



Psychosocial Impact of Chronic Back Pain: Patient and Societal Perspectives

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Contents

Epidemiology of Chronic Low Back Pain	110
Burden of Low Back Pain	110
The Need for a Biopsychosocial Model	111
Psychosocial Impact of Chronic Low Back Pain	111
Psychological Factors	112
Social Factors	114
Central Sensitization Syndrome	117
Socioeconomic Impact	117
Overview of Assessment and Management	120
Assessment	120
Management	121
References	122

Abstract

Low back pain (LBP) is a highly prevalent, poorly managed condition that is the number one cause of years lived with disability (YLDs) around the world. It is estimated that one in four prevalent cases of LBP is responsible for 77% of the YLDs. The socioeconomic burden of LBP, particularly in developed countries, is enormous with medical expenditures rivalling that of diabetes or ischemic heart disease. The individual

burden of LBP is also tremendous and commonly results in psychosocial distress and dysfunction. The most commonly cited negative prognostic psychological factors are depression, fear-avoidance, and pain catastrophizing. However, pain self-efficacy and patient beliefs have been found to even more strongly associate with actual outcome. Qualitative studies of chronic LBP patients have revealed consistent themes reflecting difficulties in coping with a sense of stigmatization that is associated with an invisible problem, loss of wellness, loss of self, loss of relationships, and loss of the future. For chronic LBP, both exercise therapy and cognitive behavioral therapy (CBT) are now recommended as first-line treatments that should be considered for routine use in addition to providing education regarding the nature of LBP and advice to

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remain active. These recommendations necessitate timely assessment, regardless of duration of symptoms, in LBP patients for the complex biopsychosocial prognostic factors that may impact patient and societal outcome.

Keywords

Chronic low back pain · Biopsychosocial model · Psychological · Social · Socioeconomic · Impact · Individual · Societal

Epidemiology of Chronic Low Back Pain

Burden of Low Back Pain

The Global Burden of Disease Study (Global Burden of Disease, Injury Incidence, Prevalence Collaborators 2016) has demonstrated that the global prevalence of low back pain (LBP) continues to increase. The global point prevalence of LBP in 2015 was 7.3%, and the estimated median 1-year prevalence in adults was 37% (Hartvigsen et al. 2018). LBP is more common in women, and the peak prevalence is in mid-life. LBP is the number one cause of years lived with disability (YLDs) with 77% of the YLDs accounted for by approximately one in four prevalent cases (Global Burden of Disease, Injury Incidence, Prevalence Collaborators 2016). This suggests that although most people experiencing LBP have low levels of disability, the enormous societal impact of LBP is driven by high prevalence and a subgroup of LBP patients with high levels of persistent disability. In 2013, low back and neck pain were globally ranked the fourth leading cause of disability-adjusted life years (DALYs) just after ischemic heart disease, cerebrovascular disease, and lower respiratory infection (Global Burden of Disease 2015 DALYs and HALE Collaborators 2015). This represents an increase over time from being ranked seventh in 1990 and fifth in 2005. Furthermore, low back and neck pain are ranked as the number one cause of DALYs in most high-income countries.

For decades the overarching public and clinical messaging for LBP (e.g., recommendations from

clinical practice guidelines) has been that LBP will get better in the majority of patients. Unfortunately, without providing the full context of this message, many patients perceive the term “get better” to mean resolution. However, multiple studies have demonstrated up to 2/3 of individuals with LBP at both the population and primary care level may have recurrent (i.e., episodic) or persistent LBP at 1 year (Hartvigsen et al. 2018). Most of the personal and societal impact of LBP is in those with chronic LBP (CLBP) which is conventionally considered to be LBP symptoms lasting more the 12 weeks. The National Institute of Health (NIH) Pain Consortium Task Force on research standards for CLBP recently defined CLBP as a “back pain problem that has persisted at least 3 months and/or has resulted in pain on at least half the days in the past 6 months” (Deyo et al. 2014). A call for increase in prognostic research to determine which patients will develop CLBP and system-wide strategies for mitigation of chronicity is at the forefront of the paradigm shift in LBP care (Foster et al. 2018).

The discrepancy between favorable natural history and persistence or recurrence is multifactorial and needs to be considered based on two main perspectives. First is the clinical setting that is being studied: the population, primary allied healthcare (e.g., physiotherapy, chiropractic), primary medical care (i.e., family doctor or nurse practitioner), and secondary or tertiary care (e.g., specialized chronic pain clinic, surgical clinic). Each scenario will provide a progressive increasing prevalence or severity of CLBP (persistent or recurrent). Second is most prevalence studies are cross-sectional or of limited duration and thus do not reflect the longitudinal aspects of LBP. Studies assessing the course of LBP over long periods are limited but can provide valuable insight regarding the true nature of LBP. Recent work from our center has demonstrated a sobering picture of the long-term trajectory of LBP in the Canadian population. Canizares et al. (2019) reported on a representative sample ($n = 12,782$) of the Canadian population over a 16-year period from 1994 to 2011. Group-based trajectory analysis was used to group participants based on the nature of their back pain over the 16-year follow-up period.

