

Assessing change in chronic pain severity: the chronic pain grade compared with retrospective perceptions

Alison M Elliott, Blair H Smith, Philip C Hannaford, W Cairns Smith and W Alastair Chambers

SUMMARY

Background: There is no standard method of measuring change in chronic pain severity. Clinical trials commonly use serial assessment scales, completed at two points in time, to estimate change in pain severity, while clinicians usually ask patients to make a retrospective assessment of change. How the two methods compare is not known.

Aim: To assess different methods of measuring change in chronic pain severity, by comparing changes in scores on a serial measure of chronic pain severity using the Chronic Pain Grade (CPG) questionnaire and responders' retrospective perception of change in pain severity.

Design of study: Postal self-completion questionnaires.

Setting: The Grampian region of Scotland.

Method: Postal questionnaires were sent in March and September 1998 to a random sample of 535 adults with chronic pain, drawn from responders to a postal survey of the region conducted in 1996.

Results: Corrected response rates of 87.5% and 90.7% were obtained. Over a six-month period poor levels of agreement were found, with responders' retrospective perceptions mirroring recorded changes in 41.8% of individuals ($\kappa = 0.081$). A low partial correlation coefficient between the two measures (-0.209) was also found. Over a two-year period there were again poor levels of agreement, with responders' retrospective perceptions mirroring recorded changes in 35.2% of individuals ($\kappa = 0.071$). A low partial correlation coefficient (-0.401) was again found.

Conclusion: There was poor agreement and low correlation between two commonly used methods for assessing change in pain severity over time. This finding has important implications for both service practitioners and researchers.

Keywords: pain measurement; comparative study; outcome assessment (health care); chronic disease; longitudinal studies; health services research.

Introduction

CHRONIC pain is commonly seen and managed in primary care.¹ In fact, it is one of the most common clinical problems that primary care physicians are called upon to diagnose and treat.² It has been suggested that chronic pain is often assessed and managed inadequately and inconsistently by healthcare providers, and that new ways of treating this common and important health problem are needed.³⁻⁵ However, unlike acute pain, chronic pain unfolds over time and usually it is not possible to eradicate the problem. With no clear outcome, such as recovery, evaluations of different treatments necessitate the ability to detect change in chronic pain severity over time to determine whether there has been improvement.

At present there is no standard method of measuring change in chronic pain severity over time. One approach, which is often used in clinical trials, is to ask individuals to complete standardised pain assessment scales at different points in time and to use the information to estimate changes in pain severity. In contrast, clinicians in everyday practice usually ask patients with chronic pain to make a retrospective assessment of their symptom severity. Although both approaches are frequently used, little is known about how the two methods compare, which is the most accurate, or even whether they are measuring the same factors. In the past it has been assumed that observing changes in serial measurements is more accurate than relying on patients' retrospective perceptions.⁶ However, the importance of the patient's perspective is becoming increasingly acknowledged in evaluating healthcare management,^{7,8} and for a problem such as chronic pain the patient's view is of particular importance, since pain is a wholly subjective experience. How a patient thinks his or her pain has changed is likely to affect how they cope, their general health, and their help-seeking behaviour.

The agreement between change in serial scales and patients' retrospective perception of change needs to be tested so that we may understand better how to judge change. This paper compares change in scores on a serial measure of chronic pain severity using the Chronic Pain Grade (CPG) questionnaire and responders' retrospective perception of change in pain severity.

Method

Subjects and data collection

The study was set in the Grampian region of north east Scotland. In March 1998 a stratified random sample was drawn of 560 patients with chronic pain, i.e. with pain or discomfort that was present continuously or intermittently and

A M Elliott, BSc, PhD, research fellow; B H Smith, MD, MEd, MRCP, senior lecturer and general practitioner; P C Hannaford, MD, FRCP, MFFP, Grampian Health Board chair of primary care, Department of General Practice & Primary Care; W C Smith, MD, PhD, FFPHM, professor of public health, Department of Public Health, University of Aberdeen. W A Chambers, MEd, MD, FRCP, FRCA, consultant anaesthetist, Department of Anaesthetics, Grampian University Hospitals NHS Trust, Aberdeen.

