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Agreement between 2 pain visual analogue scales, by age and area of complaint in neck and low back pain subjects: the standard pen and paper VAS versus plastic mechanical sliderule VAS

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Objective: *This study endeavoured to determine the agreement between the standard pencil and paper pain VAS (pVAS) and a relatively newly designed plastic mechanical (slide-rule) VAS (mVAS) in assessing cervical and lumbar pain intensity in cervical pain vs low back pain (LBP) patients stratified by age (< 65 years of age (yoa) and ≥ 65 yoa).*

Design Architecture: *This was a concurrent validity study assessing the agreement between the gold standard pVAS and the experimental mVAS.*

Sample Size: *A sample size estimate revealed that a minimum of 9 subjects for each of 4 age-complaint subgroups (< 65 yoa) neck pain, ≥ 65 yoa neck pain, < 65 yoa low back pain, ≥ 65 yoa low back pain) would be necessary.*

Sample Profile: *All adults (≥ 18 yrs of age) presenting to the Canadian Memorial Chiropractic College's Herbert K. Lee Outpatient Clinic with low back (LBP) pain or neck pain were considered eligible for the study. Three (3) essentially asymptomatic subjects were also recruited in order to provide a complete spectrum of pain severities.*

Outcome Measure: *Pain intensity was measured in centimetres (to nearest one tenth) on the pVAS and in ten units on the mVAS (to the nearest one tenth unit).*

Method: *The pVAS was administered by including it with either the standard intake forms which all new patients are required to complete, or by presenting it to patients visiting the Clinic for a subsequent treatment. The subject made a visual estimation of his/her pain intensity and marked it on the pVAS accordingly. The*

Objectif : *Cette étude s'efforce de déterminer la concordance entre l'échelle analogique visuelle standard du crayon et du papier (pVAS) et une échelle analogique visuelle de plastique mécanique (règle à calcul) (mVAS) nouvellement conçue, afin d'évaluer l'intensité de la douleur cervicale et lombaire chez les patients souffrant de douleur cervicale et les patients souffrant de douleur lombaire, répartis par tranche d'âge (< 65 ans et ≥ 65 ans).*

Architecture conceptrice : *Il s'agit d'une étude de validation concomitante évaluant la concordance entre l'étalon-or pVAS et l'échelle expérimentale mVAS.*

Taille de l'échantillon : *Une estimation de la taille de l'échantillon a révélé qu'un minimum de 9 sujets pour chacun des 4 sous-groupes de patients (atteints : < 65 ans de cervicalgie, ≥ 65 ans de cervicalgie, < 65 ans de lombalgie, ≥ 65 ans de lombalgie) était nécessaire.*

Profil de l'échantillon : *Tous les adultes (≥ 18 ans) se présentent au service de consultation externe de la clinique Herbert K. Lee du Canadian Memorial Chiropractic College avec une lombalgie ou une cervicalgie étaient admissibles à l'étude. Trois (3) sujets asymptomatiques ont été également recrutés pour fournir une gamme complète de l'intensité de la douleur.*

Mesure du résultat : *L'intensité de la douleur a été mesurée en centimètres (à un dixième prés) avec la pVAS et en paliers de dix pour cent avec la mVAS (à un dixième d'unité près).*

Méthode : *La pVAS a été administrée lorsque les nouveaux patient remplissaient les formulaires d'admission standard ou en la présentant aux patients*

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response was then measured in centimetres. One of the investigators presented the mVAS to the subject after arrival in the examination room. The mVAS instrument was presented to the subject with instructions as to how to indicate his/her level of present pain intensity. Every attempt was made to ensure that no less than five minutes and no more than 15 minutes elapsed between the completion of the two forms of Visual Analogue Scale. The data were categorized according to the subjects' ages (≥ 65 years of age (yoa) or < 65 yoa) and their areas of complaint (neck pain or low back pain).

Statistical Analysis Strategy: *Intraclass Correlation Coefficient (ICC) analyses were performed to determine the index of agreement between the mVAS and pVAS for each of the age and complaint categories. 95% Confidence Intervals (95% CI) were calculated for each ICC value. A clinically acceptable level of agreement was judged by the investigators to be ICC ≥ 0.85; a 95% CI no wider than ± 0.25 was considered to provide statistical significance.*

Results: *The Intraclass Correlation Coefficient (ICC) analysis revealed an ICC of 0.86 with a 95% CI of ± 0.25 for the group under 65 yoa with neck pain, and an ICC of 0.87 with a 95% CI of ± 0.13 for the group under 65 yoa with low back pain. ICC's (± 95 CI) of 0.60 (± 0.64) and 0.93 (± 0.2) were calculated for the ≥ 65 yoa neck pain group and ≥ 65 yoa LBP group, respectively.*

Conclusion: *The results of this study suggest that for the most part, there is statistically significant and clinically acceptable agreement between the pencil and paper VAS (pVAS) and a mechanical VAS (mVAS). The areas of complaint assessed (neck versus low back), did not appear to affect the level of agreement within each age category; only the older male neck pain and younger female LBP groups, however, yielded clinically unacceptable levels of agreement.*
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KEY WORDS: visual analogue scale (VAS), pain measurement, patient outcome assessment, pain, chiropractic.

visitant la clinique pour un traitement ultérieur. Le sujet effectuait une estimation visuelle de l'intensité de sa douleur et l'indiquait sur la pVAS. La réponse était ensuite mesurée en centimètres. Un des chercheurs présentait la mVAS au sujet une fois dans la salle d'examen. L'instrument de la mVAS était présentée au sujet avec des instructions pour permettre à ce dernier d'indiquer son niveau actuel d'intensité de la douleur. Tout a été mis en oeuvre pour s'assurer qu'il ne s'écoule pas moins de cinq minutes et pas plus de 15 minutes pour remplir les deux formulaires de l'échelle analogique visuelle. Les données ont été classées selon les âges des sujets, ≥ 65 ans ou < 65 ans, et leurs zones de douleur (cervicalgie ou lombalgie).

