

## Research Article

# A Comparison of Two Instruments for the Assessment of Legibility of Prescriptions in a Developing Country

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### Abstract

**Purpose:** To compare the utility of a rating and visual analogue scale for the assessment of legibility in prescriptions

**Methods:** A sample of fifty randomly selected prescriptions from a tertiary hospital in Benin City, Nigeria was assessed by five independent assessors – three doctors and two pharmacists using a rating scale and a 100 mm visual analogue scale. Rating scores were allocated as: 0 - completely illegible; 1 - barely legible; 2 - moderately legible; 3 - clearly legible, and 4 - print. Visual analogue scores were measured in millimetres.

**Results:** Rating and visual analogue scores were skewed. The median rating score by doctors and pharmacists were 2.0 and 3.0, respectively. Median visual analogue scores were 59.5, 67.0, 55.0, 51.5 and 46.0 mm, respectively. Inter-quartile ranges (rating scores) were 2.0 – 3.0 for both doctors and pharmacists except for one pharmacist whose inter-quartile range was 1.0 – 2.3; inter-quartile ranges (visual analogue scores) were 49.3 – 63.0, 59.8 – 71.0, 31.0 – 65.5, 40.8 – 62.0, 43.0 – 55.5 mm, for the five independent assessors. The pharmacists' scores using either scale were significantly positively correlated ( $r_s = 0.900$ ; 2-tailed  $p = 0.05$ ); one doctor's scores were negatively correlated ( $r_s = -0.308$ ).

**Conclusion:** The findings support the utility of both instruments in the assessment of handwriting but suggest that there may be important differences between doctors and pharmacists using either method.

**Keywords:** Handwriting; Prescriptions; Legibility; Rating Scale; Visual Analogue Scale; Nigeria.

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## INTRODUCTION

Legibility of doctors' handwriting has been assessed in many published reports, mostly from developed countries [1-4] where computer software that may be used for such assessments are available and more accessible than in developing countries.

The poor handwriting of doctors is often joked about [5] and doctors have been shown to write less legibly than other health care professionals and administrative staff [3]. In a study of over one thousand prescriptions written by doctors in public and private hospitals in Nigeria, only 20% were clearly legible [6]. Until Computerized Order Entry systems (CPOEs) become widely available in developing countries, handwritten prescriptions will continue to be the main tools for exchange of information regarding therapeutic intent. Pharmacists (and other dispensers of medicines) will therefore continue to be challenged to decipher the contents of poorly legible prescriptions.

In order to reproducibly assess handwriting legibility and monitor changes arising from interventions to improve doctors' handwriting there have to be reliable means to assess legibility in the absence of computer software. This study compared the utility of two instruments - a rating scale and a visual analogue scale - for the assessment of legibility of handwriting in prescriptions written in a tertiary health institution in a developing country.

## EXPERIMENTAL

A cross-sectional survey of hand-written prescriptions was conducted at the General Outpatients' Department (GOPD) of the University of Benin Teaching Hospital, Benin City in southern Nigeria. Five doctors were selected by simple random sampling from a total of eight doctors consulting at the GOPD. Prescriptions written on the survey day were pooled and prescriptions written by the randomly selected doctors were sequentially selected with the intention of obtaining 10

prescriptions per doctor until a total of 50 prescriptions were obtained. Prescriber identities were obscured and 5 independent assessors (3 resident doctors in internal medicine and 2 pharmacists, each with over five years' post-graduation working experience) assessed the legibility of handwriting in each prescription using a 5-point rating scale and a 100-mm visual analogue scale in turn. Each assessor independently assessed all fifty prescriptions. These assessors worked in the Department of Medicine, the Main Pharmacy Laboratory and the Bulk Store of the hospital which are physically distant and operationally different from the GOPD. The GOPD had its own pharmacy with pharmacists attached to it.

On the visual analogue scale 0 mm represented 'most illegible handwriting ever' and 100 mm 'most legible handwriting ever'. The rating scale was an ordinal scale with 0: completely illegible; 1: barely legible; 2: moderately legible; 3: clearly legible and 4: print. Mean visual analogue scores were obtained by summing up the scores for each of the prescriptions assessed by individual prescribers and dividing by the number of prescriptions assessed. Mean rating scores were similarly derived.

Data were analyzed using the Statistical Package for Social Sciences (SPSS) version 13.0 software. Inferential statistics for skewed data were employed; correlation between rating and visual analogue scores was estimated using non-parametric statistics (Spearman correlation coefficient).

Ethical approval was obtained from the University of Benin Teaching Hospital Ethics Committee.