Address for correspondence

Dr Alison M Elliott, Department of General Practice & Primary Care, University of Aberdeen, Foresterhill Health Centre, Westburn Road, Aberdeen AB25 2AY. E-mail: a.m.purves@abdn.ac.uk

Submitted: 9 April 2001; Editor's response: 4 July 2001; final acceptance: 29 August 2001.

©British Journal of General Practice, 2002, 52, 269-274.

HOW THIS FITS IN*What do we know?*

Chronic pain is commonly seen and managed in primary care, but there is no standard method for measuring change in chronic pain severity. Clinical trials commonly use serial pain assessment scales completed at two points in time to estimate change in severity, while clinicians usually ask patients to make a retrospective assessment of change. Little is known about how the two methods compare.

What does this paper add?

There was poor agreement and low correlation between recorded changes in a serial pain assessment scale and responders' retrospective perceptions of pain severity. Since both methods of assessment seemed to provide different and valuable information, it is useful where possible to use both methods of assessing change.



lasting for more than three months. The sample was drawn from responders to a postal survey of the region conducted in 1996,⁹ who indicated a willingness to participate in further research (2422 out of a total of 3605 responders). The sample was stratified for sex, age (between 25 and 59 years or older than 60 years), and chronic pain severity (mild chronic pain [CPG I or II] or severe chronic pain [CPG III or IV]). Lists of the sampled individuals were sent to their general practitioners (GPs) so that they could exclude individuals who had died, become terminally ill, or who for another reason were not to be approached. Excluded individuals ($n = 25$) were not replaced. The remaining patients were sent a self-completion postal questionnaire in March 1998. A reply-paid envelope and a covering letter, explaining the reason for the study and ensuring confidentiality, accompanied the questionnaire. Up to two reminders were sent at fortnightly intervals to maximise response rates. A second questionnaire was posted in September 1998 to all those who responded to the March 1998 posting, to allow changes in chronic pain over two different time periods to be assessed. Ethical approval for the study was given in advance by the Joint Ethical Committee of Grampian Health Board and the University of Aberdeen.

Questionnaire

The questionnaire included the CPG questionnaire and questions about the responder's perception of change in pain severity. The CPG questionnaire¹⁰ is a seven-item instrument that measures chronic pain severity in two dimensions: intensity and disability. It classifies patients into five hierarchical grades: Grade 0 (pain free), Grade I (low disability, low intensity), Grade II (low disability, high intensity), Grade III (high disability, moderately limiting), and Grade IV (high disability, severely limiting). The CPG has been validated for use in the general population in the United Kingdom (UK) as a self-completion postal questionnaire.¹¹ Its responsiveness to change over time as a postal questionnaire instrument for use in longitudinal studies in the UK has also been found to be acceptable, valid, and reliable.¹²

In addition to completing the CPG, responders were also asked to make a retrospective assessment of how their pain had changed. This was achieved by asking responders to rate their current pain compared with the pain six months and two years previously, using an eleven-point scale ranging from -5 ('pain much worse') to 5 ('pain much better'), with 0 representing 'no change in pain.'

Data analysis

Descriptive statistics were used to describe changes in the CPGs and the responders' perceptions of change in pain severity. To measure the agreement between recorded changes in CPGs and responders' perceptions of change, the κ statistic was calculated. For changes in CPGs, individuals were grouped according to whether their CPG had increased, decreased, or stayed the same. For responders' perceptions of change, individuals were grouped according to whether they thought their pain had become worse, got better, or stayed the same. The level of agreement indicated by the κ statistic was based on the standard classification of <0.2 (poor), 0.21–0.40 (fair), 0.41–0.60 (moderate), 0.61–0.80 (good), 0.81–1.00 (very good).¹³ To measure how well recorded changes in CPGs and responders' perceptions of change correlated with each other, and taking into account the height of the initial score and the size of the subsequent change, partial correlation coefficients were calculated, adjusting for the baseline CPG. All analyses were carried out using SPSS for Windows.

