

# Twice-daily pain monitoring as standard clinical practice for inpatients at a medical oncology unit: a descriptive study

A. A. Martoni\*, C. Degli Esposti, A. Cricca, G. Rocchi & S. Giaquinta

Medical Oncology Unit, Sant' Orsola-Malpighi Hospital, Bologna, Italy

Received 9 June 2006; revised 19 July 2006; accepted 21 July 2006

**Background:** Very limited experiences have explored the use of pain intensity monitoring in everyday clinical practice at a medical oncology inpatient unit.

**Methods:** The program 'Pain-Free Hospital,' including a training course for nurses and the recording every 12 h of a visual analog scale (VAS) rating in all the patients admitted to the inpatients' ward independently of their disease stage, was activated in 2002. An audit on the clinical charts of patients admitted for the first time in the first semester of 2003 was carried out in order to ascertain the applicability of the procedure and its congruence with patients' clinical status.

**Results:** The VAS rating was reported in 211 out of 223 (94.6%) clinical charts. At entry, 60 out of 211 (28.4%) patients presented VAS  $\geq 1$ , 21 (35%) of whom were not taking any analgesics. The mean VAS score  $\geq 1$  was 3.4. No statistically significant difference emerged in the distribution of VAS rating as regards disease extension, presence or absence of bone metastases and performance status.

**Conclusions:** The systematic monitoring of VAS by nurses at a medical oncology inpatients' ward is feasible with a good patient compliance. The reliability of the procedure in terms of guiding the analgesic treatment has yet to be demonstrated.

**Key words:** analgesic therapy, pain monitoring, VAS

## introduction

Cancer is the most frequent cause of chronic pain and despite increased attention to the use of analgesics by oncologists and professionals dealing with cancer patient care, these patients are still a long way from receiving satisfactory pain control. Improvement guidelines for the treatment of cancer pain have for some time considered a careful assessment of pain intensity to be the basic condition that may allow physicians to administer the optimal analgesic treatment [1].

Pain intensity evaluation can be carried out by 'proxy raters' such as health professionals and relatives or by the patient him/herself. Substantial evidence exists that pain in cancer patients is underestimated by the physicians and by the nursing staff, and this was one of the main reasons for suboptimal pain control [2, 3]. Being a matter of a subjective experience, pain can be evaluated indirectly by means of what the subject expresses, verbally and non-verbally, about his/her experience. The instruments available for subjective pain measurement in the adult patient may be one dimensional, such as the visual analog scale (VAS), numerical rating scales (NRS) and categorical verbal rating scales, or multidimensional instruments, such as

the McGill Pain Questionnaire and the Brief Pain Inventory. Currently, the use of one of these instruments is considered by many experts as the best way to evaluate pain in cancer patients [4]. When pain assessment was focused on its prevalence and the intensity dimension, a unidimensional scale appears to be the preferable instrument.

Although chronic in nature, cancer pain presents typical fluctuations in intensity, which are often unpredictable. These characteristics lead us to consider that only a careful monitoring of pain intensity can allow for the administration of the optimal analgesic treatment. In addition, pain associated to cancer diagnosis is not a prerogative of advanced disease, but it may also affect early disease stages, even if with a lower prevalence.

Many studies have been carried out on the feasibility and reliability of pain intensity monitoring by unidimensional or multidimensional instruments in cancer patients, both for inpatients [5–7] and outpatients [8–11]. However, most of these experiences have been limited to the palliative care setting or at most to patients with advanced disease. In addition, very limited information exists on the implementation of the systematic pain intensity monitoring in cancer patients in everyday clinical practice.

At our institution, the program 'Pain-Free Hospital' was activated in the second half of 2002. The program included a training course for nurses and the systematic monitoring of

\*Correspondence to: Dr A. A. Martoni, Medical Oncology Unit, Sant' Orsola-Malpighi Hospital, via Albertoni 15, 40138 Bologna, Italy. Tel:+39 051 636 2206; Fax: +39 051 636 2508; E-mail: martoni@aosp.bo.it

pain in the patients admitted to the inpatient ward using the VAS. The ultimate aim of this program was to get all the situations of pain in the cancer patients to come forth, including those that may escape the physicians' and the nurses' evaluation, so as to be able to implement the appropriate therapies and to be able to obtain a better symptom control. The objective of the present study is to check the level of the procedure's application and the congruence of the findings with the patient's clinical status.