Overall, 45.6% of participants reported back pain at least once during the study period. Of people with back pain, four distinct trajectories were identified: persistent (18.0%), developing (28.1%), recovery (20.5%), and occasional (33.4%). This is consistent with the findings of the Global Burden of Disease Collaboration study that a subgroup(s) of back pain patient (one in four) generates the majority of back pain impact (Global Burden of Disease, Injury Incidence, Prevalence Collaborators 2016). Specifically, the persistent and developing groups, which made up almost half of the patients reporting back pain, were characterized by having more pain-limited activities, disability, depression, and medical comorbidities. Furthermore, only one in five people with back pain recovered over the 16 years, and one in three continued to report occasional back pain. There is substantial literature that the natural history of LBP is not one of resolution in the vast majority of patients, provides a strong rationale for a change in the basic assumptions and approach to the management of LBP. In short LBP should be viewed as a chronic condition.

The Need for a Biopsychosocial Model

A critical part of changing the approach to LBP assessment and management is identification of risk factors for a less than favorable outcome (Hartvigsen et al. 2018). Identifying who is at risk and what factors are potentially modifiable is of paramount importance in CLBP prevention, assessment, and management. Certainly, prognostic research in LBP is by no means novel. The challenge has been the implementation and practice of prognostic care for LBP. Reviewing various multivariate predictive models, Hartvigsen et al. (2018) note several independent risk factors for individuals that are likely to develop a more disabling course of LBP: high pain intensity, psychological distress, accompanying leg pain, and pain at multiple body sites. A wide variety of well-known risk factors associated with poor outcomes have been published. These are nicely summarized by Hartvigsen et al. (2018) and include but are not limited to *symptom-related factors* (previous

episode of LBP, higher pain intensity, presence of leg pain), *lifestyle factors* (smoking, higher body mass index, less physical activity), *psychological factors* (depression, catastrophizing, fear-avoidance behavior), and *social factors* (physical work, lower education, compensation claim, poor work satisfaction). However, as noted by Kent and Keating (2008), these predictive studies only explain a small degree of the variance in the outcome of LBP, with most explaining only 30–40%. Thus, despite great advances in identifying risk factors for CLBP, much of what is known to drive poor outcomes has not been comprehensively studied in the same population or remains unknown. Consequently, what factors should be assessed, when they should be assessed, and best practices for assessment and management of LBP remain a source of ongoing tribal like debate.

Despite broad acknowledgment that a biopsychosocial model is critical to advancing LBP care, the majority of LBP assessment and management remain focused on the biomedical model.

This chapter focuses on the psychosocial aspect of CLBP.

Psychosocial Impact of Chronic Low Back Pain

In the broadest sense, CLBP affects all aspects of an individual's life including day-to-day function, mood, social interactions, recreational activities, and work life. I am not aware of any conclusive studies that assess all of these aspects simultaneously. Thus, we are reliant on quantitative and qualitative systematic reviews to inform us of the broader impact of CLBP. Within the psychosocial realm of CLBP, there is typically greater focus on the psychological aspects. However, the social consequences of CLBP are often the primary drivers of secondary psychological cognition and behavior, and therefore these two dimensions should be considered together. The use of psychosocially oriented screening questions, so-called yellow flags, to identify psychosocial barriers to LBP recovery has been noted in many LBP clinical practice guidelines and clinical tools

(Nicholas et al. 2011). Commonly cited “yellow flags” are an individual’s belief that pain and activity are harmful leading to fear-avoidance behavior or sickness behavior (e.g., extended rest), low or negative mood, social withdrawal, overprotective family or lack of support, and treatment expectations or beliefs that are against best evidence or are focused on a passive cure. Increased focus on the biopsychosocial approach to LBP has demonstrated that psychosocial risk factors for developing CLBP are much more prevalent than previously thought. In a recent randomized controlled trial, patients presenting to primary care with LBP demonstrated varying degrees of psychological risk factors with 46% rated as moderate risk and 28% being categorized as high risk of chronicity (i.e., persistent LBP) using the Keele StarT Back screening tool (Hill et al. 2011).

Psychological Factors

A large body of evidence confirms that psychological factors, including emotions, beliefs, or avoidance or other maladaptive behaviors, are linked to poor outcomes in low back pain (Chou and Shekelle 2010). While the majority of studies are in the setting of nonsurgical care, it must be noted that psychological factors are also independently associated with poor outcome in surgical intervention for LBP (Wilhelm et al. 2017). A large number of psychological factors have been assessed over the last few decades and most have been found to have a negative association with LBP patient outcomes. However, there are contradicting studies regarding the impact or dominance of one psychological factor over another, whether factors are individually modifiable or not, and whether these factors are mediated by other psychological or non-psychological (e.g., social) factors. The nature and impact of psychological factors in CLBP is an extremely complex issue and thus is often very difficult for both clinicians and their patients to fully understand.

The most commonly cited and clinically assessed psychological factors are depression,

fear-avoidance, and pain catastrophizing (Pincus and McCracken 2013). A detailed description of psychological theory is out of scope for this chapter and is not my area of expertise. Pincus and McCracken (2013) provide an excellent review of this topic. Key components of their review are briefly summarized herein to provide a non-psychologist interpretation of the available LBP psychology literature. Depression or low mood is commonly reported in LBP. Depression tends to occur more in the chronic phase and is a commonly identified poor prognostic factor across different key outcomes (i.e., negatively impacts pain, function, and work status). Fear-avoidance covers a broad spectrum of fearful beliefs or cognitions about pain inducing movement, activities, or re-injury and associated patterns of avoidance behavior. The latter can range from simple (e.g., avoiding any lifting) to very elaborate movements or avoidant activity patterns (e.g., bizarre movement patterns or behavioral responses when attempting to do simple task). Fear-avoidance is often a more significant issue when considering work-related factors but can also significantly impact day-to-day function. Pain catastrophizing is the tendency for an individual to describe a pain experience in a more irrational manner than you would expect from an average person. There are often magnification, rumination, and feelings of helplessness regarding the pain experience. Patients also may have maladaptive cognition regarding future events and a relative inability to inhibit pain focused thoughts in anticipation of, during, or following a painful experience.