Results**Participant flow and response rates**

Figure 1 shows the participant flow throughout the study and the response rates for each of the follow-up postings in March 1998 and September 1998. A total of 450 questionnaires were returned completed after the March 1998 posting, giving a corrected response rate of 87.5%. Of the 450 questionnaires posted in September 1998, sent to all those who had responded to the March 1998 posting, a total of 402 questionnaires were returned completed, giving a corrected response rate of 90.7%.

Change in CPG

Recorded changes in CPGs are detailed in Table 1. Over a six-month period between March 1998 and September 1998 a total of 213 (57.1%) responders had the same CPG at both time points, 84 (22.5%) responders had a decrease in their CPG, and 76 (20.4%) responders had an increase in their CPG. Of those who reported a change in their grade, most of them (73.1%) reported a change of only one grade. Over a two-year period between September 1996 and September 1998 a total of 192 (50.1%) responders had the same CPG at both time points, 116 (30.3%) responders had a decrease in their CPG, and 75 (19.6%) responders had an increase in their CPG. Again, of those who reported a change in their grade, most (62.3%) reported a change of only one grade.

Responders' perception of change

Responders' perception of change in chronic pain severity is detailed in Table 2. Over the six-month period between

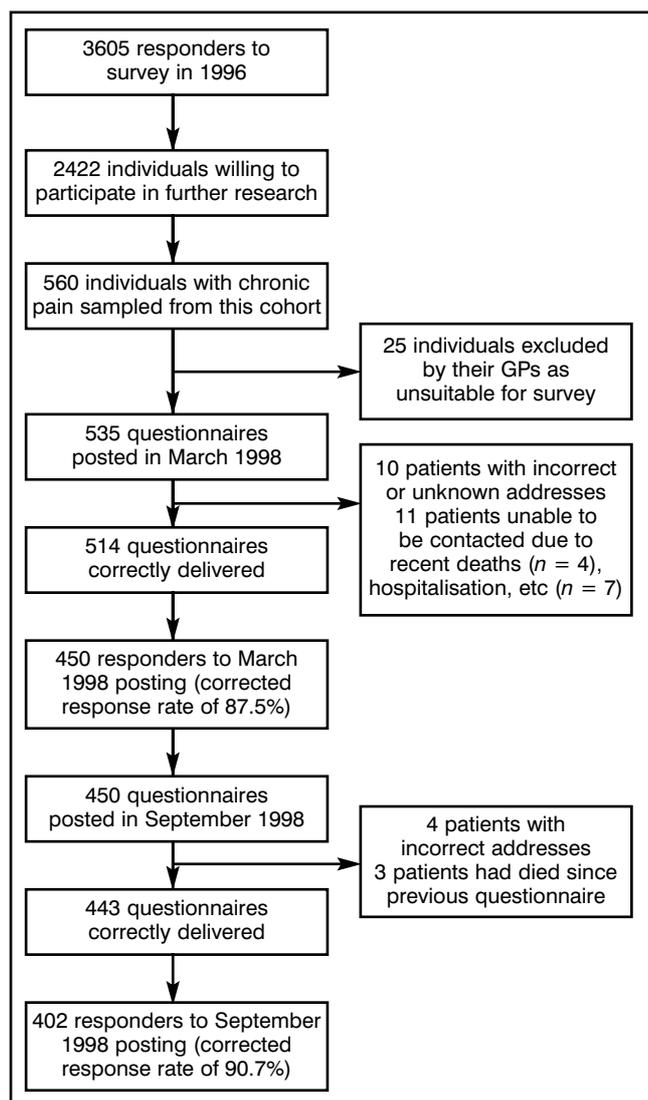


Figure 1. Diagram of patient flow of individuals sampled for the follow-up surveys in March 1998 and September 1998.

