

PHYSIOTHERAPY AND LOW BACK PAIN - PART II: OUTCOMES RESEARCH UTILISING THE BIOPSYCHOSOCIAL MODEL: BIOLOGICAL OUTCOMES

ABSTRACT: *Low back pain (LBP) is an acknowledged major health problem that is associated with high recurrence rates and increased chronic incapacity. It is one of the most common and costly conditions treated by physiotherapists and therefore the physiotherapy profession has a responsibility to provide evidence of effectiveness of interventions for LBP. The quality and rigour of published research on LBP has been found lacking and has predominately utilised a biomedical model of health that focuses on disease and system pathology rather than on illness. Outcomes research has the potential to advance the quest for evidence of effective management of LBP. Patients with CLBP and disability face complex biopsychosocial problems, hence a multifactorial model of illness is particularly pertinent and is addressed by the outcomes research model. Outcome measures that are valid, reliable and responsive are necessary to determine effective interventions for LBP. Biological, psychological and social variables shape the experience and outcome of an episode of LBP and outcome measures reflecting all three aspects of the biopsychosocial model are important to the study of LBP. Outcome measures reflecting the biological component of the biopsychosocial model are discussed in part II: measures of pain and aspects of movement dysfunction.*

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KEY WORDS: *LOW BACK PAIN, OUTCOME MEASURES, BIOPSYCHOSOCIAL MODEL, PAIN, MOVEMENT DYSFUNCTION, EFFECTIVE INTERVENTION, EVIDENCE-BASED PRACTICE.*

INTRODUCTION

Low back pain (LBP) is acknowledged as a major health problem and LBP is the most common diagnosis for which patients are treated in outpatient physiotherapy settings (Jette and Davis 1991). As such, it should be of concern to the physiotherapy profession that the validity of current treatments for LBP is questioned (Waddell 1998; Watson 1999). High recurrence rates (Croft et al 1997) and increased chronic incapacity (Taimela et al 1997) associated with LBP, in particular chronic LBP (CLBP), are responsible for enormous costs to health budgets and require that physiotherapists respond positively to the challenge of analysing the quality and cost of care for acute and chronic LBP patients (Bardin 2002).

Providers of health care treating patients with LBP are increasingly being held accountable for standards of care and selection of treatment intervention. It is important to determine a valid approach to the management of LBP (Hazard et al 1994), as the complexity of LBP has been suggested to be equaled

only by the variety of approaches to its prevention and treatment (Zanoli et al 2001). Diligent documentation of the outcome of care provided in clinical practice will enable clinical physiotherapists to measure change, an attainable goal for everyday clinicians, and has the potential to make a valuable contribution to the demand for evidence-based practice in the field of LBP management (Bardin 2002).

Outcomes research emphasises patients' assessments of pain, function, quality of life and satisfaction with the results of the intervention and is a feasible and affordable analysis of the outcome of healthcare (Bardin 2002). It would appear to be particularly suitable for measuring the impact of LBP, especially CLBP, on a patient's life. Outcome measures that reflect the biopsychosocial model are appropriate for measuring the multidimensional impact of LBP on patients' lives. Measures of pain and aspects of movement dysfunction represent the biological aspects of the biopsychosocial model and, together with psychosocial outcomes measures,

appropriately capture the broad impact of LBP on patients' lives. Reduction in pain, improvement in function and prevention of disability are core aspects of physiotherapy management of LBP (Bardin 2002). It is therefore imperative that we seek affordable, clinically appropriate, responsive, valid and reliable measures of outcome to measure the effect of physiotherapy management of this costly and potentially disabling condition.

THE BIOPSYCHOSOCIAL MODEL OF LOW BACK PAIN

In the past health outcomes were defined rather narrowly and tended to focus pri-

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marily on traditional physical outcomes that measured aspects of the biological component. Recently a much more comprehensive understanding of LBP has evolved. A biomedical model of health and dysfunction that views patients' disability and impairments as a reflection of their underlying tissue and system pathology (Jones et al 2002), is no longer thought to be good enough (Gatchel and Bell 2000a; Pinnington 2001). This has led to the use of a biopsychosocial model (incorporating the biological, psychological and social aspects of LBP and focusing on illness rather than disease) (Waddell et al 1992; Cherkin 1998). This is consistent with the International Classification of Functioning, Disability and Health (WHO, ICF 2001) of the World Health Organization (WHO): body function and body structures relating to the biological component, and activities, participation and environmental factors relating to the psychosocial impact on a person's functioning. Rose et al (1997) concluded that a multifactorial model of illness is particularly pertinent to the study of low back pain where behaviour, cognitive-behaviour, affective and socio-economic variables have been recognised as shaping the experience and the outcome of an episode of low back pain (Engel 1959; Klenerman et al 1995; Pilowsky 1978; Turk and Rudy 1987; Hazard et al 1994).