## materials and methods

### study population

The study was carried out by an audit of the clinical records of all the patients admitted for the first time in the period 1 January 2003–30 June 2003 to the inpatients' ward of the Medical Oncology Unit of the Policlinico Sant'Orsola-Malpighi in Bologna. In this unit, admission exclusively concerns those patients with a diagnosis of solid tumors in various stages and is finalized to planning, starting or continuing a specific treatment, mainly represented by chemotherapy. Most of the patients presented an advanced tumor or a tumor with loco-regional extension, while a small number had no evidence of disease (NED); the latter patients were admitted in order to receive adjuvant treatment that could not be administered in the outpatients' clinic for a variety of other reasons. Since we have considered all the admissions that have taken place over a certain period, the patients who were submitted to the present analysis may have been at their very first admission or at the first admission during the study period, having already been admitted to hospital previously.

### measures

The instrument chosen to measure pain intensity was the VAS of Scott and Huskisson [12]. This is an analogical scale etched upon a plastic medium with a sliding arrow that, on the one hand, reports a 10-cm-long linear segment with no numbers on it and that at either end bears the writing 'no pain' and 'maximum pain.' On the back, the same segment is subdivided into 1-cm-long notches with the numeric indication. The duty nurse b.i.d. (at 8 a.m. and 8 p.m.) asks the patient, after briefly illustrating how the instrument works, to indicate the pain intensity felt at that precise moment in time and transcribed it on to the medical chart, in addition to the other nursing parameters, together with the matching score that can be seen from the back of the instrument itself.

In addition for each patient, the physician records upon entry, as a standard procedure implemented for many years, any presence of related cancer symptoms and among these, pain, according to a three-point code based on clinical judgment, and the consumption of analgesics (0 = no pain and no drugs taken in the 24 h; 1 = mild/moderate pain and one administration of an analgesic in the 24 h; 2 = severe pain and two or more administrations of an analgesic in the 24 h) [13].

### training

In October 2002, all 20 ward nurses participated in a 2-day course on the epidemiology, physiopathology, measurement and treatment of cancer pain held by two oncologists, two anesthesiologists, two psychologists and three experienced nurses. During the course, a particular relevance was dedicated to the administration modalities of the VAS instrument. At the end of the course, before the monitoring program was officially launched, a preliminary training phase was activated on the use of twice-daily monitoring of the VAS. During this initial training period, the nursing staff pointed out some problems with the administration of the instrument and in particular some difficulties for some patients with the use of the VAS,

especially in the case of elderly patients, and a certain non-homogeneity as concerns the administration methods of the VAS by some nurses [14]. As a result, the nurses were given a further period of training on the VAS administration methods and communication with the patient, while at the same time two of the authors (AAM and AC) checked the matching of the score reported in the medical chart with their own evaluation (double evaluation). In the space of a few weeks, the nurses reported that most of the problems had been resolved, and by means of the double evaluation, it was seen that the score reported in the medical chart was fairly reliable. The twice-daily pain monitoring officially started on 1 January 2003.

### analgesic therapy

The physician prescribed analgesic therapy in patients with untreated or with uncontrolled pain according to the guidelines based on the World Health Organisation recommendations [15]. In particular, the anti-pain therapy was administered 'on demand' [i.e. an administration upon request from the patient limited to non-steroidal anti-inflammatory drugs (NSAIDs) orally or i.m. or tramadol orally or i.m.] or continuously with a planned schedule (two or three administrations in the space of 24 h for the NSAIDs or tramadol) and by major opiates (two to six administrations per day for morphine s.c. or two to three per day of oral slow-release morphine and every 72 h for transdermal fentanyl).

### study design

Data were collected by consulting the clinical charts of the first admissions in the period mentioned above. A clinical chart that contained at least one VAS rating in the first 24 h at entry, in the last 24 h at dismissal and two ratings for every day of hospitalization excluding the absences of the patient from the ward owing a variety of reasons (examinations, permission to go out, etc.) were considered complete for the procedure application. The study analyzed the VAS rating at entry in relation to the following entrance parameters: patient's age and sex, primary tumor site, extension of the disease, site of the metastases/relapses, performance status [karnosky (kps)], any analgesic therapy being taken and the evaluation of pain made by the physician according to the previously mentioned three-score code. The analysis included also the VAS rating upon dismissal and its comparison with the rating at entry. VAS ratings of the hospitalization days between those of admittance and dismissal were not analyzed in this study as its aim was the evaluation of the procedure's application and congruence.

