

Pain Assessment: Global Use of the Brief Pain Inventory

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Abstract

Poorly controlled cancer pain is a significant public health problem throughout the world. There are many barriers that lead to under-treatment of cancer pain. One important barrier is inadequate measurement and assessment of pain. To address this problem, the Pain Research Group of the WHO Collaborating Centre for Symptom Evaluation in Cancer Care has developed the Brief Pain Inventory (BPI), a pain assessment tool for use with cancer patients. The BPI measures both the intensity of pain (sensory dimension) and interference of pain in the patient's life (reactive dimension). It also queries the patient about pain relief, pain quality, and patient perception of the cause of pain. This paper describes the development of the Brief Pain Inventory and the various applications to which the BPI is suited. The BPI is a powerful tool and, having demonstrated both reliability and validity across cultures and languages, is being adopted in many countries for clinical pain assessment, epidemiological studies, and in studies of the effectiveness of pain treatment.

Keywords: Analgesic practice, Cancer pain, Cross-cultural studies, Pain scales, Pain severity

INTRODUCTION

Poorly controlled pain has devastating effects on the cancer patient and the patient's family, and proper management must have the highest priority in the routine care of such patients. Not only do mood and quality of life deteriorate in the presence of pain, but pain has adverse effects on such measures of disease status as appetite and activity. Pain of severe intensity may be a primary reason for both patients and their families to abandon treatment. Unfortunately, despite the many treatment options that exist for cancer pain management,¹ under-treatment of cancer pain is a significant public health problem throughout the world.² Even in the most medically sophisticated countries, as many as 50% of cancer patients may not get adequate pain management.³ In developing countries, few patients may get any pain relief at all, or the medications that they require for their pain may be severely limited by lack of availability of analgesic drugs or overly restrictive regulation of opioid medications.

The barriers to adequate treatment of cancer pain are multiple, and involve the concerns of patients and the problems caused by health care practitioners and health care delivery systems. In order to develop strategies for reducing these barriers, we need appropriate

measurement instruments for evaluating pain, its impact on the patient, and its response to various treatment measures. Without pain measurement tools, we cannot expect to identify the number of cancer patients with pain or the extent to which pain impairs patient function. Without such tools, the clinical assessment of pain is inadequate. Finally, pain measurement methods are critical to the conduct of clinical trials which might help identify effective pain therapies and the impact that health policy changes will have on patient pain and quality of life. This paper will describe the development and application of a pain assessment tool, the Brief Pain Inventory (BPI), that can be used in studies of the epidemiology of pain, in the clinic, and in studies of treatment outcome. A unique feature of the Brief Pain Inventory is that it has been validated in many languages and has been shown to produce similar data from patients in many different countries and from many different cultures.

SUBJECTIVE PAIN MEASUREMENT

Traditionally, the subjective nature of pain measurement, relying solely on subjective report, has caused some to doubt that pain can ever be measured in a meaningful way. The basis for this scepticism is

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usually based on the high degree of variability associated with the typical situation of asking patients about pain in the clinic. The usual clinical exchange about pain between doctor, nurse and the patient is often so casual or unstructured that poor pain assessment is assured.⁴ For instance, it may be left to patients to mention pain in the first place. Even if patients are asked about pain, they may be left entirely on their own to come up with a format for communicating the characteristics and intensity of their pain. This type of unstructured communication maximizes the chances that personality, cultural, linguistic and situational variables will bias the communication. Such an interchange is not a measurement situation in any sense. Variability in response will be dramatically reduced if the communication is structured by using a standardized set of questions to be asked and by introducing measurement scales designed to measure subjective response. Any pain assessment tool designed for cancer patients must be short, must cover the essential components of pain, must be understandable to both patients and professionals, and must demonstrate that it has reasonable psychometric properties.

