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Cornerstones of Disability Prevention and Management

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Table of Contents

Introduction and Overview	3
Work Disability Prevention and Management	3
Summary of Recommendations	4
General Recommendations	4
Specific Recommendations	5
Principles, Terms, and Definitions	6
Seven Dimensions of the Health-Disability Relationship	6
Serious Medical Conditions and Common Health And Life Problems	7
Other Principles and Terminology	8
General Considerations in Work Disability Prevention and Management	10
The Biopsychosocial Approach	10
The Biomedical Model	10
A Conceptual Framework for Work Disability Prevention and Management	11
Multi-Stakeholder Collaboration	14
Iatrogenicity	15
Focus on Pain Relief vs. Functional Restoration	17
The SPICE Model	19
Transitional Work and Activity Prescription: Go to Work/Stay at Work/Return to Work	19
Evidence-Based Medicine and Evidence-Based Management	23
Physician Compensation for Work Disability Prevention and Management Activities	26
Primary and Secondary Prevention	27
Attitudes, Beliefs, and Expectations: a Fundamental Theme	27
Specific Considerations and Potential Interventions in Work Disability Prevention and Management	29
Medical Management Factors	29
Introduction	30
Other Factors Considered	30
Inappropriate Initial Management	30
Physician Training and Orientation Factors	31
Personal Factors	40
Psychological Factors	43
Potential Levels of Management of Psychological Factors	47
Individual and Systemic Reluctance to Address Behavioral Health Issues	51
Societal and Cultural Factors	52
Systemic Factors	54
Workplace Factors	59
Disability Risk Prediction	63
Case Management and Coordination	66
References	69

Introduction and Overview

Work Disability Prevention and Management

Evidence has been steadily accumulating that “worklessness” for any reason is associated with substantially increased morbidity and mortality, as well as other negative psychological, social, and economic effects on the affected person, their family, and the community. The years of productivity lost (YPL) among Washington State workers receiving time loss payments for injuries in 1986 has been estimated to be 14,624 to 28,027 (3.8 to 7.3 million workdays).(1) A recent study documented severe impacts from occupational illness or injury, noting the following(2):

- Two-thirds of respondents lost their health insurance after being diagnosed with a work-related illness or injury (most for more than 1 year),
- Striking financial burdens, with respondents reporting that they were encumbered with both costs directly related to the medical care of their condition, and with coping with ongoing general expenses on a reduced income (many reporting depleting savings, borrowing money, taking out retirement funds, and declaring bankruptcy), and
- Issues of depression, anxiety, and loss of identity and self-worth.

Unnecessary lack of work in an employment-age person wastes human and financial resources, creating net economic dependents out of former economic contributors. The disparity between outcomes in well versus poorly managed health-related employment disruptions reveals not only how much work disability (particularly as a result of common everyday health problems) is avoidable, but also exposes its destructive consequences.

Physicians, including occupational health physicians and other health care providers, are in a position of influence as advisors to affected workers and providers of information to employers and benefits program administrators. Thus, they play a key role in the process that determines whether someone will stay at work or return to work (SAW/RTW), and if not, whether they will qualify for benefits. The outcome of that process is influenced by both medical and non-medical factors, some of which are malleable. Physicians who actively strive to preserve the health, function, jobs, and future employability of working-age people make a contribution of benefit to all parties, as well as help control the growth of disability program costs, and protect the vitality of both economies and societies.

Although the incidence of work-related illnesses and injuries has been falling steadily for the last three decades, the number of lost work days per case has climbed, as has the number of provided medical services and related costs. Analysis of data from millions of benefit claim records shows that absence durations are typically one-third longer for work-related injuries than for identical non-work-related injuries. In the United States, the proportion of every benefit dollar spent on medical care has risen from approximately 40 to 60%. Paradoxically, employers are paying for more – and more expensive – medical services, but employees are losing more time from work attributed to medical reasons. The obvious question arises – how much of this work disability can be prevented?

Weeks, months, or even years of work absence are sometimes unavoidable such as due to major surgery, catastrophic injuries (e.g., amputations, blinding, major burns, or spinal cord injuries), or when severe or progressive illnesses develop such as certain cancers, rheumatoid arthritis, multiple sclerosis, or schizophrenia. Beyond the biology itself, these individuals must cope with obvious difficulties in adapting their lives around medical problems of this magnitude. However, extended work disability is becoming more prevalent among people with common health and life conditions that usually cause only a few days of work absence, such as low back, neck, shoulder, knee, and wrist pain, or depression and anxiety. In fact, among the highest cost claims in both work-related and non-work-related disability benefits programs are many that began as these relatively benign conditions. It has been estimated that 5% of workers’ compensation cases account for 80 to 85% of total costs.(3) Longer durations of workers’ compensation claims are associated with higher chronicity rates.(4-6)

The fundamental question this chapter seeks to address is – how can all stakeholders in the process work more effectively to reduce the disruptive impact of injury, illness, and age on peoples’ daily lives and work, and help them remain fully engaged in society as long as possible? In order to address this question, a conceptual framework of contributing factors to work disability and potential interventions to address those factors is presented. This chapter forms a bridge between the *Guidelines* chapters on Prevention and Chronic Pain, building on the former (prevention) and attempting to provide methods of avoiding the latter (chronic pain). To begin, conceptual issues in work disability prevention are introduced that emphasize the importance of keeping life as normal as possible for ill and injured workers, keeping them at work, or safely returning them to medically appropriate work as soon as possible. Six primary areas of influence on the recovery of affected workers from illness and injury are identified, including medical, personal, psychological, socio-cultural, systemic, and workplace

factors. The chapter lays out methods that avoid creating iatrogenicity – working within a biopsychosocial framework, using evidence-based guidelines for medical treatment and disability duration, collaborating with other stakeholders, and establishing appropriate reimbursement for physician effort at work disability prevention and management. In sum, the chapter outlines a framework for examining the myriad influences on work disability and marshals the somewhat limited evidence on the effectiveness of various interventions. It also attempts to provide useful guidance to physicians and other stakeholders on tools and techniques which may be useful to them, whatever their sphere of influence, in assisting affected workers to remain engaged in society at all levels, and preventing and managing the devastating effects of this problem.