### statistical analysis

The data were collected on an Excel Windows-Office XP<sup>®</sup> (Microsoft<sup>®</sup>) spreadsheet, by means of which they were subsequently processed. The statistical tests used were chi-square test and Student's *t*-test.

## results

The audit concerns the clinical charts of 223 patients admitted for the first time in the period of the study. Two hundred and eleven charts (94.6%) contained two daily VAS ratings and at least one rating on the first and the last 24 h of hospitalization. Twelve charts were completely [4] or partially [8] lacking a VAS rating report. The main reason for non-reporting was the patient's compromised cognitive status that had meant that the nurse did not record the score. One hundred and forty-two patients (67.3%) presented metastatic solid tumors and 30 (14.2%) presented a tumor with loco-regional extension while the remaining 39 (18.5%) had NED. The mean hospitalization duration was 6.5 days.

The analysis of the VAS rating at entry is reported in Table 1. Sixty (28%) patients presented a VAS  $\geq 1$ . The mean intensity of the VAS in these patients was 3.4 and the distribution of the VAS according to three classes was as follows: VAS 1–3, 39 (65%); VAS 4–6, 15 (25%) and VAS 7–10, 6 (10%). No statistically significant difference emerged in the distribution of the VAS as regards sex, age, site of primary tumor, disease extension, presence or absence of bone metastases and performance status. Patients with low versus normal KPS presented mean higher pain intensity. The evaluation of pain by the physician at the first admission of the 211 patients resulted as follows: pain 0 in 138 patients (65.4%), pain 1 in 53 (25.1%) and pain 2 in 20 patients (9.5%).

Table 2 reports the analysis of the relationship between VAS rating and the analgesic therapy taken at entry. It can be seen that 86 patients (40.8%) were given some form of analgesic therapy but that 35% of the patients with VAS  $\geq 1$  were not taking any analgesics and that, conversely, 47 patients with VAS 0, corresponding to 22.3% of the overall patient series, were taking analgesics. In particular, 27 out of 47 patients were taking continuous analgesic medication and 20 were receiving analgesics on demand. The first of these two groups is made up of patients whose pain was controlled by analgesics previously prescribed by the medical doctors of the unit or by other doctors. Consequently, as a whole, the patients with pain involvement are those with VAS  $\geq 1$  together with VAS 0 but taking continuous analgesic drugs, making a total of 87 patients corresponding to 41.2% of the examined patient series. This number was higher than the one (73 = 34.6%) obtained with the pain evaluation made by the physician (Figure 1). Table 2 also shows that in about half the patients on scheduled therapy, the pain control was unsatisfactory irrespective of whether they had been taking opiates or non-opiates.

**Table 1.** VAS  $\geq 1$  distribution according to patient characteristics upon entry

	Total (n)	VAS $\geq 1$			
		n (%)	P*	Mean	P**
Patients	211	60 (28.4)	0.62	3.4 $\pm$ 0.28	0.896
Gender					
Male	107	34 (31.8)	0.39	3.6 $\pm$ 0.36	0.36
Female	104	26 (25)		3.1 $\pm$ 0.46	
Age					
$\leq 65$ years	133	36 (25.8)	0.53	3.2 $\pm$ 0.43	0.46
$> 65$ years	78	24 (30.8)		3.6 $\pm$ 0.38	
Disease extension					
NED	39	8 (20.5)	0.22	2.4 $\pm$ 0.50	0.15
Locally advanced or metastatic tumors	172	52 (30.2)		3.6 $\pm$ 0.32	
Bone metastases					
Yes	29	11 (38.0)	0.22	4.2 $\pm$ 0.55	0.27
No	182	49 (26.9)		3.3 $\pm$ 0.42	
Performance status					
80–100	138	35 (25.4)	0.07	2.9 $\pm$ 0.32	0.036
50–70	60	22 (36.7)		4.1 $\pm$ 0.50	

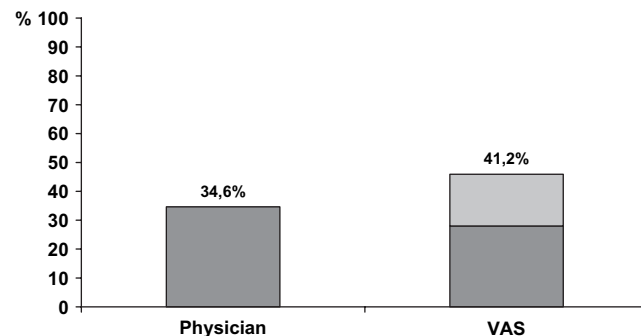
Comparison between VAS 0 versus VAS  $\geq 1$ . \*Chi-square test; \*\*Student's *t*-test. NED, No evidence of disease; VAS, visual analog scale.