PAIN SEVERITY SCALES

When developing the Brief Pain Inventory, we had to consider the method by which patients were to rate the intensity of their pain. Several ways of scaling the severity or intensity of pain and its impact have been proposed. Verbal descriptor scales (VDS) have the longest history in pain research.⁵ The patient is asked to pick a word, such as "none", "mild", "moderate", "severe", and "excruciating" which best describes severity. Pain relief can be categorized in a similar way, such as "none", "slight", "moderate", "lots" and "complete". More recently, visual analogue scales (VAS) have become quite popular in research comparing the effectiveness of analgesic drugs.⁶ Using the VAS, the patient judges how much of the scale, usually a straight line, is equivalent to (or analogous with) the severity of the pain. One end of the line represents no pain and the other some concept such as "pain as bad as you can imagine". Numeric rating scales (NRS) measure pain severity by asking patients to select a number from 0 to 10 (an 11 point scale) to represent the severity of their pain. The numbers can be arrayed along a horizontal line, with 0 on the left, labelled "no pain" and 10 on the right, labelled "pain as bad as you can imagine".

In clinical research settings, these three scales of severity approach equivalency,⁷ so that ease of administration and clarity to patients become key factors in scale selection. All three measures are highly intercorrelated, although the NRS and VAS are most highly correlated with one another.⁸ In clinical trials, the NRS has been found to be more reliable than the VAS,

especially with less educated patients.⁹ With very sick patients, oral versions of the NRS are easily administered, although the written form is acceptable to most patients. Because of the simplicity and lack of ambiguity of the NRS, we chose this type of scaling for the Brief Pain Inventory. Numeric scales also seemed the best to use for cross-linguistic pain measurement.

DEVELOPMENT OF THE BRIEF PAIN INVENTORY

Rarely will a single item (such as "rate your worst pain in the last day") give enough information to satisfy a research or clinical question. When selecting a pain measurement tool, one has to reach a compromise between asking an inordinate number of questions and accepting the theoretical and practical limitations presented by pain assessment. Since pain is such a complex experience, involving personality, learning, and situational elements, it is tempting to try to capture the flavour of these several dimensions of pain in clinical studies. On the other hand, studies using factor analysis typically find two or three dimensions which describe most of the variance among multiple items which people respond to when describing their pain. For instance, Melzack and Casey¹⁰ suggest three dimensions; sensory-discriminative, motivational-affective, and cognitive-evaluative. Much more common is the finding that two dimensions account for most of the variance. These two dimensions have been variously called by Beecher¹¹ "pain" and "reaction to pain"; by Clark and Yang¹² "sensory-discriminative" and "attitudinal"; and, in our own work (following Beecher) "sensory" and "reactive".¹³ Some have equated the reactive dimension with the distress caused by pain. Despite some variance in terminology, the agreement among these studies suggests that we should be somewhat modest in what we attempt to capture using subjective report. If we can provide quantitative information on both a "sensory" and a "reactive" dimension, that is about the best that we can do.

Some may argue that the sensory dimension might be thought of as closer to "true pain," and that ratings on this dimension ought to stand alone as a criterion for clinical and research decisions. However, a reduction in the reactive component (or distress or affective component), even in the absence of a reduction in the sensory component, should be viewed as a positive outcome. For example, a significant reduction in the sensory intensity of pain might be difficult to achieve in some circumstances, yet the impact of pain (the reactive dimension) might be amenable to an intervention. A judgement as to which dimension should get the predominant weight in outcome research should be left to the set of questions to be asked by the study.

A description of the composition of the Brief Pain Inventory (BPI) should illustrate some of these issues.

items loading separately on one of the factors in each of the samples. Furthermore, the factor structure is similar in each of the samples. Table II portrays the severity and interference factors obtained from some of these samples.

