

chapter one

Low Back Pain in the United States

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INTRODUCTION

Low back pain (LBP) is extraordinarily common. Think about it; have you ever felt some pain or a twinge in your back? It is a rare person who has not had at least one episode of LBP by the time he or she reaches the age of 50. One commonly used estimate cites that 80% of adults will have an episode of LBP at some point in their lives. Because of its high rate of occurrence, LBP accounts for a substantial portion of outpatient care and is one of the most frequent complaints among all adults who see healthcare practitioners. The condition has created a tremendous economic and social burden on society and on our medical care system.

In this chapter we will give a brief overview of the scope of the problem of LBP in the general population. As healthcare providers we need to understand not only care at the individual level, but also the population implications of LBP and LBP care. The topics that will be summarized include the prevalence of LBP, healthcare utilization for LBP, the status of diagnostics, outcomes and outcome measures, medical community approaches, and policy issues. All of these topics impact on decisions about individual care in the clinic and on our ability as physical therapists to treat patients in the most efficacious manner achieving the best outcomes.

PREVALENCE OF LOW BACK PAIN

LBP is defined as “pain localized below the line of the twelfth rib and above the inferior gluteal folds, with or without leg pain.”¹ The high prevalence of LBP is one of the principal reasons that it is a priority area for research and the subject of many academic and lay texts. Published measures of the prevalence of LBP vary due to the differing definitions of LBP proffered by surveys and researchers, the different populations studied, and the range of methodologies that may be used in studying prevalence.^{1,2}

Prevalence is a measure of the rate of all persons who have a condition at a specified point in time in a given population. Prevalence rates are dependent upon several factors related to the condition being considered. These factors include the duration of the condition and the impact of treatment on the condition. For LBP one might see a differentiation if the distinction was made between an acute episode, which is typically of short duration, as opposed to a chronic condition, which can endure for years. A number of different types of prevalence rates are typically measured when trying to understand the epidemiology of any condition. Lifetime prevalence is a measure of the number of persons who have a condition during the course of their lifetime. Annual prevalence is a measure of the number of persons who have a condition during the course of a year. Period prevalence is a measure of the number of persons who have a condition during a specified time period. Finally, point prevalence is a measure of the number of persons who have a condition at a single specific point in time.

Loney and Stratford² examined the methodologies used in studying LBP prevalence in a broad-based review of the quality of published prevalence studies. These authors attributed much of the differences in prevalence statistics to methodological differences among the studies. A great deal of the variation in prevalence rates was related to the definitions for the duration of LBP used by previous researchers. These definitions ranged from LBP lasting several days in some studies to LBP lasting at least 2 weeks in others. Those studies that used a definition of LBP with a shorter duration tended to report higher prevalence rates than those that used a definition incorporating greater time duration. In addition, differences in prevalence rates among studies were found based on the age range of the population studied. Younger adults (20–35 years) had lower prevalence rates, rates rose in the middle ages (40–60 years), and then rates dropped after the age of 60.

Deyo and Tsui-Wu³ published an oft-cited study that used the National Health and Nutrition Examination Survey II (NHANES II) data and its definition of LBP to determine lifetime prevalence, point prevalence, and care-

seeking patterns for LBP. In the NHANES II survey, LBP was defined as “pain in your back on most days for at least 2 weeks.” The lifetime prevalence of LBP was 14% and the point prevalence was 6.8%. Among demographic subgroups, prevalence rates were found to be similar for males and females but different by race, with Caucasians (14%) having a higher lifetime prevalence of LBP than African Americans (11%). When level of educational attainment was considered it was found that the less education a person reported the higher the prevalence of LBP. Individuals with less than a high school degree had the highest lifetime prevalence of LBP at 17%. Those individuals who had a high school degree had a lifetime prevalence of 14% and those with a college degree had a lifetime prevalence of 11%. In the United States regional differences were evident for LBP prevalence with the highest prevalence in the western states (15%) and the lowest in the northeastern states (11%). In a follow-up study in 2006 that also used data from national surveys, Deyo⁴ and colleagues found that 26% of adults have had a bout of LBP when asked about their previous three-months health status. Again, as education level declined and income level declined, rates of back pain increased.

Additional estimates of the prevalence of LBP in the United States come from two published studies of care seeking conducted using a random sample of residents of North Carolina.^{5,6} The benefit of these two studies is that one was focused on acute LBP while the other dealt with chronic LBP. Chronic LBP was defined as functionally limiting back pain that lasted for more than 3 months or that produced 25 occurrences in 1 year, while acute severe LBP was back pain that was functionally limiting for at least 1 day. The 1-year period prevalence of acute severe LBP was 8%. The prevalence was higher among adults aged 35–39 and higher among Caucasian persons. The 1-year period prevalence of chronic LBP was 4%.