Table 3 reports the comparison between VAS upon entry and upon dismissal. There is a slight increase in the number of pain-free patients and in particular a 50% reduction in the number of patients with VAS 7–10, although the mean VAS remained unchanged (from 3.3 to 3.2). In greater detail, 42 patients (20%) improved their VAS rating, 38 (18%) worsened and 131 (62%) remained unchanged. It is worth pointing out that upon dismissal, there were still 11.8% of patients with VAS  $> 3$ . Furthermore, also at dismissal, 17.9% (7/39) of NED patients

**Table 2.** VAS distribution according to analgesic therapy taken by patients upon entry

	Total (n)	VAS 0, n (%)	VAS $\geq 1$	
			n (%)	Mean
Total	211	151 (100)	60 (100)	3.4
Analgesic therapy				
No	125	104 (68.9)	21 (35)	2.6
Yes	86	47 (31.1)	39 (65)	4.39
On demand therapy	26	20 (13.2)	6 (10)	4.2
NSAIDS	12	11 (7.3)	1 (1.7)	2
Tramadol	14	9 (6.0)	5 (8.3)	4.6
Programed therapy	60	27 (17.9)	33 (55)	3.8
NSAIDS	3	2 (1.3)	1 (1.7)	5
Tramadol	24	12 (7.9)	12 (20)	2.5
Morphine	7	3 (2.0)	4 (6.7)	4.7
Transdermal fentanyl	26	10 (6.6)	16 (26.7)	4.4

NSAIDS, non-steroidal anti-inflammatory drugs; VAS, visual analog scale.



**Figure 1.** Pain prevalence according to physician assessment by the score system described in the text in comparison with patient evaluation by visual analog scale (VAS) (n = 211). VAS column includes patients with VAS  $\geq 1$  (dark-gray area) and patients with VAS = 0 but who were taking continuous analgesic drugs at entry (light-gray area).

**Table 3.** VAS changes at the dismissal (mean hospital stay duration: 6.5 days)

	VAS $\geq 1$ , n	VAS $\geq 1$				
		n	Mean VAS	VAS 1–3	VAS 4–6	VAS 7–10
Patients						
On entry	151 (71.6%)	60	3.4	39 (18.5%)	15 (7.1%)	6 (2.8%)
Dismissal	155 (73.5%)	56	3.3	31 (14.7%)	22 (10.4%)	3 (1.4%)

VAS, visual analog scale.

report a VAS  $\geq 1$  with a mean intensity of 2.9. The time to instruct the patient about the use of the instrument was limited to around 2 min on entry and 1 min subsequently.

## discussion

As pain may accompany all the phases of the cancer course, medical oncologists should be interested in implementing strategies in order to detect its presence, to evaluate its intensity and to treat it, theoretically, in all their patients. This vision is shared and supported by the European Society of Medical Oncology [16]. However, such a strategy is preferably adopted in and limited to patients with very advanced disease and in a palliative care setting, both as inpatients [5, 17] and outpatients [11].

Few experiences have evaluated the feasibility and applicability of pain intensity monitoring in everyday clinical practice at a medical oncology unit. From these experiences, the critical role of educational training in pain assessment for health professionals emerges. In fact, only after such an effort, Au et al. [18] reported that chart review showed 98% of nurses' notes contained recorded pain scores by using an NRS. Similarly, Rodes et al. [9] conducted a pre- and post-intervention chart review of 520 randomly selected oncology patient visits. The intervention consisted in training health assistants to measure and document patient pain scores by using VAS. They found that recording pain scores in the patient chart rose from 1% to 75.6%.

At our unit's inpatient ward, we chose to use VAS in that it has been widely shown to be easy to administer, valid and sensitive to the treatment effects [4, 19] and for the positive results reported with its use in pain intensity monitoring in an outpatient setting [9]. These characteristics made it suitable for the daily pain monitoring in all the patients admitted independently of their disease stage. The tool was administered experimentally b.i.d., as is the case for the recording of body temperature and other standard parameters, by the nurses and for the whole duration of the hospitalization. All the nurses had been previously involved in this program by means of a specific training course. The study has shown a high level of completeness of the charts, with the twice daily VAS rating at 94.6%. The main cause for the failure to record the VAS score was the patient's severe cognitive deficiency, particularly in the elderly patients. A compromised cognitive status is a well-known limit for all the main tests of subjective pain evaluation and for VAS in particular [7, 20]. A comparative evaluation of selected pain scales, including VAS, NRS and verbal descriptor scales (VDS), indicated that the VDS was the scale of choice for assessing pain intensity among older adults [21]. Our observation underlines the need to deepen the research into pain evaluation in such patients.

