The Application of a Pain Assessment tool within a Hand Therapy Unit: A comparison of pain measurements

Roberta Brincat SROT (Malta, U.K.)

ABSTRACT

The aim of this study was to determine a reliable and valid pain assessment tool to quantify the quality and intensity of pain, providing a simple method for the therapist to administer in an acute hand therapy unit and for a hand injured patient to follow. Thirty clinical case notes were evaluated. Two separate groups were divided according to the type of pain assessments. Group 1 consisted of those subjects who were assessed by the Visual Analogue Scale (VAS) and Group 2 consisted of those subjects who were assessed by the McGill Pain Questionnaire (MPQ). The McGill Pain Questionnaire measured quality and intensity of pain whilst the Visual Analogue Scale measured pain intensity. Pain levels demonstrated a significant decrease between the initial pain score and the follow-up pain scores. Correlation coefficients were calculated to measure pain intensity and quality of pain attained by the Present Pain Intensity score and the Pain Rating Index score of the MPQ. Other statistical analyses measured the mean time taken to administer the initial pain score and the follow-up pain score for both pain assessments. Results demonstrated a relationship between quality and intensity of pain. Significant results for the Visual Analogue time scales ($p<0.05$) were determined but a low correlation was attained for the McGill Pain Questionnaire. The results of this study demonstrate that the Visual Analogue Scale is more effective to use in an acute hand therapy unit because of its simplicity to assess pain.

INTRODUCTION

The International Association for the Study of Pain defines pain as 'An unpleasant sensory and emotional experience, which is associated with actual or potential tissue damage or described in terms of such damage' (IASP, 1986, p.27). Pain is frequently accompanied by other reaction

components, which often affect the judgement of pain. Multiple studies have failed to demonstrate the objectivity of tests to measure quality and intensity of pain. This is because the measurement of pain is inherently presumed and most often not worth attempting (Jacox et al., 1994; King, 2000). Other substantial research has led to some general agreement regarding the best assessment tools to measure pain (Baille, 1993; Price et al., 1983; Reading, 1984; Sim & Waterfield, 1997; Turk & Melzack, 1992; Yarnitsky et al., 1996). In Malta, pain evaluation is objectively accomplished by asking the patients to verbally quantify their pain level. Consequently therapists do not appreciate or heed their patients' reports of pain. In light of this, different pain measures were implemented but were never analysed. The purpose of this comparative study is to analyse quality and intensity of pain, measured by two pain assessment tools (the VAS & the MPQ), providing suitability for use in an acute hand therapy unit.

The Visual Analogue Scale (VAS)

The VAS consists of a 100 millimetres horizontal line whose end points are marked with "no pain" and with "pain as bad as it could be" (see Fig. 1). The patient is asked to rate his/her pain by means of an X-mark on the horizontal line. The point where the X-mark intersects corresponds to the magnitude of the subjective pain intensity being objectively measured. The pain score is derived by measuring the distance in millimetres between the mark and the left-hand end of the scale.

Fig. 1

The reliability of the VAS has been extensively tested. Scott & Huskisson (1976) showed that the VAS is one of the best assessment tools to measure pain intensity. VAS responses are easy to obtain from patients and it requires little instruction. There appears to be a consensus of opinion that the reliability and validity of the VAS is high (Bowsher, 1994; Grossman et al., 1992; Revill et al., 1976). Joyce et al. (1975), Ohnhaus et al. (1975), Scott &

Huskisson (1976) demonstrated a high degree of sensitivity for the VAS when compared with other scales. Thus the vulnerability to distortions or biases in rating are decreased.