TABLE II: FACTOR LOADING COMPARISON — WISCONSIN, FRANCE, CHINA AND PHILIPPINES CANCER PATIENTS

	Wisconsin		France		China		Philippines	
	I	II	I	II	I	II	I	II
Sample size	1002		256		197		251	
Severity items								
Pain worst	0.68		0.64		0.74		0.74	
Pain least	0.87		0.82		0.81		0.83	
Pain average	0.87		0.80		0.91		0.75	
Pain now	0.78		0.82		0.76		0.77	
Interference items								
General activity	0.80		0.79		0.72		0.72	
Mood	0.79		0.85		0.71		0.71	
Walking	0.71		0.63		0.82		0.72	
Work	0.80		0.73		0.86		0.79	
Relations with others	0.76		0.81		0.81		0.66	
Sleep	0.68		0.56		0.62		0.60	
Enjoy	0.83		0.73		0.75		0.73	

These data suggest that cancer patients who are in pain from widely different cultural and linguistic backgrounds respond in a similar fashion to rating the severity of their cancer-related pain and the interference caused by their pain. In the non-US samples, where adequate analgesia was not available at the time patients were studied, the magnitude of pain severity ratings and pain interference ratings were quite similar. For all of the samples, the intensity of pain is rated somewhat independently from ratings of the interference that the pain causes in important dimensions of the patients' lives, suggesting that the two sets of items are not redundant. These cross-cultural and cross-linguistic data, coupled with reliability and validity data, indicate that the portrayal of pain using the BPI's simple scales is quite robust.

OTHER BPI ITEMS

Like most pain questionnaires, the BPI asks the patient to provide a graphic representation of the location of pain. The patient is given a front and back view of a human figure and asked to shade in the area of pain. This item can provide a wealth of information about possible physical mechanisms contributing to the pain. For example, patients may draw the pain in the distribution of a particular nerve, suggesting that the mechanism of pain is tumour impingement on that

nerve. A more diffuse representation of pain might suggest radiation-induced fibrosis or myelopathy. The BPI asks patients to rate the percentage relief they feel that their current pain treatments provide. This might be thought of as an item which taps satisfaction with treatment. The BPI also asks patients to report the duration of pain relief that they get after taking their pain medications. Patients are also asked to attribute the cause of their pain either to the disease, the treatment of the disease, or to conditions unrelated to the disease.

APPLICATION OF THE BRIEF PAIN INVENTORY

The Brief Pain Inventory has several applications, including studies of the epidemiology of cancer pain, the routine clinical assessment of pain, efforts to assure the quality of pain management, and the conduct of clinical trials examining the effectiveness of cancer pain treatments. A review of each of these areas will illustrate the application of pain measurement and assessment techniques.

PREVALENCE AND SEVERITY OF CANCER PAIN

We have known for a long time that the majority of patients with end-stage cancer will need careful pain management. Estimates are that between 60-80% of such patients will have significant pain.¹⁷ However, less attention has been paid to pain as a problem for patients before end-stage disease has been reached. As increasing numbers of patients live longer, proportionately greater numbers of patients face longer periods of having to cope with pain. A significant percentage of those who achieve a cure will face indefinite periods of treatment-related pain.

Severe pain is rarely a problem before metastatic disease is present. Most immediate post-operative pain can be managed without difficulty. Fewer than 20% of patients report persistent disease-related pain at this stage.¹⁸ When the disease has metastasized, however, the percentages increase dramatically. A recently published study found that 36% of outpatients with metastatic disease report significant pain as we have defined it.¹⁹

The prevalence and severity of pain will obviously vary as a function of adequacy of treatment. Using patient estimates of the relief they achieve with their pain treatments, studies in the US, the UK and Japan indicate that less than half of those patients sampled reported that their pain was effectively managed.³ It is also important to keep in mind that the patients surveyed in the studies cited above were all receiving analgesic treatment for their pain. Prevalence studies have not attempted to estimate whether pain was being adequately treated. It is possible to index adequacy of pain management, at least in a crude fashion. Using the

BPI, one can develop an index of pain management (Pain Management Index, or PMI) using patient pain ratings and the World Health Organization's recommendations for cancer pain management.² The WHO's "three-step ladder" of analgesic prescription specifies aspirin-class analgesics for mild pain, codeine-class analgesics for moderate pain, and morphine-class analgesics for severe pain. The index ranges from -3 to +3, with -3 (a patient with severe pain receiving no analgesic drugs) representing extreme mismanagement, and +3 (a patient with no current pain receiving morphine) representing good management. This index does not take into account whether or not the appropriate dose of the primary analgesic (or adjuvant drug) is being ordered. Nor does it account for patients who fail to take a prescribed analgesic drug. However, this simple index is able to differentiate patients being seen in different treatment settings and also determine the characteristics of patients most at risk for poor pain management. Negative values of the index represent a conservative indicator of poor pain management.