Another important factor that is receiving more clinical and academic focus is pain self-efficacy. Described by Bandura (1977), self-efficacy is an individual’s belief about how well they can cope with difficult situations or their ability to achieve a desired outcome. Higher levels of pain self-efficacy are typically associated with lower levels of disability despite the presence of pain. Lee et al. (2015) performed a systematic review and meta-analysis of which psychological factors are involved in the process of pain leading to disability. Specifically, they reviewed mediation analysis studies. Mediation analysis seeks to identify and explain the mechanism or process that underlies

an observed relationship between an independent variable (e.g., pain) and a dependent variable (e.g., disability) by assessing the influence of the independent variable on a third variable, often termed a mediator variable (e.g., depression), that may influence the dependent variable. Using data from 12 mediation studies, the authors identified self-efficacy, psychological distress (depression/anxiety), and fear were mediators that explained some of the association between LBP pain and developing chronic disability. In a comprehensive study of psychological obstacles to recovery in primary care LBP patients, Foster et al. (2010) assessed the relative strength of 20 different baseline psychological factors to predict patient-reported disability at 6 months. At baseline, most factors were related to degree of disability, with perception of consequences, depression, and pain self-efficacy most strongly associated. However, when considered together, depression, catastrophizing, and fear-avoidance were not independent predictors of outcome. Patients' perceptions regarding the timeline (i.e., belief that their LBP will be chronic), illness identity (i.e., number of symptoms related to their LBP), perception of personal control, and pain self-efficacy were the factors that remained significantly associated with outcome (explaining 56.6% of the variance of outcome). The authors note that patients "who perceive themselves able to exercise control over their back problem, now and in the future, are less likely to develop longer-term disability." I would add that it must be kept in mind that CLBP is a dynamic process; thus psychosocial factors are likely overlapping and/or cumulative to varying degrees over time. Consequently, as much as it is unwise to focus LBP assessment or management on the biomedical model only, focusing on a single psychological factor would likely be equally ineffective.

A patient's acceptance, or lack thereof of chronic pain has been shown to be a significant and independent factor in the outcome of those dealing with CLBP or other types of chronic pain (McCracken and Vowles 2008). Although this may seem intuitive, assessing and managing a patient's ability to accept and deal with chronic pain is not something that is typically addressed in

the front-line management of LBP. Similarly, a patient's pain beliefs, and expectations are also independently associated with their recovery from LBP as well as their response to different treatments (Main et al. 2010). In a systematic review by Ramond et al. (2011), the authors found that "depression, psychological distress, passive coping strategies and fear-avoidance beliefs were sometimes found to be independently linked with poor outcome, whereas most social and socio-occupational factors were not." However, a patient's or care provider's perceived beliefs regarding persistent LBP was the factor that was most consistently linked with actual outcome. Although, negative beliefs and expectations are often a part of behavioral/psychological treatment, they are typically not addressed in the early aspects of LBP care and thus may become entrenched (i.e., reinforced) due to persistent or recurrent pain. As noted above, persistence or recurrence is the more likely course of LBP in patients seeking healthcare.

In a Canadian population-based survey of 2400 adults, half of the respondents had pessimistic views of LBP (Gross et al. 2006). Respondents felt that back pain makes "everything in life worse," worsens over time, and eventually will "stop you from working." Interestingly the authors at that time noted: "Contrary to recent evidence-based clinical practice guidelines that advocate that back pain is a benign, self-limiting condition, most subjects in our sample had pessimistic beliefs concerning back pain." The authors concluded: "Public association back pain beliefs in the 2 Canadian provinces sampled are not in harmony with current scientific evidence for this highly prevalent condition. Given the mismatch between public beliefs and current evidence, strategies for re-educating the public are needed." As our knowledge of the natural history of LBP continues to improve, the patient beliefs reported by Gross et al. (2006) were reflective of the actual experience of many LBP patients. Until recently, the messaging from LBP clinical practice guidelines was in fact misaligned with the reality of LBP patients.

Walker et al. (2004) reported that half of LBP patients do not actually seek healthcare. It is likely

that these patients are the ones who have a favorable natural history. In a systematic review of studies assessing the course of non-specific acute LBP patients seeking treatment in primary care, Itz et al. (2013) found that 65% of patients still report pain at 1 year. The authors concluded: “The findings of this review indicate that the assumption that spontaneous recovery occurs in a large majority of patients is not justified.” Similar conclusions can be drawn from the cumulative trajectories of back pain (see above) in the population where almost 50% of individuals experience a persistent or developing trajectory of back pain (Canizares et al. 2019). It is the belief of the author that the decades of clinical practice guideline messaging that LBP is a benign and self-limiting condition, while correct from a medical perspective (i.e., no sinister pathology and typically mild in severity), may have (at least in part) led to some of the more strongly held pessimistic beliefs of patients with CLBP.