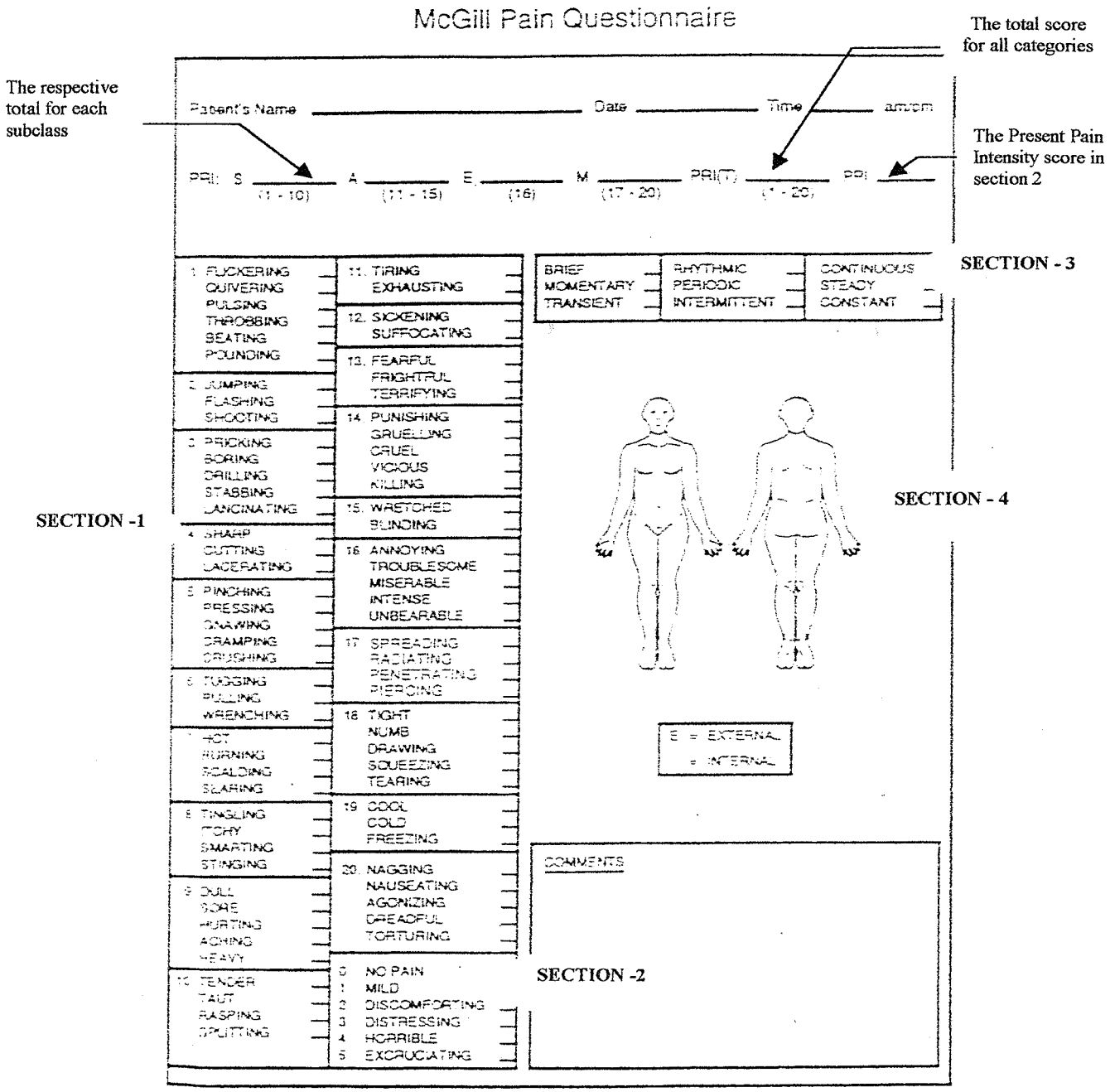
The McGill Pain Questionnaire (MPQ)

The MPQ is designed as a four-part tool (see Fig 2). The first section is divided into 20 sub-classes of pain descriptors classified as sensory, affective, evaluative, and miscellaneous. The second part contains a rating scale, which registers present pain intensity, and the third section denotes a group of words describing the pattern of pain. The last section of this questionnaire demonstrates a diagram of the body to indicate the location of the pain. Patients are asked to select words that best describe their pain, choosing only one word from each sub-class within the four categories. Three major indices are attained. The Pain Rating Index which is based upon the rank values of the words; the number of words chosen; and the Present Pain Index which demonstrates the number of the word chosen in combination as an indicator of the overall pain intensity at the time of administration of the questionnaire. The Pain Rating Index score is determined by scoring the word in each sub-class. The first word describing the least pain is given a value of 1, the next word is given a value of 2, etc. The values of the chosen words are then added up to obtain a score for each category, and finally obtaining a total score for all categories.

The MPQ has been reported as a dependent measure in clinical evaluations (Hunter & Philips, 1981; Reading & Newton, 1977), in treatment trials (Fox & Melzack, 1976; Rybstein-Blinchik, 1979), and in laboratory studies where noxious stimulation was applied to normal volunteers. Love et al. (1989), Kremer et al. (1982), Kremer & Atkinson (1981), all agree that the MPQ demonstrates a high reliability when utilised within a clinic as it gives a comprehensive approach and analysis of several aspects of pain within the same instrument.