Summary of Recommendations

General Recommendations

The Work Disability Prevention and Management (WDPM) Panel recommends that **all stakeholders** (clinicians, employers, payers, and others) in the Work Disability and Prevention process:

- Primary prevention is preferable to secondary prevention, no matter how effective the secondary prevention programs may be. Thus, it is even better to avoid illness, injury and re-injury through programs such as wellness and health promotion, pre-work screening for functional ability, and workplace safety than it is to mitigate the impact of those medical conditions on people's lives and work.
- When injury or illness or the effects of aging become apparent, adopt a secondary prevention approach designed to prevent work disability whenever possible by minimizing attendant life disruption, work interruption, and job loss.
- Understand the continuum from symptom-based musculoskeletal complaints (common health and life problems or CHLPs) and those based on demonstrable tissue pathology (serious medical conditions or SMCs), the strong contribution of the former to work disability, and the need for differentiation between the two in diagnosis and management.
- Operate within a broad biopsychosocial model that acknowledges the influence of causal and contributing factors in multiple domains on work disability. When delay in recovery occurs or difficulties arise, seek potential issues that may be amenable to intervention in the medical, personal, motivational, interpersonal, psychological, socio-cultural, and administrative/regulatory/legal domains, as well as the tangible environment.
- Actively collaborate with other stakeholders to preserve or restore the patient's usual daily routine and resume productive work activity as rapidly as possible. Strive to appreciate other stakeholders' perspectives, priorities, and challenges. Provide support for problem-solving interactions between the direct supervisor and the affected worker.
- Remain cognizant of the potential for iatrogenic effects by their actions or inactions, particularly with regard to: 1) medicalization of nonmedical issues such as job dissatisfaction, workplace performance problems, and personal issues such as anger and domestic stress; 2) a focus on pain relief instead of functional restoration for affected workers; and 3) unnecessary delays in recognizing, reporting, diagnosing, and medical and administrative management of worker illness and injury.
- Appreciate the importance of underlying attitudes, beliefs, and expectations (ABEs) of all stakeholders on their approaches to and behaviors in work disability prevention and management. When delays in recovery occur, investigate underlying ABEs of all stakeholders – particularly those of affected patients and their direct supervisors – with regard to the process of recovery, activity during recovery, or adjusting job demands to changes in work capacity. When necessary, seek to positively modify ABEs through education or by offering a different perspective (reframing).
- Acknowledge affected worker psychological factors, ranging from normal reactions to illness or injury through both adaptive and maladaptive reactions and behaviors to primary or co-morbid psychopathology, and effectively address those contributing to work disability. Effectively address normal human reactions to illness or injury and provide support for coping efforts. Preserve self-reliance by ensuring that patients remain an active participant in their own recovery and return to function. When persistent maladaptive reactions or frankly abnormal behaviors become apparent, or when pre-existing or co-morbid psychopathology exists, provide access to behavioral health interventions on the condition that they will expedite functional recovery, including pharmacotherapy and/or referral for psychotherapy, particularly short-term, evidence-based and non-dependency producing techniques such as cognitive behavioral therapy.
- Actively drive towards optimal episode outcomes for affected workers, especially whose benefits will be paid by workers' compensation insurance, since these patients tend to have worse medical, personal, and vocational outcomes than those covered by other benefit programs.

The WDPM Panel recommends that all stakeholders avoid:

- Inhumane or medically inadequate treatment of newly-injured or vulnerable patients in order to manipulate safety or attendance records, lost time injury statistics, or other performance metrics;
- Exposing patients to risk by ignoring medical restrictions designed to keep them safe and reasonably comfortable;
- Overestimation of the accuracy or precision of physician recommendations regarding worker functional limitations and work capacity;
- Aggressive, extensive, or prolonged medical treatment of benign conditions such as non-specific low back pain because it increases the risk of iatrogenic and advocagenic impairment and work disability.

Specific Recommendations

The WDPM Panel recommends that physicians and other treating clinicians who care for ill and injured individuals:

- Learn the basics of their role in preventing needless work disability by helping working age people become and stay employed, and remain as fully engaged in society as possible.
- Take responsibility for assisting affected individuals to minimize the work life disruption created by injury or illness or the effects of aging and optimize functional recovery
 - Adopt the SPICE model as described below.
 - Avoid removing employees from work entirely unless work avoidance is actually medically required due to the condition itself.
 - Support affected individuals in staying at or returning to work by specifically describing the circumstances under which they can work as safely and comfortably as possible.
 - Provide activity prescriptions whenever individuals' ability to function either on the job or at home has been altered by medical conditions or if specific circumstances pose a hazard (medical risk). Such activity prescriptions should encompass the actual functional requirements of jobs, objective facts concerning individuals' ability to function, and the perceptions of the affected person.
- Stay alert to elapsed time from the date that life disruption began, since the likelihood of a good outcome falls over time. Adjust the urgency of interventions to the life disruption calendar, instead of the interval since the patient entered the physician's care.
- Develop communication skills to use and enhance the power of the physician's role and speaking as a positive influence on attitudes, beliefs and expectations (ABEs) of patients and other stakeholders. Include information and reassurance about the beneficial effects of remaining active and at work on recovery and well-being as part of routine patient education. When speaking with other stakeholders, do the same thing. Adjust communications with affected individuals and other stakeholders to the receiver's cultural background and educational level.
- Encourage and participate in interactive dialogue and problem-solving in the go to work/stay at work/return to work (GTW/SAW/RTW) process.
 - Actively support affected individuals in communicating with supervisors or return to work coordinators.
 - Proactively reach out to employers or insurers when the process becomes delayed; offer information, education, or assistance with problem-solving.
 - Seek opportunities to explore and influence stakeholder ABEs, particularly with regard to obstacles to GTW/SAW/RTW.
- Use the ACOEM *Practice Guidelines* and other authoritative and evidence-based medical treatment guidelines as a communications device with other stakeholders.
 - Read or provide excerpts from relevant sections from the guidelines to patients, employers, claims adjusters and case managers in order to explain and support the reasoning behind treatment and functional recovery plans.
 - As an important example, when a patient's recovery is being delayed because the payer has not yet authorized a comprehensive risk assessment, psychosocial evaluation, behavioral medicine intervention, or psychotherapy as suggested or recommended by the guidelines, a telephone conversation between the treating or consulting clinician and the payer that points to the relevant guideline provision can build support for those interventions.
- When choosing among diagnostic and therapeutic methods, preferentially select those known to be the most effective in restoring function and shortening the period of life disruption, while at the same time minimizing risk to the patient and maximizing cost effectiveness.
- Consider the possible deleterious effects on wound healing and functional recovery of individuals with undetected or unaddressed substance abuse (particularly alcohol and tobacco), and recommend evaluation or treatment for them.

- Identify and use referral resources in the local community that are prepared and willing to assist with patients whose recovery is being delayed or imperiled by psychological or non-medical factors.