Stratégie d'analyse statistique : *Des analyses de coefficient de corrélation intraclasse (CCI) ont été effectuées pour déterminer le niveau de concordance entre la mVAS et la pVAS pour chaque catégorie d'âge et de douleur. Des intervalles de confiance de 95 % (IC 95 %) ont été calculés pour chaque valeur de CCI. Le niveau de concordance acceptable sur le plan clinique a été établi par les chercheurs à CCI ≥ 0,85; ces derniers ont considéré qu'un IC de 95 % pas plus large que ± 0,25 était statistiquement significatif.*

Résultats : *L'analyse du coefficient de corrélation (CII) intraclasse a révélé un CCI de 0,86 avec un IC à 95 % de ± 0,25 pour le groupe de moins de 65 ans souffrant de cervicalgie, et un CCI de 0,87 avec un IC à 95 % de ± 0,13 pour le groupe de moins de 65 ans souffrant de lombalgie. Des CCI (± 95 IC) de 0,60 (± 0,64) et de 0,93 (± 0,2) ont été calculés pour le groupe de ≥ 65 ans atteint de cervicalgie et pour le groupe de ≥ 65 ans atteint de lombalgie, respectivement.*

Conclusion : *D'après les résultats de cette étude, la plus grande partie de cette étude comprend une concordance statistiquement significative et acceptable du point de vue clinique entre le crayon et le papier (pVAS) et la règle à calcul mécanique (mVAS). Les régions de plainte du malade évaluées (cervicalgie et lombalgie) ne semblent pas avoir affecté le niveau de concordance au sein de chaque catégorie d'âges. Seuls les groupes de sujets masculins âgés souffrant de cervicalgie et de jeunes femmes souffrant de lombalgie démontrent des niveaux de concordance cliniquement inacceptables.*
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MOTS CLÉS : échelle analogique visuelle (VAS), mesure de la douleur, évaluation du résultat chez le patient, douleur, chiropratique.

Introduction

Comprehensive assessment of conditions presenting to a chiropractic office mandates the use of both objective and subjective parameters. Such assessment techniques should be validated and, at the very least, proven reliable. A widely used subjective measure of pain intensity is the pen and paper Visual Analogue Scale (pVAS). It consists of a 100 mm line reproduced on a piece of paper, with one end labelled "no pain" and the other labelled "the pain is as bad as it could be". The patient is asked to mark a spot on the line which corresponds to the best estimate of his/her own pain level at the time. The level of pain intensity is measured as the distance in millimetres from the absence point to the patient's mark. It can be used as a relative measure in monitoring pain levels, or it can be used as discrete value. In general, this method of clinical pain assessment has been shown to be reliable and valid.[1–5] The pVAS is used to compare pain intensity in the same patient at different times or in groups of patients receiving different treatments. Huskisson[1] states the pVAS has a greater capacity to detect a change in response to a stimulus such as a treatment, than the simple verbal descriptive scale. It has also been noted that the pVAS is particularly reliable when used to measure current pain intensity.[2] Other advantages attributed to the pVAS include: simplicity, universality,[1] and that it can usually be subjected to parametric statistical analyses.[5]

Validity of the pVAS has been challenged by Carlsson,[6] who states that patients seem to differ considerably in their ability to use the VAS reliably. Price[5] concluded that validity of pVAS measures may be dependent on the instructions given to respondents; however, completion of the VAS is difficult for many patients, in spite of careful instructions and practice.[6] This is based on the fact that estimation of pain intensity with pVAS requires perceptual ability; therefore, pVAS may give unreliable measures in the geriatric population, children, patients who are highly medicated and patients with multisystem disease.[7] Carlsson[6] found that the pVAS may be less reliable as a measure of pain relief than as a measure of unchanged or intensified pain.[6] It is important to note that the study which produced these negative results had a very small sample size ($n_1 = 3$, $n_2 = 5$) and there was a lack of patient blinding to previous pVAS scores. Other sources of error which should be considered with the use of pVAS are: photocopying which makes the line longer,[1] measurement of the VAS line and interpretation of where the subject has made the mark. In addition, the lack of ease in administering the pVAS (since it must be written) and subsequent scoring of the VAS ratings (i.e. it can be time consuming), may limit the use of the pVAS in common health care settings.[5]

A mechanical VAS (mVAS), in the form of a modified slide rule, has been used by various researchers in an attempt to reduce certain sources of error and improve the ease of VAS use.[4,5,8,9] It was purported to have been validated by Million in 1982;[8] however, a review of the referenced study revealed that no such validation was made. The mVAS was used in the study as a subjective outcome measure for the assessment of progress in back-pain patients and it was simply observed that "it presented no special difficulties for the patient, saved considerable time and paper, and eliminated any problem of interpretation about where the subject had made his mark". No data or analysis were provided.[4]

Recent research, however, has investigated the reliability and validity of a mVAS by comparing it with numerical rating scales.[5] It was found that both produced consistently different stimulus response functions for pain sensation intensity as compared to pain unpleasantness although both provided a consistent measure of *experimental* and *clinical* pain intensity.[5] In addition, two recent studies specifically compared the mVAS with the pVAS.[5,10] Price[5] established that both types of pain VAS produced very similar results when used by a group of musculoskeletal pain patients to rate 45–51°C temperature stimuli. Although the type of correlation coefficient was not provided, the stimulus-response curves obtained were almost identical, and the patients' mean "temperature match to their clinical pain" and the mean ratings of "presently perceived clinical pain", were internally consistent. These findings lend support to the construct validity of the mVAS. Its ease of use and scoring (in acute and chronic pain patients) makes it potentially appealing in its use in health care and research settings.