Deyo and Diehl (1983) suggested that for LBP, impacts other than physical often need to be considered e.g. social and emotional states, and emphasised that some of these may be even more sensitive indicators of change than physical function. Hoffmann et al (1994) state that few physiologic tests of spine function, including laboratory and physical measurements, are clinically meaningful to patients, and that other outcomes are more relevant e.g. relief of symptoms (back and/or leg pain), improvement in functional ability, work status (including type of work), improvements in psychological measures, and use of health care resources and medication. Furthermore the Quebec Task Force suggested that generalisability is increased by selecting measures of health status that assess symptoms, functional ability and work status

(Quebec Task Force 1987). Qualitative studies have shown considerable functional and emotional impact on the lives of LBP patients (Borkon et al 1995; Skelton et al 1996; Miller et al 1999). Furthermore, many recent studies (Greenough and Fraser 1989; Bigos et al 1991; Coste et al 1994; Croft et al 1995; Mannion et al 1996; Papageorgiou et al 1997) draw attention to the effects of psychosocial factors on all aspects of LBP behaviour including the reporting of it and response to treatment (Adams et al 1999). These studies reinforce suggestions by Deyo and Diehl (1983) that, in many patients, objective physical findings are absent, and progress can *only* be assessed in terms of pain resolution and improved function; this appears to be consistent with the emphasis by Waddell et al (1992) that in CLBP there may no longer be any demonstrable structural impairment. Waddell and co-authors (Waddell et al 1992) were of the opinion that conventional physical outcome measures often assessed only a small portion of the spectrum of impacts caused by back pain, and suggested that the validity, reliability and sensitivity of these measures was uncertain. Recent research by Taimela and co-workers (Taimela et al 2000) suggests that psychological and psychosocial factors, patients' beliefs in control over pain (Härkapää et al 1991) and satisfaction with the overall treatment outcome have been more important predictors of outcome than objective physical and biomechanical findings. Taimela et al (Taimela et al 2000) concluded that self-experienced beliefs regarding pain and function are more important indicators of successful low back rehabilitation than measurements of strength and mobility. Waddell found that correlations between pain, physical impairment and disability were low and that statistically these did not combine into a single score (Waddell 1987). Similarly Deyo found that physical parameters relating to the biological component (for example muscle strength and range of motion), were only weakly correlated with actual patient behaviour or symptoms (Deyo 1988). This would appear to be consistent with the fact that patients tend to define their problems in terms of dis-

abilities and handicaps rather than impairments (Partridge 1984). The latter are regarded as relatively easy to measure, but would appear to be of questionable validity in terms of measuring outcome in relation to what patients perceive as their problems (Yekutieli 2002). Patients are experts on the subject of the condition that disables them, and if they want help, it is they who must tell us what they need (Yekutieli 2002). More recent research, however, has provided biological evidence, for example persistent muscle dysfunction as a factor in the chronicity/recurrence of LBP (Hides et al 1994 and 1996; Hodges and Richardson 1996, 1997 and 1998). Research measuring outcome at the impairment level is likely to play a valuable role in advancing our understanding of biological factors influencing the aetiology of LBP and the risk factors for recurrence and for chronicity.

Gatchel and Mayer emphasised that the diversity of disability/illness expression (including its severity, duration, and consequences for an individual) is accounted for by the complex interrelationships among many factors: host, predisposition, physiology, psychology (e.g. genetic and prior learning experiences), and the sociocultural context that helped shape a person's perceptions and reactions to an adverse external or internal environment (Gatchel and Mayer 2000b). Main and Spanswick proposed an extended biopsychosocial model of disability (Main and Spanswick 2000). This model expands on the psychosocial influences inherent in the Mature Organism Model of health and disability (Gifford 1998); it illustrates the interactions between factors such as pain and deconditioning, fear and avoidance, depression, anger and frustration, iatrogenics, family, socio-economics and occupational factors (Jones et al 2002). In the quest for effectiveness of management for LBP patients, it is essential that outcome measures are developed and existing measures selected that reflect the impact of LBP on these multiple aspects of the illness experience. Furthermore recognition of the importance of patients' definition of their problems is likely to facilitate patient oriented therapy, in which patients themselves set the goals of their therapy

and do not necessarily all aim for the same outcome (Yekutieli 2002).