Prevalence studies and prevalence data are useful as they identify the size and the scope of the LBP problem and help to clarify the population that may require the provision of health services. LBP is a problem that is wide in its scope, having an impact on a large proportion of the population in the United States

RISK FACTORS FOR LOW BACK PAIN

In most prevalence studies the analysis of demographic or even clinical subgroups does not extend beyond bivariable descriptions of prevalence. This means we know the rate of LBP by educational attainment, we believe it to

be higher among those with less education, but since there are so many factors involved we can't be sure that educational attainment is truly related to developing LBP. The development of multivariable models makes possible identification of subgroups at risk for back pain or back pain care. The introduction of control variables allows multivariable models to identify more clearly associated risk factors.

Reisbord and Greenland⁷ studied LBP prevalence in relation to demographic characteristics using these multivariable techniques. The authors' intent was to develop a model for the prediction of LBP. In this study, the data source was the RAND Health Insurance Experiment and the survey definition of LBP was "frequent back pain during the 12 months prior to the interview." The demographic variables investigated included age, gender, race, education, occupation, physical demand of the occupation, income, and marital status. In the univariate analysis the authors found that all of the variables except race had a significant association with back pain. The prevalence of LBP was 4% higher among women than men. The multivariable modeling produced three identifiable subgroups for demographic profiles and prevalence. The high prevalence group comprised persons 50–64 years old and no longer married. The intermediate prevalence group was made up of persons 35–49 years old and no longer married and married persons with a high school education or less, regardless of age. Finally, the low prevalence group consisted of persons who were married with greater than a high school education and 18–34 year old persons who were no longer married regardless of level of education. The most important predictors for LBP prevalence in this analysis were education, gender, and marital status.

Studies of risk factors for LBP have also demonstrated that a key factor in risk is occupation and physical load/demand placed on the body. In Reisbord and Greenland's⁷ model, income, occupation, and demand were factors shown to be intermediate to education, gender, and marital status. This study was not only unique in the use of multivariable analysis but also in the finding that demographics may play a more important predictive role than physical attributes.

Heistaro et al.⁸ examined 20 years of data from a series of surveys conducted in Finland. The 20 years enabled these researchers to examine the stability of prevalence rates in relation to demographic and social characteristics and behavioral risk factors for LBP. The authors used statistical models to analyze the change in prevalence rates over time for subgroups divided by age and gender. Back pain was most prevalent among persons with lower levels of education, with lower levels of income, with blue-collar occupations, and

with jobs that required heavier physical workloads. These prevalence rates were relatively stable over the 20 years of the study, though the strongest and most time-stable determinant of LBP in this study was level of education.

Education level is a demographic factor that deserves attention on its own because it plays an important role as a determinant not only of back pain prevalence, but it has also been found to be a predictor of the outcomes of back pain episodes and the outcomes of care for episodes of back pain.⁹ A review of the evidence of the relationship between level of education and measures of back pain prevalence found that low educational status was associated with increased back pain prevalence in at least 16 separate studies. Education level, according to the authors' analysis, had a stronger effect on the duration and recurrence of back pain than it did with the actual onset of back pain. Five hypotheses were postulated to explain the relationship between education level and LBP. The hypotheses were based on the premise that education level may also be linked to socioeconomic status or other risk factors that occur in the presence of lower education levels. The hypotheses incorporated a profile of persons with lower education levels that included more toxic and hazardous living environments, more life stressors, more physically demanding occupations, compromised "health stock," and differential access to and differential use of health services. The authors urged for more rigorous methodology in future studies to adjust for confounding factors such as level of education and to develop a model accounting for multiple factors. It seems evident that social determinants play a crucial role in the occurrence of LBP and that LBP prevalence has an inverse relationship with measures of higher socioeconomic status.

LOW BACK PAIN AND RECURRENCE

LBP can be described as a condition in which pain and accompanying disability typically decrease rapidly within 1 month. Most individuals who are off of work due to LBP are able to return within a month.¹⁰ Improvement from the condition continues for 3 months. After the 3-month point, levels of pain, disability, and return to work remain constant with pain and disability, both at low levels for up to 12 months following onset. Finally, the risk of at least one recurrence of LBP within a year was estimated as a range from 66–84%. From this analysis, LBP could be characterized as a condition that for most people has a good prognosis since its impact is time-limited and improvement is imminent. However, the analysis also shows that LBP is a condition that likely will recur.