The optimistic message of “don’t worry it gets better in most people” is still reasonable for public health campaigns. This, however, is not the intended audience of clinical practice guidelines. This message has been delivered for decades by health providers to patients who are seeking healthcare. Given the substantial prevalence data on the transition from acute to chronic LBP (Hartvigsen et al. 2018), this messaging was doomed to fail in the majority rather than a minority of patients as intended. For the large number of patients seeking care who do not “resolve” (whether their beliefs and expectation were falsely set by a well-intended provider or put forth by financially incentivized providers promising a “cure” for LBP), persistent or recurrent pain may lead to a negative perception or belief that something more serious or unmanageable is occurring. This also puts the provider in a difficult position to explain why the pain is not getting better as they said it would. It is the belief of this author that this common scenario leads to the perfect storm of overmedicalization of LBP by the both the patient and healthcare provider(s). This is certainly a multifactorial issue driven by persistent/recurrent symptoms, heightened/worsening symptoms, the potential for loss of or lost patient confidence in

the provider(s), clinical uncertainty, and the need/desire to do something.

Social Factors

At a population level, CLBP disproportionately affects people with low education and socioeconomic status association (Shmagel et al. 2016). Possible reasons for this may be related to inadequate health literacy, poor access to healthcare, and greater likelihood of being in labor-intensive work (Hartvigsen et al. 2018). At an individual level, the social implications and interplay of LBP are much more complex and are best understood through qualitative methods of inquiry. Three available systematic reviews and meta-syntheses of the qualitative research on patients’ lived experience with LBP provide a deeper understanding of the more complex personal and nuanced aspects of LBP. Interestingly all three were published within a year of each other (Froud et al. 2014; Snelgrove and Lioffi 2013; Bunzli et al. 2013) and presented different but interrelated perspectives.

In the study by Froud et al. (2014), the authors reviewed 49 articles from 42 studies. They reported on four first-order themes from the qualitative literature:

Theme 1 – Activities: loss of function, particularly regarding domestic chores, important recreational activities (friends and family), and an inability to plan ahead were consistently found across studies.

Theme 2 – Relationships: significant negative impact on personal relationships was a common impact of CLBP. This occurred from two perspectives. First and more common is being worried about how their inability to participate in activities with family or friends was affecting others (e.g., holding others up or ruining it for others), and second is worrying about the pain that would occur if they participated. However, some felt unsupported in these relationships. Regardless of the perspective, the end result was often social withdrawal and isolation.

Theme 3 – Work: the impact of LBP on work was very prevalent and included the need (and difficulty) to modify work, fear of losing their job, and difficulty navigating disbelief from co-workers.

Theme 4 – Stigma: a very prevalent finding in the qualitative literature pertains to worries of not being believed by others (family, friends, employers, healthcare workers, insurance, etc.) and the need to legitimize or validate that their pain was real.

Froud et al. (2014) provide an excellent summary of the pertinent interpretation of the qualitative literature as follows: “People with low back pain seek to regain their pre-pain healthy, and emotionally robust state. They desire not only diagnoses, treatment and cure, but simultaneously reassurance of the absence of pathology. Practically, although sufferers are often chiefly concerned with (re)engagement in meaningful activities, and attenuation of symptoms, the more experientially-focused literature suggests that the impact of back pain is pervasive, with life-changing effects.” Consistent with prevalence of persistent or recurrence LBP, the authors also state the following: “Whilst back pain is not itself life-threatening, it does threaten quality of life. In the absence of diagnosis and effective treatment, complex enmeshment and interactions can ensue between chronic LBP, identity, and social roles, having a diverse and pervasive impact of the condition with life-changing psychological and social consequences.”

In the review by Snelgrove and Lioffi (2013), the authors assess 33 articles from 28 studies. They summarized the qualitative literature in three interrelated themes similar to those put forth by Froud et al. (2014). **Theme 1- Self:** CLBP leads to “loss of a previous lifestyle and changes in personality.” Persistent LBP essentially leads to loss of self (former and future) due to “an incremental rise of functional limitation accompanied by feelings of self-loathing, frustration, anger, negativity towards others, self-denigration and even depression.” Furthermore stigmatization (see above), perceived or real, threatens personal integrity. **Theme 2 –**

Relationships: Snelgrove and Lioffi (2013) divided this into two distinct aspects, (1) relationships with family and friends and (2) relationships with health professionals and the organization of care. The impact of CLBP on relationships with family and friends was noted by Froud et al. (2014). The authors highlighted an important issue of the effect of CLBP on relationships over time: “Participants reported being a burden to their families and ‘holding people back’ with sympathies lessening as time went on with no diagnosis or formal explanation,” the latter being another driver for legitimization and over-medicalization of their CLBP. Negative relationships with health professionals and the organization of care were significant issues. As noted by the authors, “Participants described a good consultation as a partnership enabling a sense of security and belonging; promoting feelings of mutual understanding and recognition, and incorporating individualised care, clear explanations, reassurance, discussing psychosocial issues and future options.” In many instances, this does not represent real-world health interactions. As noted by the authors “a lack of diagnosis and ongoing unresponsiveness to treatment invoked perceptions of not being believed, leading to a feeling of stigma and distress,” “Participants reported being viewed as culpable; accused of imagining their symptoms; seeking secondary gain; symptoms being ‘all in the mind’ and laziness.” Typically, providers and the system (e.g., disability insurer needs a diagnosis to provide benefits) are biased toward the biomedical approach which often will not provide a specific causation or resolution for most CLBP and further drives these negative psychosocial consequences and loss of faith in healthcare provider(s). **Theme 3 – Coping:** The authors reported coping in the context of individuals’ attempts to manage their LBP. Snelgrove and Lioffi (2013) note “A number of authors identified biomedical beliefs as a determinant of participants’ experiences.” “Biomedical beliefs were related to less successful rehabilitation to work and perceptions of reduced well-being; disappointment with the inefficacy of medical treatments; an overall narrow range of behavioural focused coping strategies,

psychological inflexibility and comprehensive enmeshment with pain, with little engagement or acceptance and a loss-orientated focus.”