It would appear that traditional outcome indicators, as utilised in the biomedical approach, are of little value in making decisions about the outcomes of care provided to those with chronic disabling illnesses of which CLBP is one of the most prevalent and most costly (Indahl et al 1995; Zusman 1997). Jette suggested that as the goals of health care have changed, so too must the indices used to evaluate the achievement of these goals (Jette 1993), and in a later study emphasised the importance of both impairment and disability outcomes (Jette 1995). Although active rehabilitation based on a biopsychosocial model is widely advocated in the literature (Pinnington 2001), Foster and colleagues (Foster et al 1999), in a survey throughout the United Kingdom, found that few physiotherapists utilised this approach. Cherkin suggested that if research is to provide substantial improvements for back pain, its focus must embrace an existing but nevertheless neglected paradigm, the biopsychosocial model (Cherkin 1998). Outcomes research of LBP is an aspect of clinical research that addresses the need for the application of the biopsychosocial model to the multi-dimensional study of the LBP patient (Bardin 2002).

OUTCOME MEASURES FOR LOW BACK PAIN RESEARCH INCORPORATING THE BIOPSYCHOSOCIAL MODEL

Research of outcome measures is recognised as an important area of clinical research (Jull 1996; Stratford et al 2000; Huijbregts et al 2002), however it has been suggested that tools validated for research purposes are not always suitable for clinical purposes (Huijbregts et al 2002). Important information required by clinicians utilising outcome measures is: acceptability to patients, clinical feasibility, comparability of tools measuring similar constructs, discriminative and evaluative properties and normative data on various clinical populations to assist with interpretation: this information is suggested by Huijbregts et al to be important to enable clinicians to decide what are the most appropriate published measures for their patients and to inter-

pret findings meaningfully (Huijbregts et al 2002). It has been suggested that, in most cases, gold standards do not exist and that the rigour of many studies investigating new measures and evaluating competing measures is questionable (Stratford et al 2000). Stratford and co-workers direct readers to 'how to' resources in their efforts to raise awareness of seven points that the authors believe will strengthen the conceptualisation, design and analysis of studies examining outcome/evaluative measures (Stratford et al 2000). Kirshner and Guyatt use the term evaluative measure (Kirshner and Guyatt 1985) to describe instruments used to assess change in patients over time and were the first to provide a definition for responsiveness defining it as the power of a test to detect clinically important difference (Kirshner and Guyatt 1985). Responsiveness, reliability and longitudinal construct validity are considered the three essential properties of an outcome measure (Stratford et al 2000), however it is beyond the scope of this paper to discuss these properties of outcome measures. It has been suggested that reliable, clinically responsive and relevant outcome measures are needed to assess change in three critical areas of patient management i.e. pain relief, physical capacity and disability (Liebenson and Yeomans 1997) and to determine the relevant effectiveness of different interventions for LBP. Recent research emphasises that the selection of outcome measures for the study of LBP should reflect the biopsychosocial model and the impact of LBP on multiple aspects of the illness experience (Stucki et al 1996; Deyo et al 1998; Bardin 1998, 2000b, 2000c and 2002).

Pain

Pain, an impairment relating to the biological and psychological component, is the common presenting symptom of most musculoskeletal conditions (Jahad and McQuay 1993) and is the most common presenting symptom in LBP patients (Bardin 1998; Zanolini et al 2001). The subjective intensity of pain is probably the aspect of pain most often measured in both clinical work and in treatment outcome research. There is

a spectrum of syndromes within the descriptive symptom/category of LBP and it has been suggested that, within a great many variables influencing their condition, probably the only thing these patients have in common is back pain (Zanolini et al 2001).

The measurement of pain is considered important to evaluate the relative effectiveness of different therapies (Melzack and Katz 1994; Bardin 1998, 2000a, 2000b and 2002). Many different scales for the measurement of pain have been reported in the literature (Huskisson 1974; Joyce et al 1975; Scott and Huskisson 1976; Downie et al 1978; Kremer et al 1981; Seymour 1982; Sriwatanakul et al 1983; Jensen 1986; Murphy et al 1987; Duncan et al 1989; Bardin 2000b), however no gold standard exists for a measure to detect change in pain (Stratford et al 2000).