Von Korff et al.¹¹ examined the outcomes of back pain among patients enrolled in a health maintenance organization (HMO) who sought care from primary care physicians. In this study 1,128 patients participated in an interview 1 year after initially seeing a physician for back pain. Outcomes measured by the researchers included pain, disability, and depression. Patients were divided into two groups based on previous occurrences of back pain. At the 1-year follow up, both groups reported high levels of back pain in the month prior to the phone interview (69% and 82%). Poor outcomes in terms of persistence of pain and disability were associated with being female and having a lower level of education. This study suggests that the good prognosis of LBP may only be apparent if analysis is undertaken within a short time-frame after the initial onset.

Carey et al.¹² also examined the likelihood of recurrence after an episode of acute LBP. Subjects in the study were enrolled through a care provider and interviewed at 6 and 22 months after the initial visit to the provider. Over one-half of the 921 subjects identified as being at risk had a recurrence of LBP. The level of recurrence rose from the 6-month to the 22-month interviews. Predictors for recurrence included a history of more episodes of back pain and a higher level of disability.

Most studies that examine recurrence are restricted to follow-up periods of 1 year's time or shorter. Enthoven, Skargren, and Oberg¹³ extended the time period of follow up to 5 years to understand the long-term clinical course of persons with LBP. These authors surveyed a cohort of subjects who had participated in a prospective study on treatment by chiropractors and physical therapists. In this study, the researchers found that overall 63% of the subjects reported two or more recurrences or a continuous episode of daily pain at the 5-year point. In addition they found that 32% of their subjects reported seeking care during the 6 months prior to the survey. In summary, there is evidence that repeated episodes are common with LBP and that they often occur within 5 years of the first episode.

DISABILITY DUE TO LOW BACK PAIN

LBP results in a significant burden to society and to the individual due to the disability that is often a consequence of these conditions. Among chronic conditions reported in the U.S. National Health Survey, back pain is the most frequent cause of limitation for persons less than 45 years old.¹⁴ Fanuele et al.¹⁵ examined the impact of spine disorders and comorbidities on physical function. Functional status was measured using the Physical Component

Summary (PCS) derived from the SF-36 Questionnaire. The mean PCS score for subjects in this study was 30, which was lower than 50, the mean for the general U.S. population. Persons with greater numbers of comorbidities tended to have lower PCS scores; in this sample, 46% of the patients had at least one comorbidity. When subjects who had only a spine condition and no comorbidity were analyzed, the mean PCS was 32.

As with prevalence, demographic variables play a role as determinants of disability for persons with LBP. Deyo and Tsui-Wu¹⁶ found that disability due to LBP was most strongly correlated with education level. Hurwitz and Morgenstern¹⁷ found that the correlates of disability due to back pain included age, gender, race, education, marital status, employment status, presence of comorbidities, weight, and traumatic onset of back problem. Men, unemployed individuals, and persons with other disabling conditions were most likely to report a disabling back problem. Disabling back conditions were most common in the 35–54-year-old groups and among those with less than a high school degree.

Disability is an important outcome of LBP since it potentially results in a reduction of people available for the workforce. Recognizing the impact of disability, Rizzo et al.¹⁸ investigated the labor productivity losses associated with back pain. The authors used models to examine the probabilities of being employed and of missing workdays. Having back pain among older age cohorts resulted in a lower probability of being employed and increased the risk of incurring a disability day. When the models were translated into lost earnings the results for loss of employment were an average of \$1,106 annually for men and \$725 annually for women. The results for disability days were an average of \$124 annually for men and \$48 annually for women. At an aggregated level these figures result in annual productivity losses due to back pain of 28 billion in 1996 dollars.

HEALTHCARE UTILIZATION DUE TO LOW BACK PAIN

Rates of provider utilization for spine-related pain vary by provider type. The utilization rate for persons with LBP ranges from 39–85% for care sought from any category of healthcare provider. Rates of physician utilization are the highest of any provider followed by rates of chiropractic utilization and rates of PT utilization.

Utilization rates vary by the country in which a study was conducted and by the nature of the sample. By country, rates reflect healthcare patterns that are specific to the health services systems in place. The U.S. utilization rate

of 85% of all persons with LBP having seen any provider³ is the rate most often used to represent a national standard. However, in studies based on a population in North Carolina a utilization rate of 40% from all persons with LBP was reported.⁶

Feuerstein, Marcus, and Huang¹⁹ demonstrated that trends in overall utilization rates in the United States are stable by using a 10-year period of time. The rate of utilization for outpatient treatment for LBP was 4.5 per 100 population. Among those who received care, the proportion of physician care increased from 64–74% and the proportion of PT care increased from 5–9% in the 10-year period.