The second aim was to show the congruence of the information obtained with VAS monitoring. The comparison with the physician's evaluation highlights how the percentage of patients with pain concerns results to be higher (41.2% versus 34.6%) when evaluating pain with the VAS. This observation is in harmony with many other reports in the literature concerning the underestimation of the pain incidence by the medical and nursing staff [1].

Although there is a trend between a higher incidence of VAS  $\geq 1$  and disease extension, bone metastases presence versus absence and impaired versus good KPS, the differences are not statistically significant. The lack of statistical significance could be due to a number of reasons: (i) a low statistical power of the comparisons between subgroups with a very different number of patients; (ii) problems in the communication phase between nurses and patients; (iii) 'noise' distributed across the whole of the patient series by a patient's use of VAS to express not only the sensorial pain experience but also other components (functional, emotional and psychological). This seems to be confirmed by the fact that at entry about 20% of the NED patients declared a VAS  $\geq 1$  and that such a percentage remains substantially stable also upon dismissal. Thus, the VAS seems to be used also as a multidimensional instrument and for a part of the patients it seems to represent an instrument for expressing a general suffering. This could represent a substantial limitation for the use of our monitoring system in guiding the analgesic treatment.

The analysis of the VAS variations shows that there is a slight trend toward a reduction in the incidence and the intensity of pain at dismissal, but there nevertheless persists a significant number of patients with VAS  $> 3$  (11.8%). Although this can be attributed to the brevity of the hospitalization and to the physical and psychological consequences of the received antitumor treatment, this observation confirms the need on the part of the oncologists to increase their attention toward the pain symptom in order to achieve improved control.

One of the limits of this study is that it was carried out on a heterogeneous oncological patient series in terms of clinical stage and it has been conditioned by the local organizational characteristics (first of all, selection criteria for the patients to be admitted and analgesic therapy to be adopted). Consequently, the study observations cannot be extended automatically to all the medical oncology wards. Another limitation of the study is represented by the lack of information on the characterization of the pain such as its source (possible co-existence of other chronic diseases) and type (somatic, visceral and neuropathic).

On the basis of our observations, the use of VAS as a tool for twice-daily pain intensity monitoring at a medical oncology unit can be applied by a motivated nursing staff, although it does have some drawbacks. Apart from the previously cited unsuitability for administration to cognitively impaired patients, the chief limit appears to be intrinsic to the VAS and is represented by difficulties concerning the administration method and the instructions given to the study subjects as previously reported [22, 23]. NRS are probably simpler and easier to implement in the setting we have studied [24]. Experiences on their use in the pain intensity monitoring were reported to be associated with educational actions [7, 18, 25]. The results from these studies have led the authors to recommend the implementation of a daily numeric pain scale in nursing practice at medical oncology services.

In conclusion, systematic twice-daily pain intensity monitoring using VAS applied by the nursing staff at a medical oncology inpatient ward is feasible in the routine clinical practice with a good patient compliance. Its congruence with the patients' clinical situation seems to be suboptimal. The next step in this program will be to prospectively evaluate the

reliability of systematic pain intensity monitoring in driving the analgesic therapy prescription.