In a study comparing six methods of measuring clinical pain intensity it was found that each of the scales was a useful measure of subjective pain intensity and was suggested that any of these measures could be used to evaluate pain in a chronic pain population (Jensen et al 1986). However pain, particularly chronic pain is an elusive phenomenon to measure through objective means and as pain is a highly subjective experience, the use of multiple pain scales might reflect the pain state of a chronic pain patient more accurately (Bardin 1998). The scales reported by Jensen and co-workers included verbal rating scales, numerical pain rating scales (NPRS) and visual analogue scales (VAS) (Jensen et al 1986). Visual analogue scales provide simple and reliable measures of pain intensity (Huskisson 1974; Melzack and Katz 1994; Zanolini et al 2001). They have been widely used in clinical and research situations where a quick measure of pain is required and the numerical value given to the score makes for easy analysis and comparison. Other advantages of the VAS include ease and brevity of scoring, minimal intrusiveness, its conceptual simplicity (Melzack and Katz 1994), extra sensitivity (Huskisson 1974) and usefulness as a tool in describing spine patients (Zanolini et al 2001).

It has been suggested that patients find simple descriptive scales easier

than VAS or NPRS (Bardin 1998), however earlier researchers stated that the VAS was the best method for measuring pain (Huskisson 1974). In a recent study (Tal-Akabi and Rushton 2000), however, the VAS and a modified pain relief scale (PRS) were used to compare the effectiveness of two interventions for the treatment of carpal tunnel syndrome. The results of the PRS were highly significant ($p < 0.01$) and more sensitive than the VAS. The modified PRS (Tal-Akabi and Rushton 2000) appears to have high sensitivity. No examples of this outcome measure were found in studies of LBP, however it would appear to warrant investigation as a potential indicator of change in an acute or a chronic LBP population.

The McGill Pain Questionnaire (MPQ) (Melzack 1975) has been widely used as a clinical research tool. It evaluates the experience of pain in a multidimensional context using *evaluative* words that describe the total pain experience including *sensory* and *affective* qualities of pain (Melzack and Katz 1994). Melzack and Katz (1994) were of the opinion that the most important requirements of a measure are validity, reliability and clinical usefulness. Several authors suggest that the MPQ meets all of these requirements (Melzack 1983; Wilkie et al 1990) and provides a relatively quick method of measuring subjective pain experience (Melzack 1975). The internal structure of the MPQ was examined in studies by Turk and co-workers (Turk et al 1985), Lowe and colleagues (Low et al 1991), and Pearce and Morley (1989) confirming the three (sensory, affective and evaluative/cognitive) dimensions of pain. A short-form MPQ (SF-MPQ), more time efficient than the long-form MPQ (LF-MPQ) was developed and correlates very highly with the LF-MPQ and is able to detect clinical change (Melzack 1987; Harden et al 1991).

It has been suggested that describing pain solely in terms of intensity is like specifying the visual world only in terms of light flux without regard to pattern, colour, texture and the many other dimensions of visual experience (Melzack 1983). This view is supported by other researchers who contend that pain intensity, in itself, is not a reliable measure for dysfunction and for the

outcome of management (Bardin 2000a, 2000b, 2000c, 2002; Duckworth 1999; Main and Watson 1999; Watson 1999; Ferguson 2000). Pain is always subjective, however recent research evaluated serum pseudocholinesterase levels in chronic spinal pain patients and found these levels to be objective, quantitative measurements of chronic spinal pain (Cameron et al 2000). Serum pseudocholinesterase levels were found to have a correlating trend with visual assessment scores and were significantly higher in chronic spinal pain patients than in normal control volunteers (Cameron et al 2000). Future research might provide additional objective outcomes of pain, but it remains important that other evaluations should be included which tap the dimension of the biopsychosocial framework for evaluating CLBP patients (Bardin 1997, 1998, 2000b and 2002).

The presence and severity of pain is considered to be a narrow definition of health outcome (Ruta et al 1994; ICH 2001) and it is generally agreed that the ultimate goal of providing physiotherapy services to people with chronic disease is the improvement of functional status and ultimately the improvement of overall quality of life. Pain scales correlate poorly with physical function (Turk and Rudy 1987; Rainville et al 1992) and focus on impairment, therefore a shift to outcomes that reflect the goals of decreasing disability and improving quality of life have been recommended (Stucki et al 1996; Deyo et al 1998; Bardin 1998, 2000b and 2002). Pain, as perceived by the LBP patient, affects their ability to function and their quality of life (Bardin 1997, 1998, 2000) and, as measures of pain have been widely used in the study of LBP and have been reported to be a useful tool in describing spine patients (Zanoli et al 2001), it would appear useful to retain these in combination with measures of other aspects of the biopsychosocial model.

