 line contains more letters than the 20/100 line.

3. The letter spacing is not held constant thus decreasing legibility due to contour interaction.

4. The symbols choosen are not equally legible.

The Feinbloom chart, especially designed for working with the low vision patient, has the following problems:

1. The number of symbols per row varies.

2. Letters and spacing varies throughout the chart

3. The letters choosen are not equally legible.

Both charts have the same problems inherent in their design, the difference being that the Feinbloom incorporates more acuity steps within the 20/100 to 20/200 range.

It is important when measuring acuity by any method that room illumination and test distance be controlled. Our test distance remained constant at 14 feet for the projecto chart and 10 feet for the Feinbloom chart, while chart luminance for both was kept at 14 ft-cds. It is known that visual acuity increases with increasing amounts of illuminance but at the same time, as higher illuminances are reached there is a diminishing rate of increase in acuity, as was shown by Konig and Lythgoe.2

Factors which were not controlled in this experiment were:

PUPIL SIZE: Retinal illumination varies with pupil size and diffraction, spherical abberation and depth of focus all come into play. However, under normal clinical test conditions, pupil size is not controlled, which makes this data relevant to clinical test conditions.

ECCENTRIC VIEWING: It was not possible to determine the retinal area with which eccentric viewers were fixating. As a result visual acuities could not be controlled.

ROOM ILLUMINATION: Chart illumination was 14 ft-cds but the overall room illumination was not controlled, this in turn may affect the pupil size.

CHART CONTRAST: Chart contrast was not measured for the two charts.

CHART ANGLE: The angle at which the Feinbloom chart was held was not constant thus possibly affecting acuity due to glare and therefore decreasing contrast.

PATIENT FATIGUE: In some patients, acuity was measured at the beginning of their low vision examination while other's acuity was measured at the end. Because of this differnt sequencing, patient fatigue is an uncontrolled factor.

Based on the data compiled in this project we cannot state conclusively that there are significant differences in acuities as measured using the projecto chart snellen letters or the Feinbloom Designs for Vision Chart.

TABLE 1: Ocular health anomalies encountered.

1. Aging Macular Degeneration (2)
2. Aging Macular Degeneration and Diabetic Retinopathy
3. Aging Macular Degeneration and Glaucoma
4. Albinism with Nystagmus
5. Aphakia
6. Chloroquine Retinopathy
7. Geographic Atropy (2)
8. Geographic Atrophy and Cataract
9. Leukemia (2)
10. Optic Atrophy and Nystagmus
11. Presumed Ocular Histoplasmosis
12. Retinal Ischemia and Cataract
13. Retinitis Pigmentosa (2)

Abbreviations to be used in Tables 2-5:

POC - Projecto chart snellen acuity
FB - Feinbloom Designs for Vision Acuity
* Numbers refer to subjects assigned no.

Table 2: 14 foot POC acuity verses 10 foot FB acuity (converted to 20 feet)

	a. acuity better with POC (20/?)	b. acuity better with FB (20/?)	matching
O.S.	3 (70vs 80)	1 (200 vs 400)	
	6 (400 vs 700)	5 (280 vs 400)	
	7 (200 vs 280)	10 (360 vs 400)	
	8 (80 vs 100)	11 (200 vs 400)	
	9 (70 vs 120)	11.5 (200 vs 300)	
	14 (100 vs 140)	13 (100 vs 120)	
	15 (300 vs 400)		
	16 (60 vs 80)		
O.D.	1 (60 vs 120)	2 (240 vs 300)	
	3 (70 vs 120)	6 (120 vs 400)	
	5 (200 vs 280)	8 (160 vs 200)	
	7 (200 vs 280)	10 (160 vs 200)	
	9 (400 vs 450)		
	11 (400 vs 1400)		
	11.5 (400 vs 1400)		
	13 (60 vs 80)		
	14 (100 vs 120)		
	16 (30 vs 40)		

Table 3: For 20/200 Feinbloom acuity the equivalent 14 foot POC acuity was:

1	(20/400)
11	(20/400)
11.5	(20/300)

Table 4: For 20/200 POC acuity, the equivalent FB acuity (10 feet) was:

5	(10/140)
7	(10/140)
8	(10/80)
10	(10/60)

Table 5: FB acuity in 10/50 to 10/100 range versus 14 feet POC acuity:

a. FB acuity		b. POC acuity
1	(10/60 = 20/120)	20/60
3	(10/60 = 20 120)	20/70
6	(10/80 = 20/160)	20/400
8	(10/80 = 20/160)	20/200
10	(10/80 = 20/160)	20/200
14	(10/60 = 20/120)	20/100

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