The WDPM Panel also recommends that **physicians and other treating clinicians** seek to do no harm and avoid:

- Contributing to the disempowerment, stigmatization and abandonment that sometimes occurs to individuals who find themselves in the workers' compensation system, particularly the exclusion of affected individuals from active participation and responsibility for decision-making and problem-solving in GTW/SAW/RTW.
- Overemphasizing common life and health problems (CLHP):
 - Refrain from use of alarming or dramatic diagnostic labels or jargon in the absence of serious medical conditions (SMCs), instead using lay terminology like "common back pain."
 - Educate stakeholders, particularly affected workers, by putting conditions into proper perspective. Provide appropriate and accurate reassurance by emphasizing the likelihood of full recovery when appropriate, or the need to live with, adapt to, and "work around" residual symptoms due to work related conditions or other factors such as encroachment of age.
 - Defer early establishment of a precise anatomical diagnosis (even when pressed) unless red flags are present or diagnostic certainty will materially affect management. If diagnostic imaging must be obtained, educate the patient beforehand about the meaning and relevance of possible results, particularly the prevalence of 'abnormal' but non-contributory findings due to age or other factors.
 - Avoid elaborate or aggressive treatment regimens for new problems in the absence of serious medical conditions (SMCs), as such inappropriate management may signal an inaccurate level of seriousness to the affected individual.
- Employment of interventions shown to worsen functional outcomes, such as:
 - Bed rest and prolonged inactivity.
 - Early or prolonged use of narcotic analgesics in the absence of definite indications (such as significant acute trauma or SMC).
 - Withdrawing patients from work or writing strict work restrictions and limitations based on patient preference, fear, or pain alone without a sound or objective medical or functional basis.
 - Implying that work disability work is medically necessary when it is actually due to discretionary decisions or other non-medical factors.
 - Inappropriate specialist and rehabilitation referral practices, which may include: a) premature referral for diagnostic imaging, specialist evaluation or extensive rehabilitation in the absence of red flags or failure of simple initial evidence-based care; and b) delayed referral despite the patient's failure to recover as expected based on normative disability duration data.
 - Beyond the acute or immediate post-operative setting, treatments whose only therapeutic endpoint is the relief of pain rather than restoration of function.
 - Prolonged or extensive passive treatments, such as occupational or physical therapy and chiropractic manipulation, especially if the intervention is not focused on or progressively effective in restoring the ability to perform a specific function necessary at work or home.

Principles, Terms, and Definitions

Seven Dimensions of the Health-Disability Relationship

Several interrelated terms are used in the study of disability.(7) Objectively demonstrable or verifiable conditions include disease and impairment. **Disease** is a disorder of structure or function that deviates from the biological range of normal,(8) and may include biochemical, physiological, or anatomical abnormalities resulting from pathological processes. **Impairment** is defined as "a significant deviation, loss, or loss of use of any body structure or body function in an individual with a health condition, disorder, or disease."(9) Impairment is not the same as the underlying disease, but is the manifestation of the disease. Disease may or may not lead to physical or mental impairment, and does not necessarily cause symptoms, illness, disability, or incapacity.(7)

Subjective conditions, which add elements of conscious or unconscious experience of the individual, include symptoms and illness. **Symptoms** are "bodily or mental sensations that reach awareness and are bothersome or of concern to that person, e.g., feeling aches and pains, being tired or anxious."(7) Some symptoms are a clinical manifestation of disease. However, many symptoms are related to activities of daily living or aging and are a normal part of life. Some symptoms fall outside of the range of what is considered to be normal, but are not reliably associated with any identifiable disease process. These

have been termed “subjective health complaints”(10) or “medically unexplained symptoms.”(11) It has been suggested that these symptoms may also be manifestations of common life problems, such as minor psychological distress due to work or family issues.(12) Many people have mild or moderate cardio-respiratory, musculoskeletal, or mental health conditions that have been described as “common health problems.” (13) All of these poorly defined conditions can cause considerable symptomatic distress and may be a source of work disability. This chapter will use the term “common health and life problems” (CHLPs) to encompass these syndromes, which are discussed in more detail in the section on iatrogenicity.

Illness or ill health is the subjective feeling of being unwell. It occurs when a health condition impacts on well-being or quality of life, although not necessarily producing impairment as defined above. Central to all definitions is that illness is an internal and personal experience.(7)

Consideration of the environmental context produces sickness (or the sick role), disability, and work incapacity. **Sickness or the sick role** is a social status accorded to the ill person by society and defines interactions between the individual and other people or society.(7) It implies a lack of direct responsibility for the condition and involves both temporary exemption from normal social roles and a responsibility to seek competent medical help and cooperate with medical advice to get well.(14) **Disability** is defined as “activity limitations and/or participation restrictions in an individual with a health condition, disorder, or disease.”(9) **Incapacity for work** is reduced capacity, functioning and performance in work, associated with sickness or disability. The traditional biomedical model has related these concepts as below, with disease (or symptoms, or illness, including common health and life problems) causing impairment and resulting in disability and work incapacity.

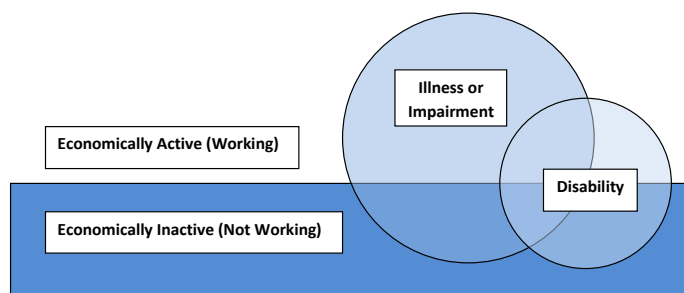
DISEASE

SYMPTOMS → IMPAIRMENT → DISABILITY → WORK INCAPACITY

ILLNESS

However, it is important to note that **impairment** and **disability** are not synonymous. The former is an objectively observable and often measurable alteration of body structure or function, whereas the latter is a more global disruption of function encompassing psychological characteristics of the individual as well as environmental and other influences.(9) In addition, there is a limited correlation between illness (or impairment) and disability (see Figure 1, below).

Figure 1. Limited Correlation Between Illness/Impairment and Disability



Modified from Waddell G, Aylward M. *The Scientific and Conceptual Basis of Incapacity Benefits*. London: The Stationery Office, 2005.

Work disability (synonymous with **work incapacity** in the classification above) is the focus of this chapter. Work disability is usually operationally defined as absence from work, reduced productivity while at work (“presenteeism”), or working with functional limitations as a result of either illness or injury.(15) It is important to note that the term “work disability” includes both work-related and non-work-related causes. This is an important concept given the aging of populations and the rise in incidence and prevalence of chronic diseases and impairments which impact work function.