The results of a student investigative project, undertaken at CMCC in 1994 (unpublished), revealed a clinically acceptable level of agreement (ICC = 0.927) between mVAS and pVAS, and thus concluded that a metal slide rule VAS could be used interchangeably with the paper and pencil VAS. No consideration, however, was given to the age of the patients, specific location of the

pain, or duration of pain (acute or chronic) therefore, the purpose of our study is to assess the level of agreement between the pVAS and a relatively new plastic slide rule mVAS in assessing cervical and lumbar pain in patients $\geq$ 65 and < 65 yoa. The instrument is also called a "slide algometer" and looks somewhat like a white plastic slide rule (see Figure 1). One side has a horizontal sliding tab which, when closed, completely conceals a bright red stripe extending the length of the instrument. The two ends of the instrument are 150 mm apart and are marked "no pain sensation" and "the most intense pain sensation imaginable". The other side of the sliding tab is divided into 10 equal units, which are further subdivided into five 3 mm units. This mVAS is administered by an examiner who presents the instrument to the patient with the sliding tab closed (i.e. red stripe is completely covered). The examiner then asks the patient to slide the horizontal tab from left to right, to uncover a length of the red stripe which best indicates his/her present level of pain intensity. The examiner records, from the back of the instrument, the point to which the horizontal tab has been moved (to the nearest tenth of a unit). The sliding tab is then closed for the next reading.

This study endeavoured to determine the agreement between the standard pencil and paper pain VAS (pVAS) and a relatively newly designed plastic mechanical (slide-rule) VAS (mVAS) in assessing cervical and lumbar pain intensity in cervical pain vs low back pain (LBP) patients stratified by age (< 65 years of age (yoa) and $\geq$ 65 yoa).

Acceptable agreement is judged to be ICC $\geq$ 0.85, and a statistically significant ICC is judged to be one for which the 95% Confidence Interval is no wider than $\pm$ 0.25.

Methods and Materials

The Instruments: The plastic Mechanical Visual Analogue Scale (mVAS) was provided by Algometrics, Inc. and is shown in Figure 1. The Paper and Pencil Visual Analogue Scale (pVAS) used is shown in Figure 2.

Sample Size: A sample size estimate assuming an alpha of 0.05 and ICC of > 0.7[11] revealed a minimum of 9 subjects to be sufficient for each of the 4 subgroups studied. Sixty-seven (67) new or in-progress patients who presented to the Herbert K. Lee Clinic at the Canadian Memorial Chiropractic College, were recruited for the investigative project.

Inclusion-Exclusion Criteria: Inclusion criteria for the study required that all subjects be over the age of 18 years, that most be symptomatic with either neck or low back pain, and that all subjects understand enough English to comprehend the study instructions, be consenting, and able to complete the requirements of the study. Exclusion criteria consisted of any physical condition which prevented the subject from being able to adjust the mVAS instrument, and/or insufficient comprehension/literacy level to satisfactorily complete either scale. Information on age, gender and major area of complaint was also obtained.

Protocol: Chiropractic interns were approached in advance to determine which of their patients were eligible for the study. Permission was then requested from these interns to allow those patients to be asked to participate.

The pVAS was either included with the standard intake forms which all new patients upon arrival at the clinic are required to complete, or in eligible patient files, if these patients were scheduled to come in for a subsequent treatment. Subjects were not informed that their pVAS response would be compared to a subsequent mVAS score. Each subject participated in the study for only 1 set of VAS's. The pVAS consisted of a 10 cm line, with one end labelled "no pain" and the other end labelled "the pain is as bad as it could be". No other verbal labels or instructions other than what were on the sheet of paper were provided (see Figure 2). The subject made a visual estimation of his/her pain intensity and marked it on the 10 cm line accordingly. The response was then measured in centimetres (to the nearest tenth) from the point designated "no pain", and recorded. After being escorted to the examination room, an investigator **blinded to the results of the pVAS**, entered the room and presented the mVAS to the subject, prior to any history taking, examination or treatment. The mVAS instrument was presented to the subject with the sliding tab closed (i.e. red stripe completely covered). The investigator then asked the subject to slide the horizontal tab from left to right to uncover the red stripe to a point which best indicated his/her level of present pain intensity. The investigator recorded, from the back of the instrument, the point to which the horizontal tab was moved (to