Movement dysfunction

It has been suggested that the clinical estimation of the amount of movement occurring in the lumbar spine is an important part of the investigation of patients with LBP (Rae et al 1984). The measurement of joint range of motion

(ROM) is often used to document the level of impairment and is a variable that is relatively easy to measure. It has been suggested to be more 'scientific' than the unmanageable sphere of patients' handicaps, their whims and peculiarities (Yekutiel 2002). External measurements of spinal ROM, which are easy to apply, are noninvasive and are commonly used (Ng et al 2001).

Lumbar flexion

It has been postulated that forward flexion is the most important measurement of lumbar spinal movement (Macrae and Wright 1969) and that the most important physical sign in the back is persistent severe restriction of lumbar flexion (Waddell 1998). The measurement of lumbar flexion is thought to offer clinically valuable information and limited flexion, together with other relevant clinical information, should alert the clinician to dysfunction or underlying disease (Waddell 1998). A traditional method of external measurement of lumbar flexion is the fingertip-to-floor test (Hoehler et al 1981). This test, however, includes the contribution of hip flexion (Rae et al 1984; Helliwell et al 1992) and therefore is only a gross measurement of lumbar flexion (Ng et al 2001) and more a measure of general sagittal plane flexibility (Bardin 1998 and 2000b). The fingertip-to-floor test is quick and user-friendly and Bardin (1998 and 2000b) used this method to assess progress in individual CLBP patients and in analysis of groups of CLBP patients undergoing group spinal rehabilitation. Bardin (1997, 1998, 2000a and 2000b) noted a 53% improvement in flexibility 3 months after patients commenced rehabilitation, and noted a significant correlation between this method of measuring flexibility and functional disability measured on the Roland-Morris disability scale ($r = 0.5$; $p < 0.01$).

The modified Schober technique uses a more specific measure of movement in the lumbar spine, however it can measure only the lower lumbar levels (Macrae and Wright 1969) and has been suggested to be prone to errors (Reynolds 1975; Miller et al 1992). In a study by Adams and co-workers (Adams et al 1999) Schober value consistently failed

to predict LBP of any description, but was related to the lumbar range of flexion ($p < 0.001$) although accounting for less than 9% of it. The technique for measuring lumbar flexion recommended by the American Medical Association is the inclinometer technique (American Medical Association 1993), which records regional movement of the lumbar spine. This improves the accuracy of assessment of lumbar movement over a combined movement of the hip and spine (Burdett et al 1986). The inclinometer technique has been reported to be valid and reliable (American Medical Association 1993) and has been found to correlate well with measurements taken from a radiograph (Mayer et al 1984; Newton and Waddell 1991; Saur et al 1996).

Lumbar extension

Lumbar extension is the most commonly reported movement dysfunction in patients with lumbar spinal stenosis and therefore might be of particular relevance to measure in this sub-group of LBP patients. The inclinometer technique is a valid and reliable measure to record lumbar extension (American Medical Association 1993) however it has been suggested that lumbar extension may be difficult to measure (Ensink et al 1996; Ng et al 2001). A new measurement method using a pelvic restraint device in combination with an inclinometer showed good intra-tester reliability (Ng et al 2001), would appear to assist in measuring lumbar extension and showed good reliability (Ng et al 2001).

Lumbar lateral flexion

Spinal ROM of lateral flexion has been reported to be a good indicator of the severity of low back pain (Michel et al 1997) and of disability (Waddell et al 1992). Fingertip-to-floor distance during lateral flexion is the common method of recording lateral flexion ROM, however, as with the fingertip-to-floor forward flexion measurement, this does not isolate flexibility specifically to the lumbar spine. Regional lumbar spine ROM in lateral flexion can be measured by using the validated inclinometer technique (American Medical Association 1993) or the method developed by Ng and co-workers (Ng et al 2001).