In the third review, Bunzli et al. (2013) reviewed 33 articles representing 28 studies. They also categorized the existing qualitative literature into three interrelated themes similar to those already noted. However, they also provided a provocative conceptualization of CLBP experience as one of “biographical suspension” in which three aspects of suspension were described: “suspended wellness,” “suspended self,” and “suspended future.” **Theme 1 – The Social Construct of CLBP:** This theme emerged based on the highly prevalent biomedical beliefs of back pain patients. This should not be a surprise given the long-standing general biomedical model that is ingrained in both patients and practitioners alike (i.e., “diagnosis-treatment-cure”). As noted by the authors, “A biomedical explanation for the CLBP was critical for an individual to establish their pain as being a legitimate disability, which could then receive the support of the family, workplace, and welfare agencies.” “The lack of a satisfactory etiological explanation for their ‘invisible’ pain meant participants in many studies felt at risk of not being believed.” “The participants’ experience in the health care system was repeatedly described with feelings of anger and frustration towards professionals who could not fulfill expectations of a diagnosis-treatment-cure pathway.” These perceptions were found in most studies to occur with themes of stigmatization as noted above. Even in scenarios where the pain fluctuated, participants reported the need to demonstrate (i.e., sickness/pain behaviors) their pain and its impact all the time as a means of legitimizing their CLBP. The authors put this further into the context of the perceived role of the healthcare provider (HCP), noting that “HCPs were identified as painting an image of the demanding, difficult, and drug-seeking CLBP patient” and “any inference by HCPs of the pain being psychological in origin was felt by participant in several studies to be labeled with the stigma of questionable integrity.” **Theme 2 – The psychosocial impact of the nature of CLBP:** The authors noted that “In the studies reviewed, pain was

described as omnipresent, salient, and characterized by unpredictable fluctuations in intensity during both waking and sleeping hours”; “studies described participants experiencing disbelief at why they were suffering, prompting feelings of frustration, anger, guilt, and despair”; and “anxiety and distress, in light of an uncertain future, were widely described by study participants.” The alterations in mood often resulted in depression. Consistent with the theme of the impact of LBP reported by Snelgrove and Lioffi (2013), the authors provide a profound quote that the psychological effects of pain amounted to an “assault on the self.” **Theme 3 – Coping with CLBP:** The findings from this theme are consistent with the interpretation of the same theme reported by Snelgrove and Lioffi (2013). The authors framed coping strategies that were reflective of a constant fight or struggle to legitimize and control pain and the impact of CLBP in the context of the two other interrelated themes.

It is clear from these qualitative reviews that the biomedical model and practice of medicine are at odds with the lived experience of CLBP patients. The interrelated themes presented by these three reviews certainly resonate with my clinical experience as a spine focused practitioner. For example, the social construct of CLBP noted by Bunzli et al. (2013) is something that I suspect all HCPs dealing with CLBP (or chronic pain of any sort) experience on a regular basis. In my practice, this is a weekly occurrence when attempting to explain to a patient why surgery is not going to fix their pain, a process that takes significantly more time to do than saying “I have a solution that fulfills the biomedical belief and expectation of a given patient.” As a strong believer in a holistic approach to CLBP, even under the scenario of a detailed and patient-centric explanation of the nociceptive and centralized mechanisms of pain, explaining the presence of unrelated imaging “abnormalities,” etc., patients often simply conclude “so you are saying is this is all in my head” and/or “how is it possible that you cannot fix my – *any given radiographic diagnosis*” (i.e., the highlighted “problem” on their imaging report). As a surgeon in a tertiary-quaternary academic center (i.e., a highly biomedically

focused practice), I find the biomedical belief for a solution so ingrained in some patients that it is at times difficult if not impossible to alter. Another scenario that commonly occurs in my practice and is in keeping with the social implications of CLBP such as legitimization of pain is the need for disability or other insurance companies to have a definitive biomedical diagnosis for an individual who in the eye of the insurer (based on decades of messaging regarding resolution of LBP) should be better. I find this to be a profound source of patient frustration and stigmatization. The resultant stress of financial loss added to the common feeling of stigmatization is a tremendous driver for patients to continue to pursue a biomedical approach to their CLBP. This truly represents a vicious negative feedback loop for a significant proportion of the CLBP population.