Figure 1
Plastic Mechanical Visual Analogue Scale – Slide Algometer

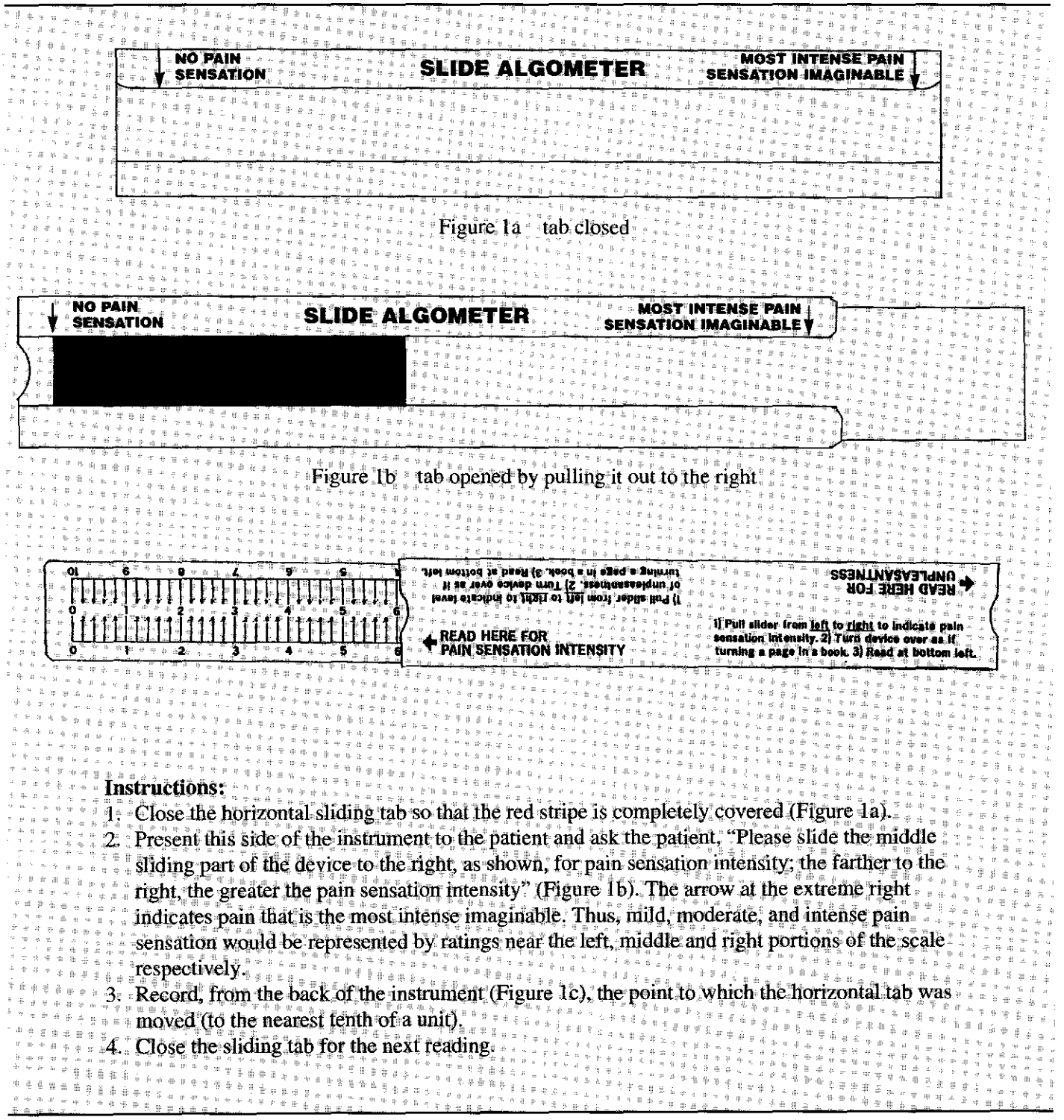


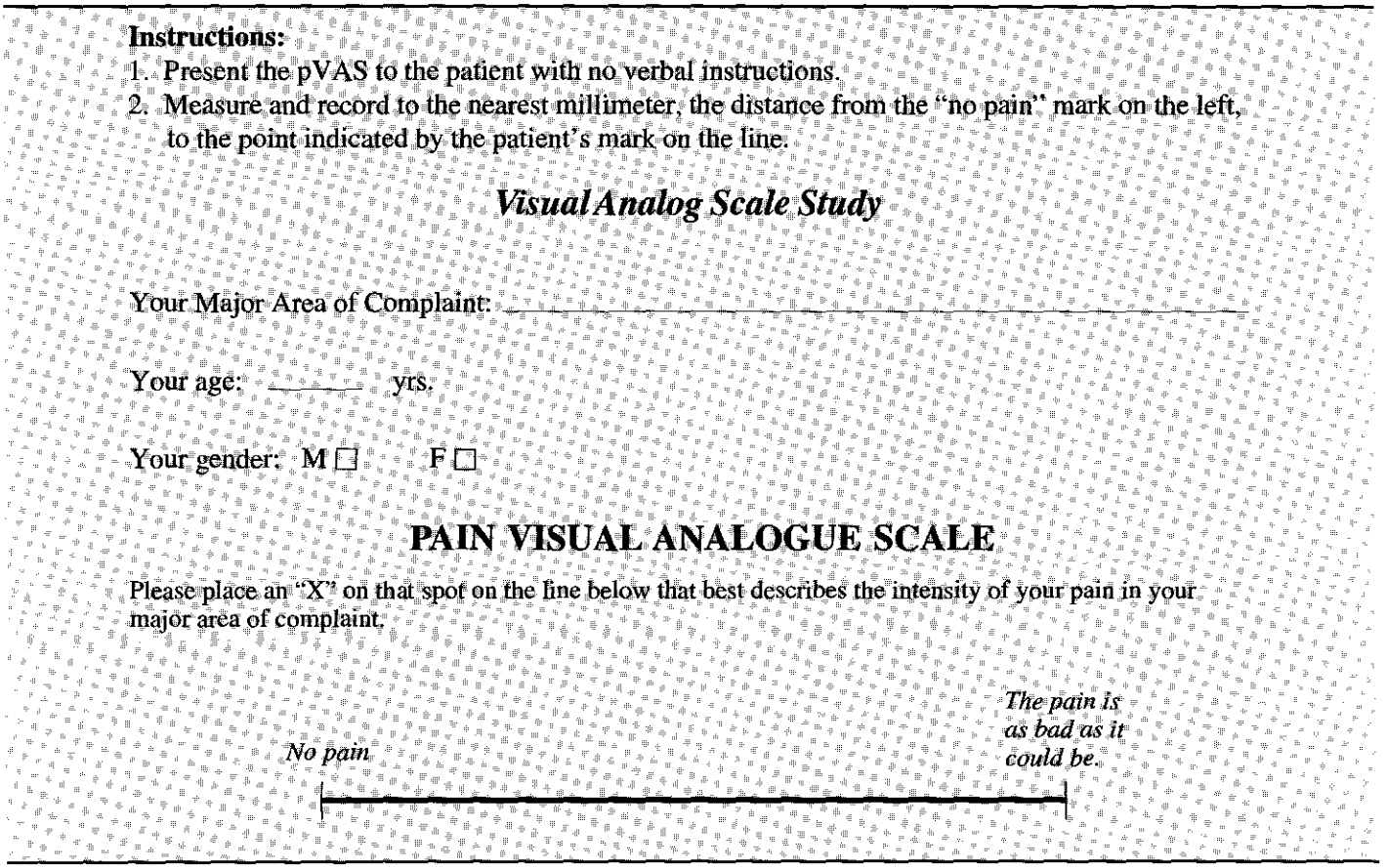
Figure 1a tab closed

Figure 1b tab opened by pulling it out to the right

Instructions:

1. Close the horizontal sliding tab so that the red stripe is completely covered (Figure 1a).
2. Present this side of the instrument to the patient and ask the patient, "Please slide the middle sliding part of the device to the right, as shown, for pain sensation intensity; the farther to the right, the greater the pain sensation intensity" (Figure 1b). The arrow at the extreme right indicates pain that is the most intense imaginable. Thus, mild, moderate, and intense pain sensation would be represented by ratings near the left, middle and right portions of the scale respectively.
3. Record, from the back of the instrument (Figure 1c), the point to which the horizontal tab was moved (to the nearest tenth of a unit).
4. Close the sliding tab for the next reading.

Figure 2
Pencil and Paper Visual Analogue Scale



the nearest tenth of a unit). Every attempt was made to allow no fewer than five minutes and no more than 15 minutes between the completion of the pVAS and the presentation of the mVAS.

Statistical Analyses: The data were categorized by area of complaint (neck or low back), age ($\geq$ 65 years of age (yoa) and < 65 yoa), and gender. A summary of the data is presented in Table 1. Intraclass Correlation Coefficient analyses were performed to determine the levels of