Lumbar rotation

Trunk rotation is commonly measured by goniometric methods that include movement of the thoracic as well as the lumbar spine (Klein et al 1991). Loebel measured axial rotation of the lumbar spine (Loebel 1973) as did Twomey and Taylor (twomey and Taylor 1979), however, as pointed out by Ng and colleagues (Ng et al 2001), these investigations all placed the lumbar spine in flexion, which might be limited in a clinical situation. Lumbar axial rotation in standing has been measured using sophisticated equipment such as electromagnetic devices (Percy and Hindle 1989) and the computerised triaxial potentiometric system (Dvorak et al 1995). It would appear that the method developed by Ng et al (Ng et al 2001) is preferable for clinical use.

In the recent study by Ng and co-workers (Ng et al 2001) lumbar ROM in three planes was investigated using a pelvic restraint device and good reliability was shown for all the measures and compared well to corresponding values in various previous studies. The method of inclinometer technique with a pelvic restraint device appears to hold several advantages including support for the patients and better intra-tester reliability than in previous studies without the addition of the stabilisation device (Ng et al 2001).

Because movement dysfunction is a unique focus of physiotherapy (Van Dillen et al 1998) the majority of physiotherapy research focuses on improvements in impairments (such as range of motion, muscle strength and endurance). Some research focusing on impairment has made a unique contribution to advancing our understanding of recurrent/chronic LBP (Hides et al 1994 and 1996; Hodges and Richardson 1996, 1997 and 1998). However, poor inter-observer agreement in rating spine motion and strength has been reported (Agre and Baxter 1987) and perhaps emphasises that outcomes more relevant to the patient and society are preferable: pain/symptoms, function, well-being, disability and satisfaction with care (Waddell et al 1992; Deyo 1983; Deyo et al 1998; Bardin 1997, 1998, 2000b, and 2002). It appears that recent research has improved the reliability of measures

of lumbar spine ROM, however these measures do not emphasise the outcomes recommended for use in LBP research (Deyo et al 1998) or those outcomes that address patients' primary concerns i.e. pain and function (Turner et al 1992; Stucki et al 1996; Zanoli et al 2001).

Ferguson et al (2001) proposed that a better understanding about recovery from LBP can be gained if both activity and participation related outcome measures (for example, symptoms and activity of daily living (ADL) and impairment related outcome measures (for example, range of movement) (ICH 2001) are used to assess change in patients. These researchers monitored the natural course of acute LBP recovery prospectively using both traditional subjective outcome measures as well as objective quantitative kinematic measure and found that the latter quantifies a different aspect of impairment not evaluated by traditional subjective measures (Ferguson et al 2000). In this study ADL were evaluated using the Million Visual Analog scale (Million et al 1982) and results showed that the outcome measure of functional performance probability demonstrated the most distinct statistically significant improvement over the three month period (Ferguson 2000). Findings from this study supported Ferguson's suggestion that the use of several outcome measures would enhance understanding of recovery from acute LBP and could facilitate a reduction in the risk of recurrent injury.

It is generally agreed, however, that the ultimate goal of providing physiotherapy services to people with chronic disease is the improvement of functional status and ultimately the improvement of overall quality of life and for this reason a shift to outcomes which reflect these goals has been recommended (Bardin 1998, 2000c and 2002; Deyo et al 1998; Yekutieli 2002). Furthermore, collaboration of patients with physiotherapists to set treatment goals that reflect the patients' goals and objectives is likely to lead to improved patient motivation, outcomes and patient satisfaction.

CONCLUSION

Measures of pain and movement dysfunction are traditionally part of the

biomedical model to investigate and study LBP; this model focuses on tissue and/or system pathology at the level of impairment, rather than on illness behaviour. Patients with CLBP and disability face multiple biopsychosocial problems and therefore a multifactorial model of illness is particularly pertinent to the documentation and study of the complexities of LBP and is consistent with the components and emphases of the ICF (WHO, ICF 2001). The biological outcomes of measures of pain and movement dysfunction can provide

useful, easily quantifiable measures of change in patients with LBP problems. However, these outcome measures should be evaluated in conjunction with a battery of outcomes from the psychosocial aspects of the biopsychosocial model, at the level of activity and participation (WHO, ICF 2001). This has the potential to provide a measure of evidence of change that appropriately reflects the multidimensional impact of LBP in patients' lives. Studies utilising a spectrum of outcomes reflecting the biopsychosocial model are likely to

capture unique aspects of understanding of LBP, foster a breadth of analysis of LBP extending far beyond the biomedical model and contribute to further scientific inquiry into the prevalent and problematic condition of LBP, in particular CLBP.

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