March 1998 and September 1998, 171 (43.6%) responders thought their pain had remained the same during the six-month period, 134 (34.2%) responders thought it had become worse, and 87 (22.2%) responders thought it had improved. Over the two-year period between September 1996 and September 1998, 179 (45.8%) responders thought that their pain had become worse, 117 (29.9%) responders thought that it had improved, and 95 (24.3%) responders thought it had remained the same.

Change in CPG compared with responder perceptions

Table 3 compares the change in the CPG with the responders' perception of change in chronic pain severity during a six-month period. The responders' retrospectively perceived change mirrored the recorded change in the CPG in 156 (41.8%) individuals ($\kappa = 0.081$), a poor level of agreement. Over the same time period a low negative partial correlation coefficient (-0.209) between the change in the CPG score and

Table 1. Recorded changes in CPGs.

Change in CPG	March 1998 to September 1998 <i>n</i> (%)	September 1996 to September 1998 <i>n</i> (%)
Increase in CPG		
Increased 4 grades ^a	0 (0)	–
0–IV	0 (0)	–
Increased 3 grades	4 (1.1)	8 (2.1)
0–III	1 (0.3)	8 (2.1)
I–IV	3 (0.8)	0 (0)
Increased 2 grades	13 (3.5)	23 (6.0)
0–II	0 (0)	0 (0)
I–III	5 (1.3)	12 (3.1)
II–IV	8 (2.1)	11 (2.9)
Increased 1 grade	59 (15.8)	44 (11.5)
0–I	5 (1.3)	0 (0)
I	18 (4.8)	17 (4.4)
II–III	16 (4.3)	8 (2.1)
III–IV	20 (5.4)	19 (5.0)
Same CPG		
Same grade	213 (57.1)	192 (50.1)
0–0	4 (1.1)	0 (0)
I–II	101 (27.1)	89 (23.2)
II–II	27 (7.2)	24 (6.3)
III–III	23 (6.2)	24 (6.3)
IV–IV	58 (15.5)	55 (14.4)
Decrease in CPG		
Decreased 1 grade	58 (15.5)	75 (19.6)
I–0	4 (1.1)	4 (1.0)
II–I	20 (5.4)	26 (6.8)
III–II	15 (4.0)	21 (5.5)
IV–III	19 (5.1)	24 (6.3)
Decreased 2 grades	20 (5.4)	19 (5.0)
II–0	0 (0)	1 (0.3)
III–I	12 (3.2)	10 (2.6)
IV–II	8 (2.1)	8 (2.1)
Decreased 3 grades	4 (1.1)	20 (5.2)
III–0	1 (0.3)	4 (1.0)
IV–I	3 (0.8)	16 (4.2)
Decreased 4 grades	2 (0.5)	2 (0.5)
IV–0	2 (0.5)	2 (0.5)
Total	373 (100)	383 (100)

^aAn increase in 4 grades was not possible between September 1996 and September 1998 as all the individuals sampled for the survey had a CPG of at least Grade I in September 1996.

the responders' perception of change was found. This was negative, since a negative change in the CPG scores means an improvement in pain severity, whereas a negative score in the responder perception rating means an increase in pain. Table 4 compares the change in the CPG with the responders' perception of change in chronic pain severity during the two-year period. The responders' retrospectively perceived change mirrored the recorded change in the CPG in 135 (35.2%) individuals ($\kappa = 0.071$), a poor level of agreement. A low negative partial correlation coefficient (-0.401) between the change in the CPG score and the responders' perception of change was also found over this two-year period.