agreement between the two Visual Analogue Scales for each of the subgroups. A clinically important level of agreement was judged by the investigators to be an ICC $\geq$ 0.85 and statistical significance was set at a 95% CI with a maximum width of $\pm$ 0.25.

Results

See Table 1, Figures 3–9.

Discussion

The results of this study suggest that for the most part, there is statistically significant and clinically acceptable agreement between the pencil and paper VAS (pVAS) and a mechanical VAS (mVAS). The areas of complaint assessed (neck versus low back), did not appear to affect the level of agreement within each age category; only the older male neck pain and younger female LBP groups however, yielded clinically unacceptable levels of agreement.

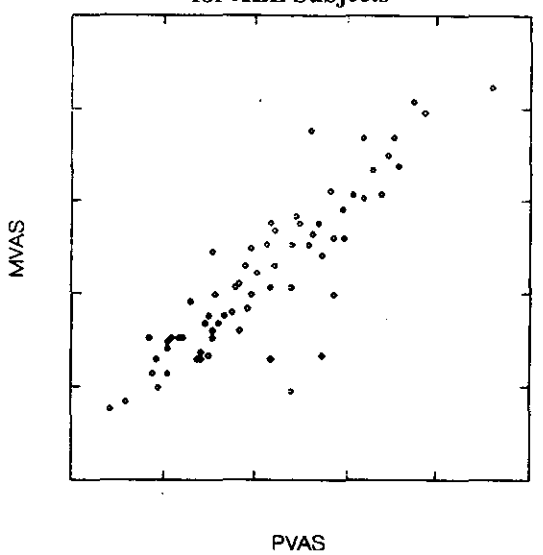
We identified a few areas of concern which may have had an impact on the study; **however, we feel that none of**

Table 1

	Neck Pain					
	< 65 yoa			≥ 65 yoa		
	All	Male	Female	All	Male	Female
Number of subjects	19	6	13	8	6	2
ICC (± 0.95% CI)	0.86** (± 0.25)	0.95** (± 0.22)	0.86** (± 0.22)	0.6 (± 0.6)	0.42 (± 0.67)	0.99** (± 0)
$r_{Pearson}$	0.90*			0.62		
Prd. t-test mean diff (sd)	1.54 0.40 (1.13)			1.14 0.6 (1.49)		
	Low Back Pain					
	< 65 yoa			≥ 65 yoa		
	All	Male	Female	All	Male	Female
Number of subjects	28	14	14	12	7	5
ICC (± 0.95% CI)	0.87 (± 0.13)	0.93** (± 0.15)	0.73 (± 0.29)	0.93 (± 0.2)	0.96** (± 0.26)	0.91** (± 0.34)
$r_{Pearson}$	0.88*			0.92*		
Prd. t-test mean diff (sd)	1.6 0.33 (1.08)			0.33 0.08 (0.72)		