In a recently published multi-centre study of cancer pain management in the US using the BPI,¹⁹ 42% of patients had a negative PMI and were therefore not adequately managed by WHO standards. Women, older patients, and minorities were at greater risk for poor management. A very strong predictor of those who would be poorly managed was the disagreement between patient and physician about the severity of pain: patients who were poorly assessed by physicians suffered greatly. Patients who received less adequate analgesia reported less and shorter pain relief and more pain-related impairment of function.

The findings of this study were amplified by a study of the pain management practice of physicians who practise in the same institutions from which this patient sample was drawn.²⁰ In responding to a case scenario, almost one-third of respondents indicated that they would wait until the patient's prognosis was less than six months before starting maximum tolerated analgesia for severe pain. This physician study also suggested that many of the physicians were conservative in their analgesic management; 14% indicated that they would not prescribe a morphine-class opioid for a patient with severe pain even after failure of a course of palliative radiotherapy. When asked their preference for medications to treat prolonged moderate to severe cancer pain, 38% failed to rate a morphine-class opioid as their first-choice therapy. This conservative approach to pain management is liable to be at least partially responsible for the large percentage of patients with inadequate analgesic orders. Of this sample of physicians, half (49%) rated pain management in their own practice settings to be fair, poor or very poor in contrast to good or very good. When asked about

barriers to good pain management in their own practice setting, 76% cited poor assessment of pain as a problem, consistent with the strong predictive role of patient-physician discrepancy in inadequate analgesic orders reported in the patient study.

Multi-institutional studies similar to the ones just described, using translations of the Brief Pain Inventory, have been done in the People's Republic of China, France and Mexico. As in the US, these studies have had an impact on national health policy. Health policy makers often have no idea of the great number of their citizens who suffer from cancer pain, or of the inadequacy of the pain management that these patients receive. Drug regulators often have no idea of the negative impact of overly strict regulation which makes it difficult for cancer patients to get the opioid drugs they need. Large scale studies using the Brief Pain Inventory make pain a very visible problem.

CLINICAL APPLICATIONS

Standard pain measurement techniques such as the BPI are increasingly being used in the clinical assessment of cancer pain. Their use minimizes some of the barriers that exist in the typical communication between patient and physicians and nurses concerning pain. In some instances, health practitioners may not ask patients about pain at all. Or, once an analgesic has been prescribed, practitioners may assume that the pain has been taken care of. Individuals with cancer may have personal resistances to reporting pain not found in other clinical conditions. For instance, they may not wish to acknowledge the spread of disease that new pain can signal, they may not want to report that mild analgesic drugs are no longer effective, they may be frightened about addiction and side effects, and they may be concerned that complaining of pain will divert the doctor from the task of curing the tumour. Finally, patients want to be liked by those taking care of them, and they know that persistent complaining is viewed as troublesome.⁴

Using pain assessment instruments such as the BPI minimizes many patient reporting biases and assists practitioners in obtaining complete information. Using pain scales which assign a metric to pain intensity and interference makes pain more of an "objective" symptom, more like other signs and symptoms such as blood pressure and heart rate. By making pain "objective", standard questions make patients feel more free to report its presence, severity and also to report when treatment is not working. Patients are often less concerned about responding openly to a questionnaire than to questions put to them by staff who care for them. Using pain questionnaires or pain measurement scales also can serve to minimize our inability to recognize the presence and severity of pain.²¹ Using pain measurement

tools reduces staff time in the assessment process. Finally, assigning a metric to pain allows for monitoring the effectiveness of pain treatment.