Serious Medical Conditions and Common Health And Life Problems

Occupational illnesses and injuries may or may not be characterized by pathophysiological abnormalities. Demonstrable tissue pathology at micro- or macroscopic levels include sprains, strains, spinal disc herniations, and fractures, and non-musculoskeletal conditions such as eye injuries, inhalation toxicities, and occupational cancers. Historically, the incidence and prevalence rates of these various conditions are decreasing with increased attention and efforts at safety and prevention.

Some symptoms (e.g., chest pain) are clearly clinical manifestations of disease. However, many symptoms (e.g., musculoskeletal discomfort, particularly spine pain) may be related to activities of daily living and are a normal part of life – this is particularly true in an aging workforce with many chronic illnesses. Many people have mild or moderate cardio-respiratory, musculoskeletal, or mental health conditions that have been described as “common health problems.”(13) Some symptoms fall outside the range of what is considered normal, but are not reliably associated with any identifiable disease process. These occurrences have been termed “subjective health complaints,”(10) “medically unexplained symptoms,”(11) or “functional somatic syndromes.”(16) These conditions have been characterized as follows(7):

- There is high background prevalence in the general (working) population.
- There is usually little evidence of disease, permanent damage, or impairment.
- Most acute episodes resolve quickly (with or without health care), at least sufficiently for return to most normal activities even if with some persistent or recurrent symptoms.
- Most people with these conditions remain at work and the large majority of those who do take sickness absence return to work quickly, even with residual symptoms.
- Many people with these conditions, even those on compensation or social security benefits, do not have any absolute physical or mental incapacity for most ordinary activities and most jobs in modern society.
- Overall, only about 1% of episodes of sickness absence associated with these problems go on to long-term incapacity. Yet, these conditions generate a hugely disproportionate amount of lost time and cost.

In the same context, four characteristics of musculoskeletal pain have been described(17):

1. It is very common, to a large degree reflects normal human development and experience, and is adapted to and coped with by a majority of people.
2. Many painful musculoskeletal conditions are self-limiting, and others wax and wane in symptom severity.
3. The true prevalence and natural history of these conditions is unknown because people do not consistently seek medical care for them.
4. The biomedical model of illness has not been a successful approach in terms of decreasing pain intensity and pain-related disability.

The need to differentiate conditions with demonstrable pathology, termed “severe medical conditions” (SMCs), from symptom-based conditions, which are classified as “common health problems” (CHPs) has been emphasized.(13) It has been suggested that musculoskeletal symptoms and conditions may also be manifestations of common *life* problems, primarily psychosocial issues such as job dissatisfaction and familial and financial concerns. This chapter will use the term “common health and life problems” (CHLPs) to encompass these syndromes, which are discussed in more detail in the section on iatrogenicity.(12)

There is no clear threshold between severe medical conditions and common health and life problems. Instead, there is a continuum or spectrum. All of these poorly defined conditions can cause considerable symptomatic distress and may be a source of work disability. A major challenge for physicians caring for affected workers is the differentiation of SMCs and CHLPs, and appropriate management.

Other Principles and Terminology

Return to Work

As noted, the term “return to work” (RTW) can be utilized as both a process and an outcome measure.(15) As a process, the term is most often used in the context of go to work/stay at work/return to work efforts involving temporary (transitional) or permanent (modified) adjustment to the individual worker’s job description and function.(18) These activities are crucial to ill or injured worker rehabilitation and are discussed at length in the section on Transitional Work and Activity Prescription. As an outcome measure, RTW can be categorical and descriptive (working or not working) or a continuous variable measuring parameters such as duration or extent of inability to work due to functional limitations.(19, 20) An additional temporal consideration raised by a 1996 study is that 61% of workers with an initial episode of temporary work disability experienced at least one subsequent episode of work absence due to the same illness or injury event.(21) Thus, only 39% of the workers in the sample returned to and remained in their original job during the course of the study. Multiple variables, including occupation, past history of work disability episodes (e.g., affecting worker expectations for successful return to work), and variability in effects of environmental factors and treatment over time as complicating factors in work disability prediction have also been described.(22)

Medical Necessity of Work Absence (Disability)

Work absence may be considered to be medically necessary, discretionary, or unnecessary.(23) **Medically necessary work absence** requiring prolonged time (more than 2 weeks) away from work may be due to:

- Hospitalization or requirement for frequent attendance at a place of medical or other care.
- Medically unstable conditions (e.g., new-onset seizure disorder or severe psychiatric conditions) or advanced progressive neurological disorders which cannot be satisfactorily medically managed and which may present a danger to affected workers or others.
- Requirements for confinement at home, particularly to bed (e.g., acute response to injury or risk of contagion).
- Conditions in which travel to and from the workplace or work activity itself is medically contraindicated and poses a serious risk to affected workers, co-workers, or the public, or may delay the affected worker's recovery.
- Debilitating conditions such as severe congestive heart failure which may preclude even sedentary activities.

The following factors **do not** make work disability medically necessary(24):

- Self-perception of work incapacity by affected workers without objective evidence.
- Personal decision on the part of affected workers (see tolerance, below).
- Delay in diagnostic or specialist referral.
- Business decision on the part of employers or payers.
- Insurance company design of insurance policies.
- Social decisions made by legislatures or other policy bodies.

Discretionary disability occurs at the volition of affected workers or employers and is: 1) associated with diagnosable medical conditions that may have created some functional impairment but left other functional abilities still intact or 2) more commonly, due to worker or employer decision not to make the extra effort required to find a way for the employee to stay at work during illness or recovery.

Unnecessary disability results from delayed medical care (due to communications delay, ignorance or resistance on the part of participants, administrative or procedural delay, or poor case and care management), inadequate medical care (whether due to diagnostic, treatment, or administrative, factors), and failure to address non-medical issues due to medicalization or reluctance on the part of stakeholders. This form of disability may be termed *preventable* or *avoidable* work disability, and often involves a combination of a medical condition affecting function, loss of ability or willingness to cope, and lack of external support.(25)

Risk, Restriction, Capacity, Limitation, and Tolerance

Five relevant terms – risk, restrictions, capacity, limitations, and tolerance – have been described in determining affected worker ability to perform a given job description, and suggested an ordered process for making return to work determinations.(26)

Risk refers to the chance of compromise of the healing process, or harm to affected workers or the general public if individuals engage in specific work activities. The presence of specific risks may necessitate the use of **work restrictions**, which proscribe activities that affected workers can, but should not, perform. A common example is the prohibition of individuals with uncontrolled seizure disorders from working as aircraft pilots or commercial motor vehicle operators.