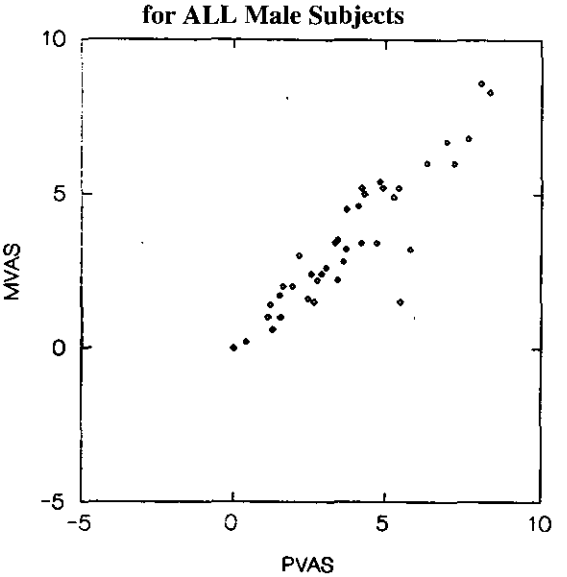
yoa = years of age
ICC = Intraclass Correlation Coefficient
CI = 95% Confidence Interval
* $p < 0.05$
** clinically acceptable (ICC > 0.85) and statistically significant (95% CI ≤ 0.25)

Figure 3
Correlation Between mVAS and pVAS for ALL Subjects



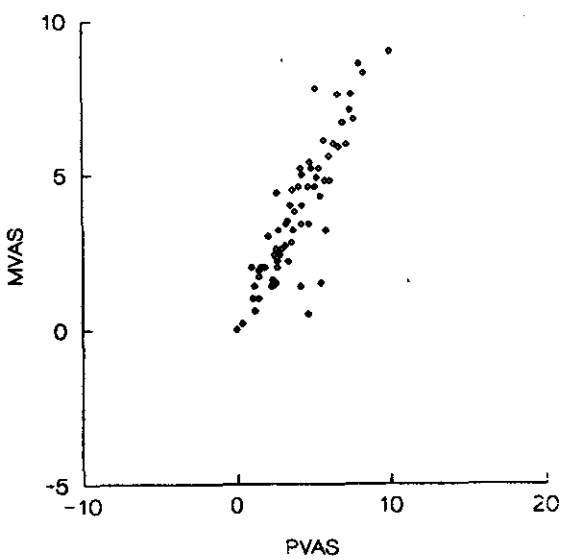
ICC (± 95% CI) = 0.72 (± 0.37)
$r_{Pearson's} = 0.88$; $p < 0.05$
Mean difference (sd) between pVAS and mVAS = 0.32 (1.08) per 10 units (not clinically significant although is statistically significant)
$t_{Prd.} = 2.41$; $p = 0.02$

Figure 4
Correlation Between mVAS and pVAS for ALL Male Subjects



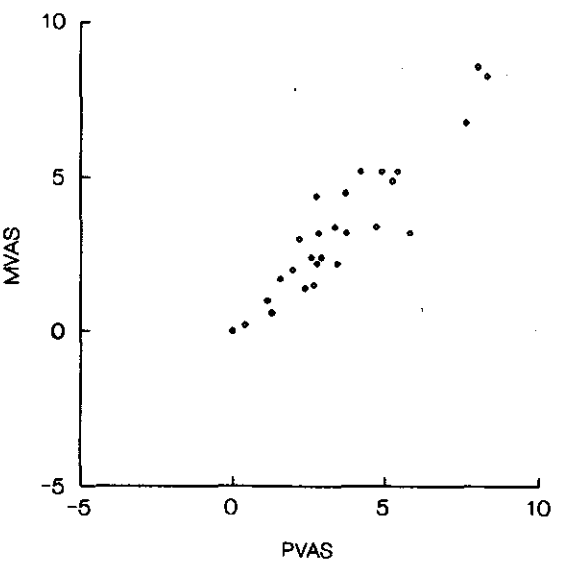
ICC (± 95% CI) = 0.84 ± 0.29
$r_{Pearson's} = 0.90$; $p < 0.05$
Mean difference (sd) between pVAS and mVAS = 0.39 (0.98) per 10 units (not clinically significant although is statistically significant)
$t_{Prd.} = 2.29$; $p = 0.03$