Central Sensitization Syndrome

For many years the aforementioned “yellow flags” were thought to be predominantly psychosocially driven and in some cases, particularly where the injury or imaging findings were minor or did not remotely match the degree of symptoms, labelled as malingering behavior. In an excellent review by Nijs et al. (2017), the authors provide an update on how contemporary pain neuroscience is providing evidence of pathophysiological changes in pain processing, termed central sensitization that can occur in approximately 25% of patients with CLBP. Woolf (2011) defined central sensitization as “an amplification of neural signaling within the central nervous system (CNS) that elicits pain hypersensitivity.” Individuals with central sensitization can have varying degrees of hypersensitivity; however, patients exhibit increased responsiveness to normal or subthreshold afferent input. Clinical features such as allodynia, pressure hyperalgesia, after-sensations, or temporal summation can be objectively detected. This condition is an important consideration in any individual with chronic pain and in fact has a biomedical explanation; however, it can be very difficult to explain to patients and manage, particularly in later stages. A detailed

discussion of the pathophysiology, diagnosis, and management of central sensitization is beyond the scope of this chapter.

Although this chapter focused on psychosocial aspects of CLBP, central sensitization is a pivotal advancement in our understanding of the pain experience and must be considered in the context of those with persistent pain. It is not clear whether certain individuals are prone to developing central sensitization or if the psychosocial consequences noted above in some way lead to central sensitization in certain individuals. For example, in a review by Delpech et al. (2015), the authors surmise that “stress-induced microglia dysfunction may underlie neuroplasticity deficits associated to many mood disorders.” In a systematic review of the structural and functional brain changes in CLBP, Kregel et al. (2015) noted consistent findings across studies of increased activation not only in somatosensory-discriminative regions of the brain but also in areas of affective and cognitive processing of pain. In a subsequent review by the same group (Kregel et al. 2017), there is limited evidence suggesting that “maladaptive central neuroplastic changes” may not be permanent and can be improved by targeted interventions. For example, behavioral extinction training was shown to shift pain-induced activation back to sensory discriminative regions from affective brain regions.

Socioeconomic Impact

In a widely cited review, Katz (2006) estimated that the cost of LBP in the United States ranged from \$100 to \$200 billion (2005 dollars) a year with indirect costs (e.g., lost wages) accounting for up to two-thirds of the cost and direct medical expenditures the rest. Around the same period, the cost of medical expenditure on LBP in Canada was estimated to be \$6–\$12 billion Canadian dollars per year (Brown et al. 2005). These very broad estimates exemplify the challenges of determining the total cost associated with most chronic health conditions. These challenges are due to a variety of factors including, but not limited to the following: region and country specific economic

factors (e.g., varying cost of healthcare within and among different countries); assessment of specific subpopulations of LBP patients such as primary care (acute or chronic), workers compensation, surgical or chronic pain patients; reporting of direct (healthcare) cost only; and when indirect cost are reported they are limited to individual productivity losses (e.g., time off work) rather than including caregiver cost or the cost of social support (e.g., food or housing). The latter point is relevant to the growing non-working aging population with CLBP.

Indirect Cost

Determining the indirect cost (often referred to as societal cost) of LBP is a resource intense process, and thus there is a limited amount of studies in this domain. Furthermore, indirect cost can vary widely depending on the specific cost variables assessed and which methods are used to determine productivity losses. The latter of which is the main driver of indirect cost. The two main methods used for determining productivity losses are (1) the human-capital method which takes the patient's perspective and tallies loss based on every hour that a individual does not work over the period that they may be eligible to work and (2) the friction-cost method which takes the payer/ employer's perspective and only tallies loss based on those hours not worked until another employee takes over the patient's work (Pike and Grosse 2018). The human-capital approach tends to result in estimating significantly greater losses (i.e., higher indirect cost); thus the friction method has become the preferred method of many health economist and countries. Both methods have their merits and limitation, such that combination of methods may be desirable depending on the perspective taken. For example, for a 40-year-old patient who never returns to any form of work, the impact from the perspective of the employer may be relatively small compared to the impact on the disability insurer that has to pay that patient for the next 25 years until retirement age.

Regardless of method used to determine productivity losses, indirect costs are typically responsible for the majority of cost attributed to LBP. In an international review of national cost of

illness studies by Dagenais et al. (2008), eight studies looked at both direct and indirect cost. With the exception of one study, indirect costs were responsible for 55–97% of estimated total national cost associated with back pain. Three of the reviewed studies by Dagenais et al. (2008) used both the human capital and friction methods for determining productivity losses. The friction method yielded estimates that were, on average, 56% lower than the human capital approach. In addition to these methodological differences, it is critical to understand whether the estimated cost per patient is being applied to all LBP patients within a representative sample of the population or a specific subgroup recruited from speciality pain or surgical clinics. In this scenario, the cost per patient (both direct and indirect) will likely be grossly different and is not interchangeable between different subpopulations. Consequently, when interpreting cost of illness studies, it is critical that the reader understand the LBP population being studied and the limitations associated with the methods and costing-data sources being used to determine indirect cost. For example, in a more specific CLBP subgroup (discography confirmed discogenic CLBP) of patients referred to four pain clinics in the Netherlands, Geurts et al. (2018) reported total societal cost of €7911.95 per patient (51% direct and 49% indirect cost) using the friction method and €18,940.58 per patient (22% direct and 78% indirect costs) when using the human capital approach. In this example, the human capital approach attributed more than double the cost per patient. Regardless of methods, the cost per patient in this study would be significantly higher than that of a LBP patient who was being managed only in a primary care setting. Thus, it would be erroneous to assign the cost per patient from this study to a different LBP subpopulation or to all LBP patients.

Direct Cost (Healthcare Expenditures)

Relative to older studies reported in the 2008 review by Dagenais et al. (2008), a more contemporaneous study by Dieleman et al. (2016) reports that the US spending for back and neck pain health services continues to increase annually and was estimated to be \$87.6 billion in 2013.