Capacity refers to concepts such as strength, flexibility, endurance, and cognitive function, most often in terms of affected workers' current ability. Capacity may be described by physicians in terms of **work limitations**, which state activities that affected workers cannot physically or psychologically perform. Examples are the inability of workers with untreated rotator cuff tears and loss of shoulder range of motion to effectively execute above-the-shoulder tasks; performance of work frequently requiring 6 metabolic equivalents (METs) of exertion by workers that can only exercise to 4 METs due to cardiopulmonary disease; and interference with problem solving or limb coordination capabilities by medications.

Tolerance is a psychophysiologic concept which describes affected worker willingness and motivation to sustain work or activity at a given level, particularly in the presence of pain and/or fatigue. Tolerance is in large part dependent upon the rewards available for performing the activity of interest. Tolerance is not a scientifically verifiable concept, and is not an appropriate subject for work restrictions or limitations.

Time Course and Phasing of Illness and Injury

The terms “acute,” “subacute,” and “chronic” are used in this chapter to refer to the generally accepted time periods of less than 1 month after the illness or injury event (acute), between 1 to 3 months post-event (subacute), and more than 3 months post-event (chronic).

General Considerations in Work Disability Prevention and Management

The Biopsychosocial Approach

“What is needed for the future is a comprehensive multivariate biopsychosocial job related model of work disability. ...Only a comprehensive model developed on the basis of sound methodological criteria could or should become a foundation for the practical applications in health care and compensation systems to identify workers at highest risk of disability and provide appropriate rehabilitation programming.”(27)

The Biomedical Model

As previously discussed, Western medicine has historically relied upon a biomedical (BM) model of disease, and consequent illness, impairment, and disability. The BM model assumed a duality between mind and body reliant on “a seventeenth century paradigm predicated on the mechanism, reductionism, determinism, and dualism of Newton and Descartes,”(28) with a direct correspondence between nociception (the pathophysiology of tissue damage) and pain (the experience of discomfort).(17) The work of Beecher(29) and Engel(30) added psychogenic factors to the potential etiology of pain. However, the combined model still assumed that pain was either organic or psychological in origin, thus supporting and perpetuating the mind/body duality.(31) The BM model primarily involves the patient and physician, and formed the basis of the modern medical approach to the patient.(32) It assumed that once the discrete nociceptive stimulus – or psychological dysfunction – has been identified and addressed, the pain will be cured according to the following sequence:

HISTORY AND EXAMINATION → DIAGNOSIS → TREATMENT → CURE

Modern concepts of workers’ compensation and social security evolved early in the 20th century and were based on the BM or disease model.(33) In this context, the BM approach assumed a linear relationship among disease (and resultant pain), impairment, disability, and work incapacity(7):

DISEASE (PAIN) → IMPAIRMENT → DISABILITY → WORK INCAPACITY

Until recently, current debate about the nature of disability was characterized by conception of the human body, mind, and society as separate spheres of existence.(34) However, even within the BM model, the relationships of disease, symptoms, and treatment is complex. For example, a patient’s symptom relief from a glucocorticosteroid injection may represent the normal self-limiting course of the condition, a placebo effect, regression to the mean, or an actual therapeutic effect.(17)

The Biopsychosocial Approach

Individuals have different genetic compositions, developmental and learning histories, emotional and physical experiences, and exposure to environmental and sociocultural influences. This variability contributes to marked differences in individual responses to similar situations, including disease conditions. The BM approach is appropriate for many acute and uncomplicated disease or injury processes (e.g., bone fracture), as well as for serious medical conditions, but is incomplete in explaining and providing a basis for management of more complex conditions or for individuals who do not respond well to traditional approaches.(15, 35)

In 1977, Engel published a seminal paper on the biopsychosocial (BPS) model, proposing that behavioral, psychological, and social influences needed to be considered in individual responses to similar pathologic (BM) processes.(36) This approach emphasized the limited correlation between nociception and pain and acknowledged the complex influences of internal and external variables on individual pain experience.(17) It should be clear that the BPS model does not merely refer to “tacking on” a psychological component to the BM model. The approach includes consideration of biomedical factors (disease processes and nociceptive sensitivity), psychological variables (cognitive factors such as affected worker attitudes, beliefs, and expectancies; self-efficacy; and emotional components such as anger, anxiety, fear, and frustration), and socio-cultural factors (environmental influences and learning mechanisms). The traditional medical/psychiatric approach gradually evolved away from psychopathology to a broader psychosocial adaptation perspective, integrating research from medical, social, anthropological, physical therapy, psychological, and occupational spheres.(15)

In the occupational medical context, the connection between disease and impairment may be strong for some discrete disorders (e.g., post-operative impairment in range of motion, or decrease in oxygen diffusion capacity related to pulmonary fibrosis), but the relationships among impairment, disability, and work incapacity are often less clear. The latter are subject to a plethora of factors both intrinsic and extrinsic to affected workers, including cultural, economic, familial, psychological, social, and vocational elements. These individual- and system-related psychosocial factors influence reaction to and recovery from illness or injury, and play a prominent interactive role in work disability severity and duration and readiness to return to work.(15, 22, 27, 37-40) For example, there are robust data that psychosocial factors have consistently been found to be more predictive than physical ones in accounting for chronic low back pain.(35) The BPS model provides a conceptual mechanism for better understanding of affected worker recovery, as well as failure to respond to conventional diagnostic and therapeutic interventions for what appear to be straightforward medical conditions and CHLPs. There is extensive literature demonstrating the therapeutic effectiveness of a BPS model-based functional restoration program for chronic low back pain(41-47) (see Low Back Disorders and Chronic Pain chapters).