Since the κ test for agreement is susceptible to assumptions made, and because results can change depending on these, a second analysis was performed. This time a change of one point on each of the assessment scales was re-categorised as 'no significant change' to see what effect this would have on the overall results. For the six-month period

Table 2. Responders' perception of change in chronic pain severity.

Responders perception rating ^a	March 1998 to September 1998 n (%)	September 1996 to September 1998 n (%)
Pain got much worse		
-5	28 (7.5)	53 (13.8)
-4	23 (6.2)	23 (6.0)
-3	12 (3.2)	31 (8.1)
-2	28 (7.5)	38 (9.9)
-1	35 (9.4)	29 (7.6)
Pain stayed the same		
0	161 (43.2)	94 (24.5)
Pain got better		
1	17 (4.6)	14 (3.7)
2	16 (4.3)	18 (4.7)
3	19 (5.1)	22 (5.7)
4	16 (4.3)	20 (5.2)
5	19 (5.1)	41 (10.7)
Total	373 (100)	383 (100)

^aThe responder perception rating scale ranged from -5 (pain much worse) to 5 (pain much better), with 0 representing no change in pain.

between March 1998 and September 1998 the responders' retrospectively perceived change mirrored the recorded change in the CPG in 203 (54.4%) individuals ($\kappa = 0.032$). For the two-year period between September 1996 and September 1998 the responders' retrospectively perceived change mirrored the recorded change in the CPG in 148 (38.6%) individuals ($\kappa = 0.057$). Although this second analysis shows marginal improvements in the total observed agreement, the calculated κ values are lower, since most of the agreement is now concentrated in the 'no change' cells.

Discussion

In this study of individuals with chronic pain we found poor

measures of agreement and low correlations between recorded change in the CPG and responders' retrospectively perceived change in severity. This poor agreement between a serial scale measured at two different time points and responders' retrospective perceptions (two commonly used methods for assessing change in pain severity over time) is an important finding.

There may be a number of reasons for the lack of agreement between the measures reported in this survey. One explanation is that the two scales may be measuring different dimensions of severity. Conceptually, the CPG represents a measurement of chronic pain severity specific to the time of recording, with reference to intensity and disability. It does not directly reflect change from previous measurements. In this study it is compared with the responders' retrospective perception of change, a global recollection of change in severity made without reference to specific dimensions.

In this study there were fewer fluctuations in scores on the CPG than in the responders' perception rating. For the two time periods, 89% and 81% of responders either had the same CPG or it only changed by one grade. In contrast, the responders' perceptions of change were much more spread out across the scale, with only 57% and 36% of responders perceiving either no change or change of only one point. Previous research suggests that recorded severity of chronic pain may regress to the mean.¹⁴ This study was not designed to look at this; however, preliminary analysis suggests that there may be some evidence of regression to the mean in the CPG over time. In contrast, a change in perceived severity tends to persist with repeated measurements. This needs further research. The CPG also appeared to be a more stable measure over time in this study. The same CPG was reported in 57% of individuals after six months and in 50% of individuals after two years. The same responder perception rating was reported in 43% of individuals after six months and in 25% of individuals after two

Table 3. Comparison of responders' perception of change in chronic pain severity and recorded change in the CPG between March 1998 and September 1998.

Change in CPG	Responders' perception of change n (%)			Total
	Pain got better	Pain stayed the same	Pain got worse	
Decreased CPG	24 (6.4) ^a	37 (9.9)	23 (6.2)	84 (22.5)
Same CPG	42 (11.3)	100 (26.8) ^a	71 (19.0)	213 (57.1)
Increased CPG	20 (5.4)	24 (6.4)	32 (8.6) ^a	76 (20.4)
Total	86 (23.1)	161 (43.2)	126 (33.8)	373 (100)

κ measure of agreement = 0.081. ^aAgreement between responders' perception of change in severity and recorded changes on the CPG.

Table 4. Comparison of responders' perception of change in chronic pain severity and recorded change in the CPG between September 1996 and September 1998.