Figure 5
Correlation Between mVAS and pVAS for ALL Female Subjects



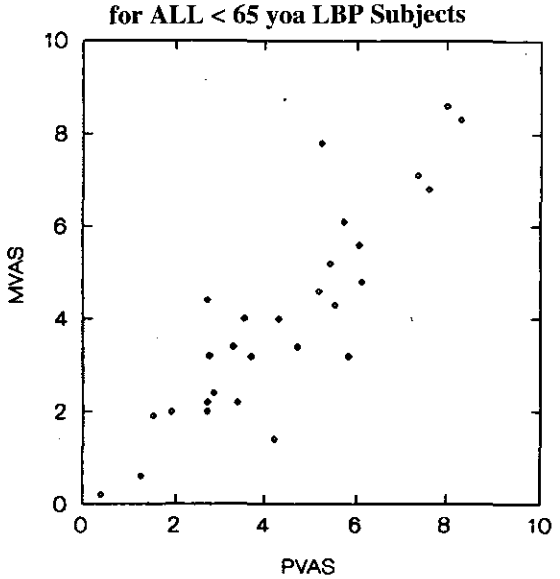
ICC (± 95% CI) = 0.83 ± 0.25
$r_{Pearson's} = 0.86$; $p < 0.05$
Mean Difference (sd) = 0.25 (1.18) (not clinically significant or statistically significant)
$t_{Prd.} = 1.22$; $p = 0.23$

Figure 6
Correlation Between mVAS and pVAS for ALL > 64 yoa LBP Subjects



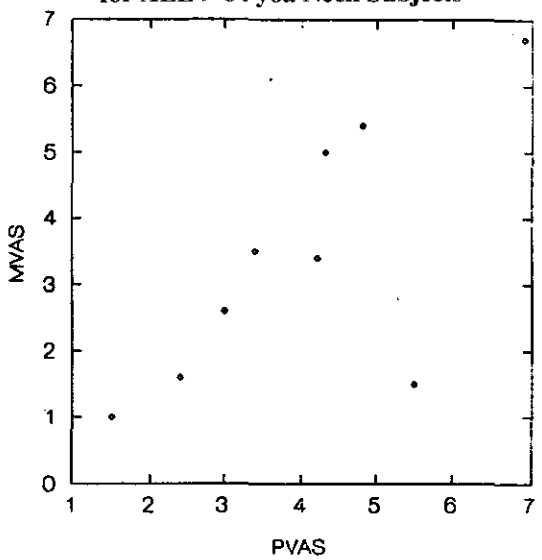
ICC (± 95% CI) = 0.93 ± 0.20
$r_{Pearson's} = 0.92$; $p < 0.05$
Mean Difference (sd) = 0.08 (0.72) (not clinically significant or statistically significant)
$t_{Prd.} = 0.33$; $p = 0.75$

Figure 7
Correlation Between mVAS and pVAS for ALL < 65 yoa LBP Subjects



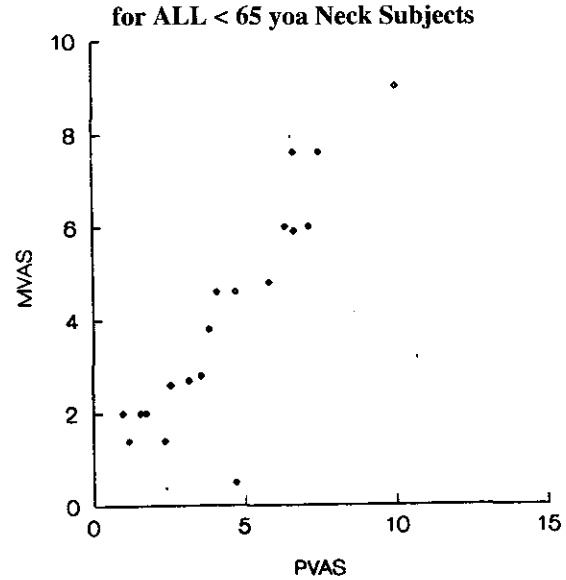
ICC (± 95% CI) = 0.87 (± 0.13)
$r_{Pearson's} = 0.88$; $p < 0.05$
Mean Difference (sd) = 0.33 (1.08) (not clinically or statistically significant)
$t_{Prd.} = 1.6$; $p = 0.122$

Figure 8
Correlation Between mVAS and pVAS for ALL > 64 yoa Neck Subjects



ICC (± 95% CI) = 0.6 (± 0.6)
$r_{Pearson's} = 0.62$; $p < 0.05$
Mean Difference (sd) = 0.6 (1.49) (clinically but not statistically significant)
$t_{Prd.} = 1.14$; $p = 0.29$

Figure 9
Correlation Between mVAS and pVAS for ALL < 65 yoa Neck Subjects



ICC (± 95% CI) = 0.86 (± 0.25)
$r_{Pearson's} = 0.9$; $p < 0.05$
Mean Difference (sd) = 0.36 (1.15) (not clinically or statistically significant)
$t_{Prd.} = 1.54$; $p = 0.14$

these problems, singly or collectively, was severe enough to jeopardize the overall conclusions about comparability.

These areas of concern are described below:

1 There was no way of determining the exact time when the new patients completed the pVAS. Depending on the length of time required for the subject to complete other intake forms, the time between completion of the pVAS and mVAS may have exceeded the maximum 15 minute time interval in certain instances.

2 There were also no verbal instructions given for the pVAS, whereas the instructions for the mVAS were predominantly verbal, resulting in a marked increase in subject/investigator interaction for the mVAS. Results on the mVAS may have been partially determined by the investigators' ability to convey (or the subjects' ability to comprehend) the verbal instructions given.

3 One very obvious difference between the two scales was their lengths. The pVAS was 10 cm in length whereas the mVAS was 15 cm in length. Why the mVAS is a larger instrument is not known by the authors. In most instances, however, comments made by subjects indicated that an attempt was being made to recall how far along the pVAS they had previously made their mark to indicate pain intensity. The subjects may not all have had similar abilities to judge proportionate distances the same way.