Time and the evolution of contributing factors to work disability are other important variables to be considered. The dynamic nature of influences over work disability over time has been recognized, and that occupational disability should not be considered to be a static state emphasized.(22) The effects of prognostic risk factors may change over time.(19, 48, 49) The phase-specificity (acute, sub-acute, and chronic, as described above) of risk factors for work disability has been described(50) Similar phases for back pain have been supported by multiple investigators.(19, 51, 52) The majority of clinical spine disorders, as well as a number of medical conditions such as hypertension and diabetes, have no permanent (or imminently foreseeable) cures and are recurrent and chronic in nature. This has led to an evolution of the phase-specificity model and emergence of prognostic approaches (53, 54) which suggest that physicians need to move away from an exclusively curative focus (BM model) to a more comprehensive rehabilitative management approach in dealing with these chronic medical illnesses.(35)

It has been noted that “we are still at the infancy stage in developing complex solutions for complex problems.”(35) A comprehensive analysis of models of work disability summarized the current evolution as comprising the following features(15):

1. A diminished role for the biomedical and insurance models, with a shift away from the latter’s focus on medicolegal evidence and compensability determination towards efficiency in health care cost management.
2. Expansion of ecological and case management approaches, with more emphasis on the interaction among affected workers and many key disability stakeholders.
3. Appreciation of the effects of the macrosystem of economic factors.
4. A greater appreciation of psychosocial factors, both individual cognitions about disability and its system-based social context, and cognitively mediated motivational factors in RTW.
5. Increased support for and reliance upon the biopsychosocial model, as described above.
6. Addition and articulation of stage-based models of work disability, with focus on temporal aspects and patterns of the disablement process by including medical recovery and psychosocial factors interacting with the time since injury and readiness to return to work.

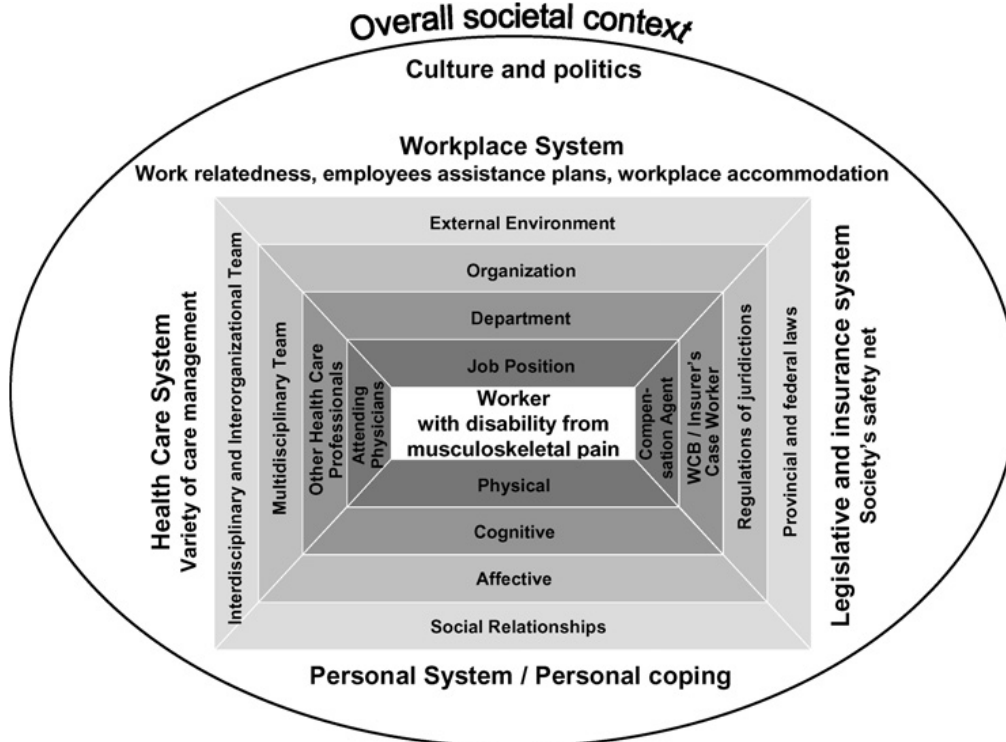
A Conceptual Framework for Work Disability Prevention and Management

In describing the problem of spine pain, LaRocca posited that “this predicament is not the result of an inadequate fund of available information with which to address the matter; to contend otherwise is to engage in counterproductive sophistry. Instead, the problem emanates from the lack of a comprehensive and unifying problem-solving strategy to appraise the relevant data and from there to establish policy and procedures for implementing effective management while remaining receptive to new learning.”(55) In a 1996 editorial, it was noted that “there appears to be a need to move from a verbal recognition that [problems with the implementation of multi-disciplinary prevention and rehabilitation services] are determined by some combination of medical, physical, ergonomic, psychosocial, and economic factors to the development and implementation of systems of care that truly allow for the consideration of these factors within appropriate limits...What is evident is that history has indicated that no one specialty has the answer or ability to effectively prevent or manage these problems.”(56)

As described in the late 1970s, Bronfenbrenner(57) advanced an ecological theory of human development describing “layers” of environmental influence affecting the individual.(15) Later, related this concept was related to workplace interactions among “microsystems” (the worker), “mesosystems” (the health care system, insurance and payment system, and the

workplace), and “macrosystems” (economic influences, and legislative and societal factors).(58) In 2001, a disability prevention management model was advanced that aggregated these factors (in a slightly different form) into a conceptual framework recognizing the multiple stakeholders in occupational disability.(59, 60) The BPS approach discussed above builds on biomedical and ecological models to integrate all of the component factors into a systemic approach comprising 6 domains, which were depicted by the ecological model(61) in Figure 2.

Figure 2. The Arena in Work Disability Prevention



With kind permission from Springer Science + Business Media: *J Occup Rehabil*, Prevention of work disability due to musculoskeletal disorders: the challenge of implementing evidence, 15, 2005, 507-24, Loisel P, Buchbinder R, Hazard R, Keller R, Scheel I, van Tulder M, Webster B, Figure 1.

These domains include the following factors, which are extensively addressed later in the chapter (those in parentheses refer to the corresponding dimension of the Loisel model depicted above):

Medical Management Factors (Health Care System)

These considerations include the potential positive and negative influences of physician management on eventual disability. An overarching concern is avoidance of iatrogenicity, or disability introduced or exacerbated by physician attitude, approach, and action or inaction (see below). Medical factors include initial management of ill or injured workers, physician training and orientation factors (such as occupational medical and work disability focus), physician performance (particularly avoidance of over-diagnosis and over-treatment), the nature, quality, and quantity of interaction between physicians and affected workers, and specific physician practices such as the inappropriate use of opioids and work restrictions.

Personal Factors (Personal System/Personal Coping)

These influences include age, gender, race, cultural background, individual behavioral practices, and familial and social factors. The effects of these elements are unclear. Some, such as gender, show significant associations, but not causative relationships with work disability. Others, such as tobacco use, have well-documented negative physiologic effects on injury healing, but only suggestive evidence for influence on work disability.