APPLICATIONS OF CLINICAL TRIALS

A major barrier to cancer pain management is a lack of traditional controlled clinical trials in cancer pain management. Most of our information about the effectiveness of analgesic drugs has come from the single dose acute analgesic assay model.⁶ There are many important clinical questions that cannot be answered by the single dose assay. For instance, it is often important to judge the efficacy of analgesic drugs over repeated administrations. Some pharmacologic interventions may take several days to reach maximum effectiveness, and the latency of their effectiveness may vary from patient to patient. Non-pharmacological interventions for pain control, including physical therapy, behavioural therapy, and temporary and permanent disruption of pain pathways do not lend themselves to evaluation by this model. Effective health policy is dependent on evaluations of outcomes of policy change; pain assessment is critical for evaluating health policy that is directed at improving pain and symptom management. Finally, it is increasingly apparent that optimal cancer pain management may involve the simultaneous applications of different pain control methods.²² These questions can be addressed in multi-institutional clinical trials using simple assessment tools such as the BPI, and following easily-understood protocols specifying principles of pain measurement.

Support for the feasibility of clinical trials using this type of measurement comes from several sources. First, most of the cancer pain prevalence and severity studies cited above have followed this model. Simple pain rating scales, either visual analogue²³ or numeric,^{18,24} were given to patients by observers who were minimally trained in pain assessment. These studies have demonstrated that pain ratings obtained in this way vary in a logical fashion with such characteristics as disease progression, extent of metastases, and appropriateness of pain treatment. Second, multi-institutional clinical trials that use simple pain scales to examine pain relief measures in other diseases have demonstrated reliable discrimination between more and less effective treatments.^{25,26}

Multi-institutional trials specific to cancer pain management should obviously adhere to the highest standards of multi-institutional clinical trials in general.²⁷ Designs should include randomized assignment to treatment or control groups, and should be double-blind designs. In addition to the criteria we have discussed concerning subjective response measures, subjective response measures should be obtained by a data manager or other person who is not a part of the

treatment team. Criteria for measures to be derived from record review or special assessment should be unambiguous, and high inter-rater reliability should be demonstrated. The question that the trial is designed to answer should be stated in such a way that it will either be clearly confirmed or refuted by the data.

CONCLUSION

Valid pain assessment is critical for epidemiology and health policy studies, for effective clinical management of pain, and for studies of the effectiveness of pain interventions and health policy changes. The Brief Pain Inventory is a simple measure of pain and its impact that performs well in several cultures and languages. The Pain Research Group is willing to work with investigators from other countries who are interested in developing additional language versions of the BPI or who are interested in the epidemiology of cancer pain or clinical trials in pain relief.

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Shooting	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Stabbing	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Gnawing	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Sharp	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Tender	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Burning	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Exhausting	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Tiring	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Penetrating	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Nagging	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Numb	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Miserable	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>
Unbearable	Yes	<input type="checkbox"/>	No	<input type="checkbox"/>

23) Circle the one number that describes how, during the past week, pain has interfered with your:

A. General activity

0	1	2	3	4	5	6	7	8	9	10
Does not										Completely
interfere										interferes

B. Mood

0	1	2	3	4	5	6	7	8	9	10
Does not										Completely
interfere										interferes

C. Walking ability

0	1	2	3	4	5	6	7	8	9	10
Does not										Completely
interfere										interferes

D. Normal work (includes both work outside the home and housework)

0	1	2	3	4	5	6	7	8	9	10
Does not										Completely
interfere										interferes

E. Relations with other people

0	1	2	3	4	5	6	7	8	9	10
Does not										Completely
interfere										interferes

F. Sleep

0	1	2	3	4	5	6	7	8	9	10
Does not										Completely
interfere										interferes

G. Enjoyment of life

0	1	2	3	4	5	6	7	8	9	10
Does not										Completely
interfere										interferes

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