Only two studies have examined rates of multiple provider utilization and the factors that influence multiple provider use. Sundararajan et al.²⁰ examined the combination of using a physician and a chiropractor. Twenty-one percent of subjects saw more than one provider and this was associated with being referred by the initial provider seen, disease severity, and type of provider first seen. Côté et al.²¹ provided data on many provider types but only conducted a detailed analysis of the physician and chiropractor combination. These authors found that utilization of this combination of providers was associated with increasing age, lower levels of educational attainment, lower income levels, and worse general health and health-related quality of life scores.

Medical Care

LBP is not a true pathology but rather a symptomatic complaint that encompasses a number of diagnostic entities. Physicians account for the largest proportion of healthcare utilization due to LBP, with 59% of all persons with LBP seeing a physician.³ At least 2% of all ambulatory care visits to physicians are related to LBP, accounting for 13 million visits on an annual basis.^{4,22} Encounters with physicians have been analyzed by two published studies.^{23,24}

Cypress²³ published a study examining patient encounters with physicians among persons whose principal complaint was back symptoms. Among persons with back symptoms 61% were treated by primary care physicians while the remainder were seen by specialty physicians. Most persons visiting physicians due to LBP were aged 25–64 (70%) and the highest visit rate was found among males aged 45–64 years. Services ordered or provided by the physicians were both diagnostic and therapeutic in nature. Among diagnostic services, physicians offered a physical exam, X-ray, blood pressure check,

and clinical lab tests most often. Among the therapeutic interventions, physicians most often prescribed drugs, provided medical counseling, and referred to physical therapy. Study results were representative of a national snapshot of ambulatory care offered in physician offices for LBP.

Hart et al.²⁴ conducted a follow-up study on physician office visits for LBP. Persons aged 25–44 made the largest number of visits. Women made more visits than men. Among the racial and ethnic groups identified, African Americans and Hispanics had the highest rates of visits per thousand persons. The most common source of payment for visits was commercial insurance. In an analysis of the content of care provided, these authors concurred with Cypress in finding that the therapeutic intervention of choice for physicians was prescribing drugs followed by medical counseling. Again, physicians conducted physical examinations and used X-ray in diagnosis.

Physician care for LBP is quite varied and is greatly dependent upon physician specialty.²⁵ Orthopedists are more likely to order X-rays; physiatrists are more likely to order exercise; osteopathic physicians use more spinal manipulation. Nonetheless, guidelines on the management of acute LBP have clarified the medical nonsurgical approach to mechanical conditions affecting the spine.^{26,27} The guidelines and more recently published review articles^{26–29} have reiterated that medical care should revolve around conservative care, counseling, and education. Conservative care in this context refers directly to the care provided through physical therapy for LBP and includes manipulative and exercise approaches to the problem.

Physical Therapy Care

LBP is a disorder that has tremendous impact on service provision in physical therapy. Given this impact it is surprising that only three studies have examined physical therapy utilization among persons with LBP.^{30–32} These three studies examined the patterns of utilization, the nature of therapy provided, and its cost.

Freburger, Carey, and Holmes³⁰ studied physician referrals to physical therapy, specifically among persons with spine disorders. Thirty-eight percent of the sample was referred to physical therapy (PT). Need-based characteristics of the patient, specifically physician diagnosis, were positively associated with PT referral, as was education level, with more educated patients more likely to be referred. Older persons and men were less likely to be referred to PT.

In terms of utilization, LBP is the most frequent primary reason a person seeks care from PT.³¹ PTs tend to use a combination of interventions in treating LBP rather than relying on any single modality or tool.³¹ The interventions most commonly employed by PTs include therapeutic exercise, education, spinal mobilization, and physical modalities.³¹⁻³³

Freburger et al.³⁰ conducted a study to identify determinants of PT use or care seeking for persons with spine disorders. Using the data from the National Spine Network they found that education level and healthcare payment attributes explained the greatest amount of variation in PT use. The demographic characteristics associated with PT use included being female and being over 50 years of age. Persons who had PT were also more likely to be receiving workers' compensation and be in litigation. The results of their study are key in identifying that there are issues of disparities in access to physical therapy.