Psychological Factors (Personal System/Personal Coping)

This domain subsumes two primary considerations in physician management: 1) affected worker psychological characteristics, including normal, adaptive, and maladaptive responses to illness and injury and 2) diagnosable psychiatric co-morbidity. Attitudes, beliefs, and expectations (ABEs) toward individual elements of the work disability prevention process

may have a profound effect on worker recovery and rehabilitation. Illness or injury may provoke normal human responses in affected workers which need to be recognized and accounted for by physicians. Psychological assets and adaptive responses may include resilience, positive coping strategies, motivation, readiness to change, and self-efficacy. Maladaptive psychological characteristics include fear avoidance; dysfunctional or inappropriate attitudes, beliefs, and expectations about pain, disability, and health care; dysfunctional perceptions, beliefs, and expectations; negative coping strategies (e.g., catastrophizing or inappropriate illness behavior); and failure to accept personal responsibility for one's own behavior and recovery. Psychiatric comorbidity in varying degrees of severity and compensation may be a baseline characteristic of affected workers (e.g., personality disorder), be precipitated or exacerbated by work disability or complicate management and recovery (e.g., depression), or represent some combination of the two.

Sociocultural Influences (Culture and Politics)

A primary sociocultural influence contributing to the increase in work disability over the 20th century has been a phenomenon of “disability creep,” with gradual medicalization, socialization, and culturalization of work disability and acceptance of progressively lesser degrees of physical and mental impairment as defining disabled status. Popular media have been shown to contribute to the increase in work disability, but concerted media campaigns to alter public perception and provider behavior have been modestly successful in reducing disability outcomes. Special interest groups and patient organizations can also have contradictory effects. A potentially overlooked aspect of work disability is the role of free will of affected workers.

Systemic Factors (Legislative and Insurance System)

At their simplest level, these factors can be defined as problems with workers' compensation benefit systems, associated legal systems, and the effects of employment climate. Workers' compensation systems represent a compromise between the rights and responsibilities of employers and workers. For affected workers who are motivated to return to their former levels of function, these systems may facilitate the process or provide significant and sometimes difficult barriers to rehabilitation. For affected workers who are not motivated to return to work for a variety of possible reasons, including personal, psychological, socio-cultural, and workplace factors, these systems can provide a perverse incentive which in the short term rewards work disability at the long-term expense of the employer, payer, and society (and unwittingly, the worker). The associated legal system is intended to protect affected workers from potential lapses or abuses by the health care system, employers and payers, and often does so, but entails the same perverse incentive that can reward work disability in direct proportion to its severity in susceptible individuals. Other advocagenic aspects are described further below. The societal economic and employment climate may affect worker motivation to return to work as well as participation in and response to the workers' compensation and legal systems.

Workplace Factors (Workplace System)

A number of workplace characteristics and factors may influence work disability. Workplace culture may interact with worker ABEs in positive or negative ways, reinforcing adaptive or maladaptive worker perceptions and behaviors. Effective pre-placement and ongoing evaluation may forestall preventable illness or injury. As primary employer representatives, supervisors may exert strong influences on incidence of untoward events and employee reactions to initial and ongoing management, as well as return to work outcomes. Proactive employee training in process and expectations in the event of work disability may be beneficial, although this effect is not well established. As discussed in the section on Transitional Work and Activity, this intervention is crucial to optimal worker recovery and rehabilitation. There also is some evidence for positive effects of ergonomic worksite evaluation and intervention (see Low Back Disorders chapter). Both co-workers and labor unions can exert significant positive and negative influence over the process.

Multiple Causality

A fundamental assumption of the conceptual framework presented in this chapter is that any and all of the factors under consideration *may* contribute to eventual work disability, particularly on a permanent basis. As with most human conditions, no one factor can be identified which is pathognomonic or inevitably determines the negative outcome. Rather, a cumulative effect may operate in any given affected worker to determine the occurrence and severity of work disability, with factors from one domain more important than another, individualized for each affected worker's past history, life circumstances, personality, outlook and motivation, response to illness or injury, and environmental influences (the “toxic dose”).(62) The current framework attempts to identify and define as many factors as possible so as to afford physicians and other stakeholders the best possible chance to identify and address those elements operative in a given case – or, systemically – to prevent eventual work disability. (In practice, those salient elements will need to be prioritized and addressed.(63, 64)) As will be seen throughout this chapter, the current state of knowledge is fragmented and incomplete, particularly with regard to

the interactions of various components. The proposed framework is intended to provide grounding for future efforts in research and practice so as to permit progress in understanding all facets of work disability prevention and optimization of management by all stakeholders.

Multi-Stakeholder Collaboration

Stakeholder Roles in WDPM

“Action depends on accepting ownership of the problem. Everyone – workers, employers, unions, insurers, health professionals, government and the taxpayer – has an interest in better outcomes....Effective management depends on getting ‘all players onside’ and working together to that common goal. This is partly a matter of perceptions (by all the players). It requires a fundamental shift in the culture of how we perceived and manage [the problem] in health care, in the workplace, and in society.”(13)

Avoidance of work disability requires concerted and responsible action by all stakeholders, including affected workers, family, primary care physicians, other health care providers, employers (at all management and supervisory levels), insurers, case managers, adjusters, co-workers, and labor representatives.(4, 58, 65-67) This process can involve complex interactions among any and all participants, with each having their own set of priorities and methods for communicating concerns.(68) The effectiveness of cooperation in this process determines the tangible outcome of a health-related employment disruption. However, the process often suffers unnecessary delays, stalls, or becomes sidetracked because of attention to corroborating, certifying, justifying, arguing about, or evaluating work disability rather than preventing it. As a result, RTW efforts may be unsuccessful even when affected workers have adequate physical capability and motivation to perform transitional or regular duties.(60, 69)

Affected Workers

To achieve optimal and maximal functional recovery, affected workers must at least partially self manage and assume responsibility for their rehabilitation. They should be compliant with medication, physical or occupational therapy, home exercise, and scheduled medical follow-up. It is important that they maintain or increase activity to minimize physical and psychological deconditioning, tissue atrophy, aches, and musculoskeletal pain, and to raise endorphin levels. Affected individuals should remain cognizant of their limitations and work within appropriately prescribed medical restrictions (determined cooperatively with physicians and employers), refusing unreasonable requests by co-workers and supervisors to function over their capabilities. It is incumbent upon workers to communicate with physicians and other stakeholders. They should cooperate with administrative and regulatory procedures and requirements, and take responsibility for their moods and emotional states, with or without assistance (see Psychological Factors (Personal System/Personal Coping)) as needed.