METHODOLOGY

Thirty acute hand injured pain assessments were evaluated. Stratified random sampling was achieved by selecting the initial 15 subjects who were evaluated by the VAS and the initial 15 subjects who were evaluated by the MPQ between the period of January 2001 and April 2001. The absolute minimum considered was between twelve to fifteen subjects per



McGill Pain Questionnaire. The descriptors fall into four major groups: sensory, 1 to 10; affective, 11 to 15; evaluative, 16; and miscellaneous, 17 to 20. The rank value for each descriptor is based on its position in the word set. The sum of the rank values is the pain rating index (PRI). The present pain intensity (PPI) is based on a scale of 0 to 5.
Copyright 1970 Ronald Melzack.

group (Hicks, 1999). All selected subjects were over 17 years of age and their average age was 45.43 years. The majority of the subjects were males (63.3%). The type of injury was classified on eight domains: fractures, crush injuries, soft tissue injuries, boutonniere deformities, ligamentous injuries, tip amputations, tendon injuries and joint dislocations. Selected demographic variables included age, type of injury, gender, type of pain assessment used, time taken to administer test, and pain intensity levels. The Assistant Principal in charge of the hand therapy unit administered and scored all pain assessment tools. This secured the reliability of both assessment tools.

Data Collection

Individual descriptors of quality and intensity of pain for each pain assessment tool were assessed together with the difference between the initial pain assessment measure and the monthly re-evaluation. The International Dictionary of Medicine and Biology defined quality of pain as "an attribute of a sensory experience, which is distinctive, belongs only to that modality, and which persists despite quantitative variations in the stimulus giving rise to sensation" (Lovell et al., 1986, Page 2372). Whilst intensity was defined as "the condition or quality of being intense; a high degree of tension, activity or energy" (Lovell et al., 1986, Page 1452). Notes were classified according to the type of pain assessment used. Ethical considerations were not appropriate as only clinical case notes were evaluated.

Data Analysis

Pearson correlation coefficients were used to determine the relationships of pain levels measured by the VAS and the Present Pain Intensity and the Pain Rating Index of the MPQ. Pain intensity and quality of pain were determined by performing Pearson correlation coefficients measures between the Present Pain Intensity score and the Pain Rating Index of the MPQ. The Statistical Package for the Social Sciences was used to compile the statistical tests.

RESULTS

Initial and 4-week follow-up clinical case notes were analysed. Only an 87% response of the follow-up could be

evaluated, as 3% of the analysed subjects who were assessed by the Visual Analogue Scale were discharged prior to the 4-week follow up. Comparatively, 10% of responses that were assessed by the McGill Pain Questionnaire were absent with 3% of the patients being discharged prior to the follow- up evaluation, while the other 7% discontinued treatment prior to the follow-up assessment.

PAIN LEVELS

Paired sample t-tests evaluated the calculated changes of pain measured by the VAS, the Present Pain Intensity, and the Pain Rating Index, measured by the McGill Pain Questionnaire. Results obtained from these tests demonstrated that pain levels decrease significantly (see tables 1 – 2). There is a high correlation between the three scales, as all scores were significant with $p<0.05$.

PAIN INTENSITY VERSUS QUALITY OF PAIN

Quality and intensity of pain could only be analysed and compared with evaluation of group two. This group was assessed by using the McGill Pain Questionnaire. The Present Pain Intensity score assessed the intensity of pain and the Pain Rating Index measured the quality of pain. By using paired t-tests on the data, (see table 3), results showed high significance when comparing measures with quality of pain measures ($t= 4.491$, $df=14$). Results were significant ($p<0.05$) for a two-tailed test.

Within this study, the first group was assessed using the VAS. However only pain intensity could be analysed. In view of this, estimates of the fluctuations are subjected to a certain bias, as the sample size was limited, thus the study had restricted power to detect significant differences in outcomes.