## RESULTS

Rating and visual analogue scores were provided for all fifty prescriptions by all the assessors, except that one pharmacist (by

**Table 1:** Handwriting scores using rating and visual analogue scales

Assessor*	Assessment tool ( $\bar{X} \pm S.D$ )	
	Rating scale**	VAS**
<b>D1</b>	2.3 $\pm$ 0.5	55.8 $\pm$ 12.0
<b>D2</b>	2.4 $\pm$ 0.6	65.2 $\pm$ 10.8
<b>D3</b>	2.2 $\pm$ 0.8	49.0 $\pm$ 19.3
<b>P1</b>	2.5 $\pm$ 0.8	52.6 $\pm$ 14.8
<b>P2</b>	1.9 $\pm$ 0.8	47.7 $\pm$ 9.2

D1-3 = Doctors 1, 2 and 3; P1, 2 = Pharmacists 1 and 2; RAS = rating scores (ordinal scale from 0-4); VAS = visual analogue scores (in millimetres)

error) did not provide a visual analogue score for one prescription. Handwriting scores by each independent assessor using either scale are presented in Table 1 as means with standard deviations. Because the data were skewed they were subsequently analyzed using non-parametric statistics. Median handwriting scores (with inter-quartile ranges) allocated by individual assessors are presented in Table 2.

Handwriting scores were positively correlated except in one case (Table 3). Correlation was stronger for assessments undertaken by pharmacists (Spearman correlation coefficient,  $r_s = 0.9$ ;  $p = 0.05$ ).

## DISCUSSION

In this study, legibility was assessed by experienced physicians and pharmacists and it is noteworthy that the lowest rating scores were assigned by a pharmacist. It is not possible, however, to hypothesize that pharmacists scored prescriptions more strictly than doctors because of the overlaps between scores assigned by the doctors and pharmacists.

Evidence for the reliability of both the rating and visual analogue scales in the assessment of legibility is provided by the correlation coefficients observed. There was perfect correlation (Spearman coefficient of 1.000) between the visual analogue scores of "Doctor 1" and "Pharmacist 2" and near-perfect correlation between the visual analogue scores of "Doctor 3" and the rating scores of "Doctor 2". Our data also provide evidence for the internal and external validity of the instruments used.

The negative correlation coefficients obtained for one of the assessors appear to be 'outlier' data judging by the otherwise strong positive correlations between scores obtained using either instrument for other assessors.

It appears that there was less variability with the scores obtained using the rating scale compared to the visual analogue scale, but this could be explained by the fact that the rating scale is a fixed interval scale unlike the

**Table 2:** Distribution of rating and visual analogue scores

	D1	D2	D3	P1	P2	D1	D2	D3	P1	P2
	RAS	RAS	RAS	RAS	RAS	VAS	VAS	VAS	VAS	VAS
Number	50	50	50	50	50	50	50	50	50	49
Mean	2.3	2.4	2.2	2.5	1.9	55.8	65.2	49.0	52.6	47.7
Median	2.0	2.0	2.0	3.0	2.0	59.5	67.0	55.0	51.5	46.0
<b>Percentile</b>										
25	2.0	2.0	1.8	2.0	1.0	49.3	59.8	31.0	40.8	43.0
50	2.0	2.0	2.0	3.0	2.0	59.5	67.0	55.0	51.5	46.0
75	3.0	3.0	3.0	3.0	2.3	63.0	71.0	65.5	62.0	55.5

**Table 3:** Correlation between rating and visual analogue scores

	D1 RAS	D3 RAS	D2 RAS	P1 RAS	P2 RAS	D1 VAS	D2 VAS	D3 VAS	P1 VAS	P2 VAS
D1 VAS	0.8	0.8	0.7	0.7	0.9*	1.0	0.1	0.8	0.6	1.0**
D2 VAS	-0.4	0.0	-0.3	-0.6	-0.2	0.1	1.0	-0.1	-0.7	0.1
D3 VAS	0.9	0.7	1.0**	0.8	0.9*	0.8	-0.1	1.0	0.6	0.8
P1 VAS	0.8	0.4	0.7	0.9*	0.7	0.6	-0.7	0.6	1.0	0.6
P2 VAS	0.8	0.8	0.7	0.7	0.9*	1.0**	0.1	0.8	0.6	1.0

\* Significant correlation at 0.05 level (2-tailed).

\*\* Significant correlation at 0.01 level (2-tailed).

D1-3 = Doctors 1, 2 and 3; P1, 2 = Pharmacists 1 and 2; RAS = rating scores; VAS = visual analogue scores

visual analogue scale which provides a continuum along which handwriting was scored.

In a study which assessed patients' experiences of pain relief with analgesic therapy, respondents preferred a visual analogue scale to a rating scale [7].

It is difficult to suggest, on the basis our findings, which of the two instruments would be preferable for the assessment of legibility. Clearly, either the rating or visual analogue scale may be used.

The differential performance between doctors and pharmacists with either instrument deserves further study before definite inferences can be drawn. It is debatable whether the performance of the pharmacists who assessed prescriptions is the result of individual skill in assessing legibility or whether it is a function of professional proficiency gained through several years of assessing doctors' prescriptions.

It would be worthwhile still to establish criterion validity for either of these instruments against a 'gold standard' for the

assessment of legibility. Such a standard does not yet exist, however.

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