Change in CPG	Responders' perception of change n (%)			Total
	Pain got better	Pain stayed the same	Pain got worse	
Decreased CPG	45 (11.7) ^a	35 (9.1)	36 (9.4)	75 (19.6)
Same CPG	58 (15.1)	43 (11.2) ^a	91 (23.8)	192 (50.1)
Increased CPG	12 (3.1)	16 (4.2)	47 (12.3) ^a	116 (30.3)
Total	115 (30.0)	94 (24.5)	174 (45.4)	383 (100)

κ measure of agreement = 0.071. ^aAgreement between responders' perception of change in severity and recorded changes on the CPG.

years. This highlights the problem of recall bias in studies addressing change in pain severity.

The responder perception rating scale relies heavily on recall. If responders were not able to recall accurately how their pain was six months or two years ago then this would have led to recall bias. The use of patient retrospective assessments of pain has been avoided in clinical studies in the past because of this concern, that people are unable to remember how bad their pain was at baseline. While this may be true, it is not a reason for the exclusion of patients' retrospective assessments, especially since this method of assessing change is commonly used in clinical practice. Patients' views are being increasingly identified as important when considering health outcomes,^{7,8} and they have been associated with greater satisfaction with care^{15,16} and better compliance with treatment programmes^{17,18} — strong reasons for including patients' retrospective assessments. Patients' opinions become increasingly important when judging the effectiveness of interventions. An intervention that has reduced pain on a serial scale but which leaves the patient feeling that their pain is the same or worse cannot truly be deemed successful.

The findings reported here are consistent with a previous study conducted in the United States of America, which compared serial assessments and retrospective assessments of change in pain and disability in 202 individuals undergoing interventions for arthritis.¹⁹ Poor agreement between the two methods of assessment was found, ranging from between 0% to 50% agreement, with an average of 29% agreement. The poorest agreement between the measures occurred when the change was small, although a significant lack of concordance was found in all the comparisons. The authors also reported that the retrospective assessment was more sensitive to change than the serial assessment and that it correlated more strongly with patient satisfaction with change. Other studies have reported similar findings.^{20,21}

This was a good-sized community-based follow-up survey of individuals with chronic pain that achieved high response rates. It is the only study of its kind in the UK comparing change in serial assessments with patient retrospective assessments of change. Assessment of how the two measures compare over two different time periods, of six months and two years, also adds strength to the study. The grouping of individuals according to whether their CPG had increased, decreased, or stayed the same, and whether they perceived their pain to have become worse, got better, or stayed the same, was necessary for this study in order to conduct the κ test for agreement, as the original scales were not equivalent. This could be considered a limitation of the study, as it does not allow investigation of how agreement varies by the size of the change. Partial correlation coefficients that took into account the height of the initial score and the size of the subsequent change were therefore calculated to add weighting to the analysis. A further limitation is the potential bias introduced by the self-selecting nature of the sample. It is unclear how this will affect the bias, though it may mean that responders are likely to be more introspective about their pain than the rest of the chronic pain population. Finally, the fact that the responders' per-

ceptions of change were all made in September 1998, instead of the first perceptions of change being made in March 1998, could also be considered a weakness. However, this did allow comparisons over six-month and two-year time periods, and this has shown some interesting differences. These differences might not have been clear if the two-year time period had been shorter.

That the two commonly used methods of assessing change in chronic pain severity compared here did not give concordant results has implications for both service practitioners and researchers. For the practising clinician, the findings of this study suggest that severity of chronic pain is often different in retrospect from currently perceived severity. This is important in judging our patients' clinical course in response to specific questioning. It reminds us that questions about perceived change in severity of chronic pain may receive different responses if asked at different times or if questions directly address intensity and disability rather than the global experience. Clearly, this difference is important when evaluating change in severity in response to treatment and in determining outcome measures for clinical trials. It is also important when researching change over time that the most appropriate measure is used. The measure needs not only to be sensitive to change, but the identified change must be relevant to the patient and/or the illness. Since both methods of assessment compared here seem to provide different information, both of which are of considerable value, it would be useful, where possible, to use both methods of assessing change to provide comprehensive information of how pain is changing over time. In particular, the inclusion of patient retrospective assessments in clinical trials should not only improve our understanding of change in pain severity, but make it easier to apply in clinical practice. Finally, it is salutary to remember that severity is only one dimension of the complex experience of chronic pain, measurement of which must be multi-dimensional at all times.¹