TABLE 1: MEAN PAIN LEVELS

	N	Mean	Std. Deviation	St. Error Mean
VAS Score 1	15	51.73	25.02	6.46
VAS Score 2	14	27.50	20.23	5.41
MPQ- PPI- Score 1	15	48.00	23.66	6.11
MPQ- PPI- Score 2	12	30.00	21.74	6.28
MPQ- PRI- Score 1	15	24.20	10.32	2.66
MPQ- PRI- Score 2	12	16.75	9.68	2.79

TABLE 2: PAIN LEVELS PAIRED SAMPLE T-TEST

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	VAS Score 1 - VAS Score 2	26.57	20.58	5.50	14.69	38.46	4.830	13	.000
Pair 2	MPQ Score 1 - MPQ Score 2	15.00	15.08	4.35	5.42	24.58	3.447	11	.005
Pair 3	Pair Rating Index in % - Monthly Review of the Pair Rating Index in %	7.92	9.70	2.80	1.75	14.08	2.827	11	.016

TABLE 3: PAIRED SAMPLE T-TEST FOR PAIN INTENSITY AND QUALITY OF PAIN

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	MPQ Score 1 - Pain Rating Index in %	23.80	20.53	5.30	12.43	35.17	4.491	14	.001

TIME

To assess the effects of practice on each pain measure, the initial time was compared with the follow-up time. Individual means were computed (see Table 4) for the VAS and the MPQ time scores. Table 5 demonstrates the mean correlation r_m, that shows a linear association between the initial time score and the follow-up time score. Estimates were highly significant (p= 0.000). Paired samples correlations were performed to analyse individual correlation coefficients, *r*, between the initial and the follow-up method for the two pain measures.

Results were significant for the Visual Analogue Scale, but there was lack of linear relationship between the change in time of administering the initial MPQ assessment and the follow-up (see table 6).

TABLE 4: DIFFERENCE IN MEAN TIME OF INDIVIDUAL ASSESSMENTS

	Number of Subjects	Mean	Std. Deviation
Time Taken to Administer Initial VAS Pain Assessment in Seconds	15	54.00	30.37
Time Taken to Administer Monthly VAS Review Pain Assessment in Seconds.	14	32.14	28.54
Time Taken to Administer Initial MPQ Pain Assessment in Seconds.	15	452.00	87.44
Time Taken to Administer Monthly MPQ Review Pain Assessments in Seconds.	12	425.00	145.76

TABLE 5: MEAN TIME CORRELATION BETWEEN INITIAL TIME OF ADMINISTRATION OF THE VAS AND MPQ AND THE FOLLOW-UP TIME

	Mean		Time Taken to Administer Initial Pain Assessment in Seconds	Time Taken to Administer Monthly Review Pain Assessment in Seconds
Time Taken to Administer Initial Pain Assessments in Seconds (VAS & MPQ)	253.00	Pearson Correlation	1.000	916**
		Sig (1-tailed)	.	.000
		N	30	26
Time Taken to Administer Monthly Review Pain Assessment in Seconds (VAS & MPQ)	213.46	Pearson Correlation	.916**	1.000
		Sig (1-tailed)	.000	.
		N	26	26

**Correlation is significant at the 0.01 level (1-tailed).

TABLE 6: TIME PAIRED SAMPLE T-TEST OF VAS & MPQ

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference Lower	Upper			
Pair 1	Time taken to administ VAS initial pain score - Time taken to administ Monthly VAS Review	21.43	18.44	4.93	10.78	32.08	4.348	13	.001
Pair 2	Time taken to administ MPQ initial pain score - Time taken to administ Monthly MPQ Review	20.00	133.76	38.61	-64.99	104.99	.518	11	.615

DISCUSSION

The objective of a pain assessment is to measure patients' response to injury or disease where pain is a symptom. Pain is often a primary complaint in hand injured patients, thus pain relief forms a major component for the therapists' clinical activity in an acute hand therapy unit. Pain assessment enables the therapist to evaluate the methods of controlling pain and assists the therapist to determine whether the intervention that the therapist has implemented has altered the pain in any significant way. Acute pain suffered by hand injured patients is often associated with tissue damage. Its duration is often expected to be closely related to the healing of the injury. Within a clinic, it is essential for the therapist to verify and analyse pain measures, depending upon the clinical environment. The VAS and the Present Pain Intensity (MPQ) scales both provide meaningful information about the magnitude of pain intensity. This study demonstrates that the ratio of pain intensity in group one and group two decreased significantly. These results are in accord with those of Carlsson (1983) who assessed pain intensity by utilising the Visual Analogue Scale. Absolute and comparative forms of the Visual Analogue Scale measured changes in pain intensity. Low values of coefficiency of reliability were attained as both scales showed prominence when pain decreased as compared to unchanged or increasing pain.