## references

- American Pain Society Quality of Care Committee. Quality improvement guidelines for the treatment of acute pain and cancer pain. *JAMA* 1995; 274: 1874–1880.
- Cleeland CS, Gonin R, Hatfield AK et al. Pain and its treatment in outpatients with metastatic cancer. *N Engl J Med* 1994; 330: 592–596.
- National Institutes of Health State-of-the-Science Panel. National Institutes of Health State-of-the-Science Conference Statement: Symptom Management in Cancer: Pain, Depression, and Fatigue, July 15–17, 2002. *J Natl Cancer Inst* 2003; 95 (15): 1110–1117.
- Caraceni A, Cherny N, Fainsinger R et al. Pain measurement tools and methods in clinical research in palliative care: recommendations of an expert working group of the European Association of Palliative Care. *J Pain Symptom Manage* 2002; 23: 239–255.
- Nekolaichuk CL, Maguire TO, Suarez-Almazor M et al. Assessing the reliability of patient, nurse, and family caregiver symptom ratings in hospitalized advanced cancer patients. *J Clin Oncol* 1999; 17: 3621–3630.
- McMillan SC, Tittle M, Hagan S, Laughlin J. Management of pain and pain-related symptoms in hospitalized veterans with cancer. *Cancer Nurs* 2000; 23: 327–336.
- de Rond ME, de Wit R, van Dam FS, Muller MJ. A pain monitoring program for nurses: effects on communication, assessment and documentation of patients' pain. *J Pain Symptom Manage* 2000; 20: 424–439.
- de Wit R, van Dam F, Hanneman M et al. Evaluation of the use of a pain diary in chronic cancer pain patients at home. *Pain* 1999; 79: 89–99.
- Rodes DJ, Koshy RC, Waterfield WC et al. Feasibility of quantitative pain assessment in outpatient oncology practice. *J Clin Oncol* 2001; 19: 501–508.
- Schumacher KL, Koresawa S, West C et al. The usefulness of a daily pain management diary for outpatients with cancer-related pain. *Oncol Nurs Forum* 2002; 29: 1304–1313.
- Hoekstra J, Bindels PJ, van Duijn NP, Schade E. The symptom monitor. A diary for monitoring physical symptoms for cancer patients in palliative care: feasibility, reliability and compliance. *J Pain Symptom Manage* 2004; 27: 24–35.
- Scott J, Huskisson EC. Graphic representation of pain. *Pain* 1976; 2: 175–184.
- Pannuti F, Martoni A, Rossi AP, Piana E. The role of endocrine therapy for relief of pain due to advanced cancer. In Bonica JJ, Ventafridda V (eds): *Advances in Pain Research and Therapy*. Volume 2. New York: Raven Press 1979; 145–165.
- Rocchi G, Degli Esposti C, Cavazza I et al. 'Ospedale senza dolore' National project: the study on VAS monitoring in cancer patients at the S.Orsola-Malpighi Hospital of Bologna [abstract]. *Ann Oncol* 2004; 15 (Suppl 2): ii 99.
- World Health Organization. *Cancer Pain Relief*, 2nd edition. Geneva, Switzerland: World Health Organization 1996.
- Cherny NI, Catane R. European Society of Medical Oncology Taskforce on Palliative and Supportive Care Attitudes of medical oncologists toward palliative care for patients with advanced and incurable cancer: report on a survey by the European Society of Medical Oncology Taskforce on Palliative and Supportive Care. *Cancer* 2003; 98: 2502–2510.
- Stromgren AS, Groenvold M, Pedersen L et al. Symptomatology of cancer patients in palliative care: content validation of self-assessment questionnaires against medical records. *Eur J Cancer* 2002; 38: 788–794.
- Au E, Loprinzi CL, Dhodapkar M et al. Regular use of a verbal pain scale improves the understanding of oncology inpatient pain intensity. *J Clin Oncol* 1994; 12: 2751–2755.
- Grossman SA, Sheidler VR, Swedeen K et al. Correlation of patient and caregiver ratings of cancer pain. *J Pain Symptom Manage* 1991; 6: 53–57.
- Briggs M, Closs JS. A descriptive study of the use of visual analogue scales and verbal rating scales for the assessment of postoperative pain in orthopedic patients. *J Pain Symptom Manage* 1999; 18: 438–446.
- Herr KA, Spratt K, Mobily PR, Richardson G. Pain intensity assessment in older adults: use of experimental pain to compare psychometric properties and usability of selected pain scales with younger adults. *Clin J Pain* 2004; 20: 207–219.
- Price DD, McGrath PA, Rafii A, Buckingham B. The validation of visual analogue scales as ratio scale measures for chronic and experimental pain. *Pain* 1983; 17: 45–56.
- Price DD, Bush FM, Long S, Harkins SW. A comparison of pain measurement characteristics of mechanical visual analogue and simple numerical rating scales. *Pain* 1994; 56: 217–226.
- Jensen MP, Karoly P, Braver S. The measurement of clinical pain intensity: a comparison of six methods. *Pain* 1986; 27: 117–126.
- de Rond ME, de Wit R, van Dam FS, Muller MJ. A pain monitoring program for nurses: effect on the administration of analgesics. *Pain* 2000; 89: 25–38.