Acknowledgements

The authors gratefully acknowledge Tenovus, Scotland, for their financial support of the work. We would also like to thank the patients and general practices whose support and work made this study possible.

References

1. Sullivan MD, Turner JA, Romano J. Chronic pain in primary care: identification and management of psychological factors. *J Fam Pract* 1991; **32**: 193-199.
2. Eaton W, Sullivan MD. Depression and chronic medical illness. *J Clin Psychiatry* 1990; **51**: 3-11.
3. Diamond A. The future development of chronic pain relief. *Anaesthesia* 1991; **46**: 83-84.
4. Davis AE. Primary care management of chronic musculo-skeletal pain. *Nurse Pract* 1996; **21**: 72-89.
5. Gallagher RM. Primary care and pain medicine. A community solution to the public health problem of chronic pain. *Med Clin North Am* 1999; **83**: 555-583.
6. Herrmann D. Reporting current, past and changed health status: what we know about distortion. *Med Care* 1995; **33**: AS89-AS94.
7. Ware JE. Monitoring and evaluating health services. *Med Care* 1985; **23**: 705-709.
8. Bayley KB, London MR, Grunkemeier GL, Lansky DJ. Measuring the success of treatment in patient terms. *Med Care* 1995; **33**: AS226-AS235.
9. Elliott AM, Smith BH, Penny KI, *et al.* The epidemiology of chronic

- pain in the community. *Lancet* 1999; **354**: 1248-1252.
10. Von Korff M, Ormel J, Keefe FJ, Dworkin SF. Grading the severity of chronic pain. *Pain* 1992; **50**: 133-149.
 11. Smith BH, Penny KI, Purves AM, *et al*. The Chronic Pain Grade questionnaire: validation and reliability in postal research. *Pain* 1997; **71**: 141-147.
 12. Elliott AM, Smith BH, Smith WC, Chambers WA. Changes in chronic pain severity over time: the Chronic Pain Grade as a valid measure. *Pain* 2000; **88**: 303-308.
 13. Altman DG. *Practical statistics for medical research*. London: Chapman and Hall, 1991.
 14. Whitney CW, Von Korff M. Regression to the mean in treated versus untreated chronic pain. *Pain* 1992; **50**: 281-285.
 15. Starfield B, Wray C, Hess K *et al*. The influence of patient-practitioner agreement on outcome of care. *Am J Public Health* 1981; **71**: 127-131.
 16. Cleary PD, McNeil BJ. Patient satisfaction as an indicator of quality care. *Inquiry* 1988; **25**: 25-36.
 17. Roter DL, Hall JA. Studies of doctor-patient interaction. *Ann Rev Public Health* 1989; **10**: 163-180.
 18. Becker MH. Patient adherence to prescribed therapies. *Med Care* 1985; **23**: 539-555.
 19. Fischer D, Stewart AL, Bloch DA, *et al*. Capturing the patient's view of change as a clinical outcome measure. *JAMA* 1999; **282**: 1157-1162.
 20. Aseltine RH, Carlson KJ, Fowler FJ, Barry MJ. Comparing prospective and retrospective measures of treatment outcomes. *Med Care* 1995; **33[supplement]**: AS67-AS76.
 21. Mancuso CA, Charlson ME. Does recollection error threaten the validity of cross-sectional studies of effectiveness? *Med Care* 1995; **33[supplement]**: AS77-AS88.
-