Pain intensity and quality of pain were compared for those patients who were assessed by the MPQ (Group 2). Such

comparisons were not possible for the VAS as only pain intensity could be evaluated. Results showed that there was a significant correlation between the same subjects who scored the Present Pain Intensity and the Pain Rating Index. These findings indicate that scores attained on the Present Pain Intensity measure and the Pain Rating Index are related. This verification provides an important attribute as it demonstrates that pain intensity is influenced by quality of pain. Patients tended to score higher the Present Pain Intensity than the Pain Rating Index. This suggests that the patients' report in grading their pain is not always proportional to the severity of their noxious input. It may be that whilst the level of pain has remained the same, the subject might have learned to cope with the pain levels better and thus this shows an improvement in the rating of pain levels. Price et al. (1983) measured pain intensity and the quality of pain by utilising Visual Analogue Scales with healthy volunteers where noxious thermal stimuli were applied. Results demonstrated that the quality of pain in relation to pain intensity was influenced by situational factors that selectively reduced or increased the quality of pain. There appears to be a consensus of opinion that the main aim for the application of pain measure within a clinic highly depends upon a subjective response. This is influenced by the patient's mood, attitude, coping efforts, resources, family support and the impact of pain upon the patient's life (Echternach, 1993; Jadad and McQuay, 1993).

In the present study, it was found that the mean correlation between the time taken to administer both pain assessments was highly significant. This means that the time to administer both assessments is satisfactory. However a low correlation between the total time taken to administer the VAS and the total time taken to administer the MPQ is present. This decrease in significance resulted because the calculated time difference between the two pain assessments shows that the VAS takes considerably less time to perform when directly estimated by the comparative scale of the MPQ. These results are partly in line with the review of Sim & Waterfield (1997) who suggested that the MPQ takes longer to administer and is more complex than the VAS. In an acute

clinical environment such as a hand therapy clinic, a pain assessment tool needs to be straightforward and not too time consuming to use especially if employed as a self-report measure. This study demonstrated that the VAS could be completed in a matter of seconds, whilst the MPQ took about 5-15 minutes.

The aim of the present study was to determine a pain assessment tool, which is time effective but simultaneously provides significant data in the measurement and evaluation of painful hand injured patients. Many scales and dimensions of pain measure are available. The choice of a particular scale and dimension should demonstrate the objectivity of the pain assessment by producing maximal sensitivity within the hand therapy unit. This will enable the therapist to make accurate judgements about what works best at assessing pain problems.

It is evident from this study, that pain intensity scales are more appropriate for measuring the state of painful hand injured patients as part of the initial assessment. This is because the ratio of pain affect to pain intensity reflects the influence of perceived situational factors which selectively decreases or enhances affective dimensions. Thus the VAS is more appropriate for utilisation in a hand therapy unit, as it is easier to use by both the therapist and the patient, because of its simplicity to administer and to score. Comparatively the MPQ gives a maximum description of pain level. The MPQ contains more descriptors of sensory components than affective, evaluative and other miscellaneous components of pain. This forces the patient to give more consideration to the sensory component than to the others. Within the local context, the MPQ required translation of a number of words. Hence the credibility of this assessment is put into question. A renewed scaling is essential for the Maltese population.

CONCLUSION

Within a Hand Therapy Unit the need for a reliable pain assessment method, which is easy to administer, is essential. This will assist the therapist in using that information to assess the effectiveness of interventions and to

ensure that the patient is given the best treatment options. In light of this, the time involved in pain assessment should be considered when applied in an acute clinical setting. Thus the application of the VAS within the local hand therapy unit will be implemented. However it would be interesting to ascertain whether treatment strategies diminish pain levels. In addition, the objectivity of applying different therapeutic strategies that alter quality and intensity of pain needs investigation. These areas could form the basis of a future research project.

REFERENCES

Baillie, L. (1993). A review of pain assessment tools. *Nursing Standards* 7 pp. 25- 29.

Bowsher, D. (1994). Acute and chronic pain and assessment. In: Wells PE, Frampton V, Bowsher D (eds). Pain management by physiotherapy, (2nd edition), Pp. 39-43. Butterworth- Heinemann, Oxford.

Carlsson, AM. (1983). Assessment of chronic pain I Aspects of the reliability and validity of the Visual Analogue Scale. *Pain* **16** pp. 87-101.

Echternach, J.L. (1993). Clinical evaluation of the patient in pain. *Physical Therapy Practice* **2** (3) pp. 14-26.

Fox, E.J, & Melzack, R. (1976). Transcutaneous electrical stimulation and acupuncture: comparison of treatment for low back pain. *Pain* **2** pp. 141-148.