Back and neck pain were ranked third, behind diabetes (\$101.4 billion) and ischemic heart disease (\$88.1 billion), out of all health conditions. The proportion of spending on ambulatory care, emergency care, and pharmaceuticals for back and neck pain was 60.5%, 4.2%, and 4.1%, respectively. Comparatively, the proportion of spending on ambulatory care, emergency care, and pharmaceuticals for diabetes was 23.5%, 0.4%, and 57.6%, respectively. This clearly demonstrates the differential impact on the healthcare system of a predominantly biomedical condition such as diabetes and predominantly non-biomedical condition such as back pain. To gain insight into some of the specific differences in medical expenditure among CLBP patients, Gore et al. (2012) compared a total of 101,294 patients with CLBP to a 1:1 age-, sex-, and region-matched control cohort CLBP. The authors used settled medical and pharmaceutical claims data from more than 98 commercially managed healthcare plans throughout the United States which represented a broader insured adult population. Relative to controls, CLBP patients had a greater number of medical comorbidities, including higher rates of depression (13.0% vs. 6.1%), anxiety (8.0% vs. 3.4%), and sleep disorders (10.0% vs. 3.4%). As expected, patients with CLBP also were more likely to be on opioids (37.0% vs. 14.8%) or other analgesic such as nonsteroidal anti-inflammatory drugs (26.2% vs. 9.6%). The study also reported significantly higher estimated total direct medical costs for CLBP patients ($\$8386 \pm \$17,507$) compared to those without CLBP ($\$3607 \pm \$10,845$). One notable driver of cost was the almost three times difference in medical expenditures for outpatient investigations (e.g., imaging) in CLBP compared to the control group ($\$3481.65$ vs. $\$1297.47$). Overutilization of diagnostic imaging is perhaps the most targeted area of non-guideline concordant care in LBP, particularly the use of more costly imaging such as magnetic resonance imaging (MRI). Inappropriate MRI utilization is not simply a matter of an unnecessary test. The high likelihood of false-positive findings has been shown to lead to a cascade of further investigations and an increased relative risk of invasive treatments including

surgery (Webster et al. 2014). Reduction of imaging for LBP is a very prominent part of the global movement Choosing Wisely. However, as noted above, the biomedical approach to LBP is ingrained into patients and providers, and change of behavior in this area has proven to be very difficult. This is highlighted by a 2017 study by Hong et al. (2017) where the authors only found a 4% relative reduction in low-value imaging for LBP 2.5 years into the Choosing Wisely campaign in the United States. Limited studies assessing the impact of alternative models of care using more active care paths and interprofessional delivery have demonstrated greater potential for reduction of unnecessary imaging and associated cost avoidance (Kim et al. 2011; Rampersaud et al. 2016).

As noted at the beginning of this chapter, LBP is the number one cause of years lived with disability (YLDs) with 77% of the YLDs accounted for by approximately one in four of prevalent cases (Global Burden of Disease 2015 DALYs and HALE Collaborators 2015). Although speculative, the evidence presented in this chapter on the psychological and social impact of CLBP would suggest these one and four prevalent cases are likely those with significant psychosocial (including central sensitization) drivers of persistent pain and disability. From a socioeconomic perspective, this subgroup of patients with a disproportionately greater disability burden is also going to be associated with higher medical expenditures and lost productivity (Hartvigsen et al. 2018). In a study by Luo et al. (2004), the authors performed an analysis of the 1998 Medical Expenditure Panel Survey and reported that 25% of patients with LBP were responsible for at least 75% of the healthcare expenditures in those with LBP. Similarly, Katz (2006) noted that 5% of workers (e.g., mostly those that have been off work for more than 1 year and are very unlikely to return to work) are responsible for the 75% of the loss in productivity cost associated to LBP. There is no current national-level evidence to suggest that these findings are not applicable today. In my opinion, although these individual findings have not been comprehensively assessed in the same study, their overarching context

provides a socioeconomic rationale for strategies aimed at prevention or mitigation of CLBP. The early identification of those at risk for persistent pain and disability and implementation of early mitigation strategies to address the psychosocial mediators of persistent pain and disability are clearly the way forward.

Overview of Assessment and Management

A detailed description of the assessment and management of the psychosocial and socioeconomic factors associated with CLBP is not the intended scope of this chapter; however, a brief overview is necessary to provide the clinical implications of the issues outlined in this chapter.

Assessment

A variety of assessment tools as well as integrated model of cares are being developed around the world to address the growing burden of LBP (Foster et al. 2018; Rampersaud et al. 2016). It is clear that the psychosocial impact of CLBP is a principle driver of both patient and societal burden. The paradigm shift in LBP care necessitates primary consideration of psychosocial factors and approaches to care, rather than these being afterthoughts following failure of a primarily biomedical framework. Often, these issues may become ingrained and much more difficult and costly to manage. Consequently, early assessment for psychosocial factors in LBP patients is recommended as part of routine primary care (Foster et al. 2018). Furthermore, the impact of psychosocial factors is not static and thus necessitates prescribed follow-up and reassessment for these barriers to recovery. Incorporating this change enables the move away from a one-size-fits-all approach to a stratified care approach that has been greatly influenced by the literature associated with the use of the Keele STarT Back screening tool in primary care (Hill et al. 2011). The STarT Back screening tool (<https://www.keele.ac.uk/sbst/startbacktool/>) is a prognostic questionnaire for patients with LBP

that aims to identify risk of developing persistent disabling LBP (Hill et al. 2011). It categorizes respondents as low, medium, or high risk of persistent pain/disability (i.e., chronicity) and aims to match treatment to each risk subgroup. Practical tools for primary care are required to enable efficient biopsychosocial assessment and reassessment of LBP in the acute and chronic (persistent or recurrent) scenarios.