4 Other patients remarked on the intensity or brightness of the red stripe which may have had the effect of reducing the estimation of their pain intensity on the mVAS, when compared to that using the pVAS. These remarks were made, despite the investigator's instruction that left, middle and right ratings on the mVAS corresponded with low, moderate and high intensity of pain; thus, as previously concluded by Price,[5] validity of the VAS measured in general may be at least partially dependent on the instructions given to respondents.

Carlsson[6] found that completion of the VAS is difficult for many patients, in spite of careful instructions and practice. This was evident in the male geriatric population ($\geq$ 65 yoa) in this study. Kramer[7] speculated that this may be due to a reduced perceptual ability, resulting from medications or multisystem disease. For example, the presentation of a 2 cm thick red slide rule in contrast to a thin 10 cm black line may have influenced the visual perception of pain intensity. As the patients could not see the length of the slide rule (unless they fully pulled it out), or estimate whether the range of intensity be an increasing color shade (from light red to darker red), this may have failed to give them visual cues suggesting a pain range. Some patients were uncertain as to where the true indicator was on the slide rule; clarification was usually required and given, resulting in increased interaction. This presents an obvious additional difference between the two VAS scales. **This did not however, appear to adversely affect the agreement between mVAS and pVAS within the younger neck pain, male LBP and older female groups, so that in light of the mVAS's practical and economical advantages over the pVAS, we feel justified in recommending the mVAS's use for these subgroups.**

It should be noted that many of the geriatric subjects in this study found the mVAS instrument itself difficult to use. The sliding tab tended to stick, and it was particularly difficult to move the tab from the closed position. This sticking tendency increased with repeated use of the instrument. As a result, its use was even more difficult for those elderly subjects whose fine motor coordination was at all diminished. This could be a critical limitation for its use with the geriatric population in health care and research settings.

We recommend that further study be conducted using a larger group of geriatric subjects, who are stratified by gender and the following age categories < 65, 65–75 and > 75 yoa. This is because dexterity and perceptual ability may not be a problem for younger geriatrics (65–75 yoa). Further investigation into level of agreement between the two scales for chronicity and "unpleasantness" of pain factors should also be undertaken.

Conclusion

Based on the results of this study, it is judged by the investigators that the plastic mechanical slide rule VAS (mVAS) can be used interchangeably with the pencil and paper VAS (pVAS) for (a) most individuals under 65 years of age, although, the data derived from LBP females < 65 yoa should be regarded with some caution, and (b) for most individuals over 65 yoa, except for males > 65 yoa with neck pain. Further investigation and possible modification of the instrument is necessary prior to acceptance of

its use in the male, neck pain geriatric population, and the < 65 yoa female LBP population.

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Appendix 1

Comparison of scores between the paper and pencil Visual Analogue Scale (pVAS) and the plastic mechanical slide rule Visual Analogue Scale (mVAS) for subjects under 65 with low back pain (Patients 1–28) and subjects under 65 with neck pain (Patients 29–47).

PATIENT	SEX	pVAS	mVAS	PATIENT	SEX	pVAS	mVAS
1	F	2.7	4.4	25	M	8.00	8.6
2	F	2.75	3.2	26	M	5.80	3.2
3	M	7.6	6.8	27	F	3.55	4.0
4	F	6.1	4.8	28	M	3.30	3.4
5	F	5.5	4.3	29	M	1.20	1.4
6	M	4.7	3.4	30	F	2.60	2.6
7	M	2.85	2.4	31	F	4.70	0.5
8	M	2.7	2.2	32	M	1.60	2.0
9	F	5.7	6.1	33	F	6.65	7.6
10	M	8.3	8.3	34	F	2.40	1.4
11	M	1.25	0.6	35	F	5.80	4.8
12	M	5.40	5.2	36	F	7.50	7.6
13	F	4.30	4.0	37	M	6.35	6.0
14	F	6.05	5.6	38	F	3.20	2.7
15	F	5.15	4.6	39	F	6.65	5.9
16	M	3.40	2.2	40	F	1.80	2.0
17	M	1.90	2.0	41	M	3.60	2.8
18	F	5.20	7.8	42	F	10.0	9.0
19	M	3.70	3.2	43	F	4.7	4.6
20	F	1.50	1.9	44	M	7.15	6.0
21	F	4.20	1.4	45	F	3.85	3.8
22	F	7.35	7.1	46	F	1.00	2.0
23	M	0.4	0.2	47	M	4.10	4.6
24	F	2.70	2.0				

Appendix 2

Comparison of scores between the paper and pencil Visual Analogue Scale (pVAS) and the plastic mechanical slide rule Visual Analogue Scale (mVAS) for subjects over 65 with low back pain (Patients 1–12) and subjects over 65 with neck pain (Patients 13–20)

PATIENT	SEX	pVAS	mVAS	PATIENT	SEX	pVAS	mVAS
1	F	5.7	1.1	11	F	4.9	5.2
2	M	4.2	1.5	12	F	2.1	3.0
3	M	0	0	13	F	6.9	6.7
4	M	5.25	4.9	14	M	5.5	1.5
5	F	2.3	1.4	15	M	3.4	3.5
6	F	2.5	2.4	16	M	4.3	5.0
7	M	1.5	1.7	17	M	4.8	5.4
8	M	4.2	5.2	18	M	2.4	1.6
9	M	2.6	1.5	19	M	4.2	3.4
10	M	3.7	4.5	20	F	3.0	2.6