Mielenz et al.³² examined utilization of PT among persons with acute LBP in North Carolina. The likelihood of being treated by a PT was influenced by a person having a greater level of disability and by the provider first seen for an episode of LBP. Persons who saw orthopedic surgeons were most likely to be treated by a PT while persons who saw chiropractors were least likely. Demographic characteristics associated with utilization were similar to those found by Freburger et al.³⁰

OUTCOMES MEASUREMENT IN LOW BACK PAIN

With the need for physical therapy established by epidemiologic measures and patients pursuing a course of therapy for symptom resolution, physical therapists need to consider the issues of measurement and, in particular, measurement of outcomes due to LBP. In later chapters, readers will learn about the types of measures used during patient examination by therapists employing the manual therapy approaches in this book. The chapter authors most often use impairment-based measures such as range of motion, strength, or symptom response to provocative movements, as tools of measurement for the patient examination. These measures aid the therapist in determining a diagnosis and in assessing the prognosis, scope, and severity of the patient's problem. In Chapter 11, we draw the reader's attention to the Treatment-Based Classification (TBC) model, which relies on both impairment-based measures and two specific outcome/survey style measures to determine the appropriate intervention and to ascertain prognosis. The measures outlined in Chapter 11, the Fear-Avoidance Beliefs Questionnaire (FABQ) and the

Pain Catastrophizing Scale (PCS) are of use to therapists who wish to understand more about the impact of a patient's pain on daily life and function. In Chapter 11, the reader will learn about the implications of scores on the FABQ and the PCS for treatment decision making and how they fit into clinical prediction rule use.

Outcome measures enable the therapist to assess the impact of the condition, in this case LBP, on the patient's daily activities. Outcome measures may be used to ascertain impact on function at both an initial visit and then as a measure of the effect of an intervention on a patient later in the course of an episode of care. By using an outcome measure at multiple points during an episode of patient care, the therapist can understand and document the impact of interventions on function, quality of life, activities of daily living, and instrumental activities of daily living.

The outcomes measures we present here are all self-administered, condition specific, and commonly used for research and clinical efforts in the area of LBP. The three questionnaires are the Modified Oswestry Disability Questionnaire,^{34,35} the Roland Morris Disability Questionnaire,³⁶ and the Quebec Back Pain Disability Scale.³⁷ We suggest the therapist select an outcome measure that is appropriate to the patient, that has valid measurement qualities, and that is brief and easy to use. The instruments we present here meet these criteria. While a therapist can certainly elect to use generic health status or health-related quality-of-life instruments, we only selected outcomes measures that are condition specific to LBP. A brief overview of each instrument follows for the patient case presented in the next chapter; we give data using the Modified Oswestry Disability Questionnaire,³⁵ but any of these three outcomes measures are suitable to clinical practice.

The first iteration of the Oswestry Disability Questionnaire was developed at an orthopaedic hospital in Oswestry, a town in Shropshire, England, in the latter part of the 1970s.³⁴ The Oswestry contains 10 sections that describe pain and its impact on a number of daily living activities. Each section is scored from 0 to 5 with higher values indicating more severe activity limitations due to LBP. The Oswestry has been modified with the question about sex life replaced by a question related to home/work function.³⁵ This replacement from the original questionnaire was made since many patients were unwilling to respond to the sex life question in the clinic. Scoring and interpretation of the modified questionnaire are the same as with the original questionnaire. The Oswestry score calculated from the tool represents the sum of all the values from each of the 10 sections as a percentage out of 50 or the total possible points a patient could have scored if the patient does not

answer all the questions. The Oswestry has been reported to have high test-retest reliability. The Oswestry value for minimal detectable change has been reported as 10.5 points.³⁸

The Roland Morris Disability Questionnaire was originally published in 1983 and has since been translated into 36 languages and is used widely for LBP outcomes.³⁶ The scale is made up of 24 statements. The patient is asked to read each statement and make a mark next to any statements that are true about his/her pain. The scoring ranges from 0, which is indicative of no LBP disability, to 24, which indicates severe LBP disability.

The Quebec Back Pain Disability Scale was developed in Canada and published in the mid-1990s as a tool for clinicians to use for the measurement of “functional disability.”³⁷ The scale comprises 20 items that are scored using Likert-style scoring that ranges from 0, “not difficult at all,” to 5, “unable to do.” A patient’s total score is the sum of each of the item scores with higher scores indicating more severe limitation.

SUMMARY

Based on the presentation in this chapter, the therapist should have some understanding of the broader issues that surround LBP care. With this knowledge the therapist can now consider how each patient fits into the picture of the clinical care continuum. In the remaining chapters we explore a single patient on this continuum that has been referred to a physical therapist. The patient is demographically typical of persons with LBP. We will present the patient, his clinical signs and symptoms, and his scores on the outcomes measures. In subsequent chapters we will analyze several models of care a physical therapist may use in the process of examination and intervention for LBP.

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