In collaboration with interprofessional knowledge experts, front-line primary care providers, and funding from the Ontario Ministry of Health, we have developed the Clinically Organized Relevant Exam (CORE) Tool for the Low Back Pain Toolkit for Primary Care Providers (Alleyne et al. 2016). The CORE Back Tool (<https://cep.health/clinical-products/low-back-pain/>) provides a primary care toolkit that is evidence informed and interactive and provides a management matrix for early stratified care. It starts with six principle screening questions that allow identification of the biopsychosocial components of a patient presenting with LBP. A response-dependent stepwise progression to more detailed questions and recommended validated tools for more in-depth assessments are also provided. We have had excellent frontline uptake of the CORE Back Tool, and it is now integrated into the medical school curriculum at the University of Toronto. If psychosocial concerns are identified (primary lead question: Is there anything you *can not* do now that you could do before the onset of your low back pain?), then the user is directed to assess for yellow flags and if positive use of a validated prognostic tool such as the STarT Back which has specific questions regarding fear, anxiety, catastrophizing, and low mood (Hill et al. 2011). In addition, I would recommend a brief assessment (Chiarotto et al. 2016) of self-efficacy using the Pain Self-Efficacy Questionnaire – Short Form (PSEQ-4). The PSEQ asks simple questions of patient's confidence in dealing with their LBP such as "I can cope with my pain in most situations" or "I can live a normal lifestyle." Obtaining a basic understanding of a patient's ability to cope or not to cope with a given situation will more broadly help guide the need for psychological as well as social supports as

needed. More intensive psychological assessment and treatment is not within the scope of this chapter and is not typically in the scope of practice of many primary care physicians or medical specialists such as rheumatologist or surgeons that deal with spinal conditions. However, identification of psychosocial issues and referral to appropriate assessment and management should be the responsibility of all practitioners that deal with LBP.

Management

The recently published Lancet series on LBP reflects the paradigm change in messaging and first-line management recommendations for both acute (<6 weeks) and CLBP (Foster et al. 2018). The prioritization of the Lancet Low Back Pain Series Working Group recommendations have only recently begun to surface in clinical practice guidelines. For both acute LBP and CLBP, advice to remain active and education are first-line recommendations. For CLBP both exercise therapy and cognitive behavioral therapy (CBT) are also recommended as first line treatments that should be considered for routine use. Additionally exercise therapy and CBT should also be considered for limited use in selected patients with acute LBP. These recommendations are in line with the need for early assessment of the complex biopsychosocial factors that may negatively impact recovery of LBP patients at any time period from the onset of symptoms. All other treatments such as spinal manipulation, massage, acupuncture, medication, injections, and surgery are to be considered second-line or adjunctive and delivered in a limited fashion in highly selected patients. The goal of these secondary or adjunctive treatments should be to enable functional activities (modified as needed) and optimization of non-pharmaceutical treatment options whenever possible.

For those with or identified as at risk for psychosocial barriers to recovery, CBT is the most commonly recommended treatment (Foster et al. 2018). CBT is a structured, time-limited, problem-focused, and goal-oriented form of

psychotherapy. As it pertains to LBP, it has been shown that changing an individual's thoughts about pain and the associated negative emotions or beliefs can change not only how that individual's mind responds to pain but also their body. CBT can be effectively delivered in varying degrees of intensity, by a variety of different types of practitioners (not just psychologist), and in a variety of setting such as one-on-one, group, and even virtually (Vitoula et al. 2018; Bostick 2017). Fundamentally, the goals of CBT are to recognize the negative feelings, thoughts, and behaviors that occur as a result of LBP and use of goal-oriented techniques to incrementally transform negative thoughts (cognitive part) and behaviors (behavioral part) to positive ones that improve an individual's ability to manage their pain (i.e., improve pain self-efficacy) and become more active and engage in healthy behaviors that ultimately reduce their pain. Other adjunctive treatments may be required on a case-by-case basis including medical management of more profound psychological dysfunction (e.g., major depression) to address specific issues that exist or may arise. Just as a one-size-fits-all biomedical approach to LBP does not work, a one-size-fits-all psychosocial approach will also fail. For patients who have not responded to recommended first-line treatments, with ongoing significant pain, functional disability, or psychosocial dysfunction, multidisciplinary rehabilitation programs that individualize and coordinate different types of treatment (e.g., pain management, exercise, and CBT) have been shown to be more effective than standard treatments for pain, disability, and return to work (Kamper et al. 2015). However, it must be noted that multidisciplinary rehabilitation programs can be costly, time-consuming, and resource intensive and may not always be accessible to vulnerable populations (Salathé et al. 2018). Unfortunately, significant changes in policy, system-level clinical pathways, available resources (including first-line management of psychosocial issues such as improvement of self-efficacy), and the mindset of frontline clinicians will be required to see meaningful reduction in the increasing individual and socioeconomic impact of LBP (Foster et al. 2014, 2018).

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