Grossman, S.A., Shudler, V.R., McQuire, & D.B., et al. (1992). A comparison of the Hopkins Pain Rating Instrument with standard visual –analogue and verbal description scales in patients with chronic pain. *Journal of Pain Symptom* 7 pp.196- 203.

Hicks, C.M. (1999). Research methods for clinical therapists. Applied project design and analysis. (3rd ed.). Churchill Livingstone: Edinburgh

Hunter, M. & Philips, C (1981). The experience of headache- an assessment of the qualities of tension headache pain. *Pain* **10** pp. 201-220.

IASP 1986. Classification of chronic pain: Descriptions of chronic pain syndromes and definitions of pain terms. *Pain* **27** (Suppl): S1-S225

Jacox, A., Carr, D.B. & Payne, R. (1984). Management of cancer pain. Clinical practice guideline, AHCPR Publication Number 94-0592. Rockville, MD: Agency for Health Care Policy and Research, Public Health Service, US Department of Health and Human Services.

Jadad, A.R., & McQuay, H.J. (1993). Chapter 2: The measurement of Pain. In Pynsent P.B, Fairbank, JCT, Carr, A (eds): Outcome Measures in Orthopaedics. Butterworth- Heinemann: London. Pp 16-29

Joyce, C.R.B., Zutshi, D.W., Hrubes, V. & Mason, R.M. (1975). Comparison of fixed interval and visual analogue scales for rating chronic pain. *European Journal of Clinical Pharmacology* **8** pp. 415- 420

King, S. (2000). The Classification and Assessment of pain. *International Review of Psychiatry* **12** pp. 86-90

Kremer, E. F., Atkinson, J.H., & Ignelzi, R.J. (1982). Pain measurement: the affective dimensional measure of the McGill Pain questionnaire with a cancer pain population. *Pain* **12** pp.153-164.

Kremer, E., & Atkinson, S.H. (1981). Pain measurement: construct validity of the affective dimension of the McGill Pain Questionnaire with chronic benign pain patients. *Pain* **11** pp. 93-100.

Love, A., Loeboeuf, D.C., Whisler, W.W., & Crisp, T.C. (1989). Chiropractic chronic low back pain sufferers and self report assessment methods. Part 1. A reliability study of the Visual Analogue Scale, the pain drawing and the McGill Pain Questionnaire. *Journal of Manipulative and Physiological Therapeutics* **12** pp. 21-25.

Lovell Becker,E., W.J.H., Butterfield, McGehee Harvay, A., Heptinstall, R.H., & Thomas, L. (1986).

Ohnhaus, E.E., & Adler, R. (1975). Methodological problems in the measurement of pain: a comparison between the verbal rating scale and the visual analogue scale. *Pain* 1 pp. 374-384

Price, D.D., McGrath, P.A., Rafii, A. & Buckingham, B. (1933). The validation of Visual Analogue Scales as ratio scale measures for chronic and experimental pain. *Pain* 17 pp. 45-56

Reading A.E., & Newton, J.R. (1977). On a comparison of dysmenorrhea and intrauterine device related pain. *Pain* 3 pp. 265-276.

Reading, A.E. (1984). Testing pain mechanisms in persons in pain In: Wall PD, Melzack R (eds). Textbook of pain, pp195-203. Churchill Livingstone, Edinburgh.

Revill, S.I., Robinson, J.O., Rosen, M. & Hogg, M.I.J. (1976). The reliability of a linear analogue scale for evaluating pain. *Anaesthesia* 31 pp.1191-1198.

Rybstein- Blinchik, E. 1979. Effects of different cognitive strategies on the chronic pain experience. *Journal of Behavioural Medicine* 2 pp. 93-109.

Scott, J., & Huskisson, E.C. (1976). Graphic representation of pain. *Pain* 2 pp.175-184.

Sim, J., & Waterfield, J. (1997). Validity, reliability and responsiveness in the assessment of pain. *Physiotherapy Theory and Practice* 13 pp. 23-27.

Turk, D.C. & Melzack, R. (1992). Handbook of pain assessment. Guildford Publications Ltd.

Yarnitsky, D., Sprecher, E., Zaslansky, R. & Hemli, J.A.(199(Multiple session experimental pain measurement. *Pain* 67 (2-3) pp. 327-333.

Without your articles we will not be able to issue another publication. We urgently need your input. So share your clinical expertise, information on seminars you have attended, experiences and comments, to keep this journal alive.

PLEASE SEND THE ARTICLES TO:

Ms. Tracy Rizzo

MJOT c/o O.T. Department,

Mount Carmel Hospital, Attard.