Physicians

Physicians should provide appropriate evaluation, diagnosis and treatment, relying on evidence-based approaches. Absent emergency, trauma, or other red flag situations, initial strategies limit excessive diagnostic testing. Non-invasive treatments are nearly always the primary treatments.ⁱ Superior care generally requires optimal treatments, pharmacotherapy, and physical activity while limiting excessive physical medicine prescriptions (especially passive modalities) and specialist referrals. Physicians should ascertain the functional demands of affected worker job positions (from the patient’s history, visits to the job site, job descriptions and/or quantifications of job demands)ⁱⁱ, and identify appropriate work limitations and restrictions, which should evolve as the worker recovers. It is important that physicians educate affected workers about their conditions and the employees’ participatory role in recovery and return to maximal function as early as possible to stimulate a focus on function, eliciting and utilizing employee knowledge about tolerated activities and the pace of RTW in the process.(70) Physicians should step beyond their usual medical treatment approach and be cognizant of the important contributions that can be made by other parties, especially those familiar with employee work lives, in the disability prevention process. Physicians should actively communicate and work cooperatively with other stakeholders, including employers, payers, and the affected worker’s family members, to help minimize impacts of health conditions, and maintain the full participation of the worker in work and daily living activities. This includes communications required by law for workers’ compensation systems. However, physicians should be cognizant of specific limitations and restrictions on communication of medical information within their practice jurisdiction, and in general should limit themselves to communication of information on a need-to-know basis.

ⁱExceptions are infrequent and may include trigger digit and deQuervain’s stenosing tenosynovitis (see disorder specific chapters).

ⁱⁱPreference is given to objective measures over subjective reports provided the objective measures are reasonably accurate.

Employers

Employer-based personnel include all levels of management (including immediate supervisors), human resources managers, RTW coordinators, and in-house medical department staff. To be most effective, the disability prevention process should start before any illness or injury has occurred. Program elements should be planned and instituted. However, in situations in which the worker may perceive dangerous working conditions or a negative interpersonal climate,ⁱⁱⁱ there is little incentive for injured employees to return to work particularly if alternatives, such as extended workers' compensation benefits or sick leave are available. Interventions include managerial support for prevention efforts, establishment of fair policies for both managers and workers, education of supervisors and employees in workers' compensation matters; and promotion of a non-hostile work environment in which positive supervisor and management responses follow an injury or onset of symptoms.

Managers determine whether, when, and how affected workers return to work within the functional limitations and medical restrictions specified by physicians. They have a responsibility to provide physicians and other healthcare providers with necessary employment-related information to enable appropriate medical advice and support. Ideally, they will have quantified job demands readily available for provider review. More likely, they have some job descriptions or information available and are willing to participate in job and/or schedule modification as necessary. The optimal system allows early return to modified work and communication with employees, physicians, and payers. Many lost-time injuries can often be avoided if all stakeholders communicate and collaborate to return affected workers back to normal or optimized functional status.

Employers are also responsible for ensuring that workplace cultures support safe and timely return to meaningful work. Typically, the medical care associated with successful programs is conservative and should always be guided by quality evidence-based treatment guidelines. The employer's ability to eliminate obstacles and facilitate on-the-job recovery will strongly contribute to the affected worker's rehabilitation and return to maximal function. Employers should consistently monitor and evaluate the progress of disability prevention programs in order to identify opportunities for improvement.

Payers

Payers should assume a non-adversarial role, acting expeditiously in evaluating responsibility for claims, accepting their financial responsibility for payment of legitimate claims, and working with employers to define their approach. They should execute their responsibilities in accordance with applicable statutes. As stakeholders with a strong interest in cost-effective claim resolution, payers should actively monitor care and case progress for appropriateness of medical management. Claims should be monitored for indicators of delayed recovery, which should trigger early or intensified case management.

Other Stakeholders

Occupational health specialists, other medical specialists, behavioral health professionals, case managers, family members, union representatives, attorneys, and adjudicators may have significant involvement in cases. Benefits claim administrators and insurance adjusters often act as communication intermediaries on behalf of employers. Nurse case managers are often engaged to expedite the process of care and facilitate communication among all parties. In disputed cases, lawyers may assume the role of a communication conduit between the non-medical parties. Physical or occupational therapists, ergonomists, industrial hygienists, and employer-based health and safety professionals may be able to assist when functional demands of jobs need to be specified, options for work accommodations need to be developed, or hazardous conditions need to be rectified. Vocational rehabilitation professionals may identify new job opportunities for people who have lost their jobs or who are no longer medically able to perform their former occupation.

Iatrogenicity

The term "iatrogenic" usually refers to an untoward medical event or outcome caused by a patient's medical care. It has been proposed that the concept of iatrogenic illness be extended from its narrow definition of physician-caused illness to its logical conclusion to include health problems caused by any party in the health care process, including patients and their families.⁽⁷¹⁾ This meaning can include adverse outcomes resulting from an ill or injured worker's contact with the workers' compensation and disability benefits system as a whole, caused by the failure of any and all stakeholders to respond appropriately to the needs of the affected worker and collaborate in driving the episode towards a positive outcome.

ⁱⁱⁱThis may also occur in a microclimate. The employer may have sophisticated disability prevention policies and procedures but there may be a work unit (e.g., department) where there is hostility to disability prevention, interpersonal conflicts, etc.

Stakeholder actions or inactions and systemic characteristics can hinder prevention and promote work disability. Iatrogenicity may be caused by medical management, societal and cultural influences, systemic determinants, and workplace (job or organizational) factors. Three important aspects of iatrogenicity discussed in this section are: 1) the medicalization of common health and life problems; 2) the focus on pain relief as opposed to functional rehabilitation in affected workers; and 3) the critical nature of time (particularly with regard to diagnostic and treatment delays) in avoidance of work disability.

Medicalization Of Common Health And Life Problems

Differentiation of serious medical conditions (SMCs) and common health and life problems (CHLPs) was discussed in the Principles, Terms, and Definitions section. A prototypical example of the latter is non-specific back pain, which may be the best studied because of its dominance in both prevalence and costs in work disability.⁽⁷²⁾ It is estimated that 70 to 85% of all people have at least one episode of disabling back pain in their lives.⁽⁷³⁾ Back pain was not considered an injury until the mid-20th century.⁽³²⁾ It seems to cause disability mainly and paradoxically in developed countries.⁽⁷²⁾ The cause of the vast majority of back pain is poorly understood. Diagnostic imaging procedures to attempt to identify causes of back pain actually have poor correlation with tissue pathology in blinded studies. Objective measures of pathology do not predict disability and physiological explanation of back pain is only available for an estimated 15% of cases.⁽⁶⁷⁾

Medicalization is the process by which non-medical problems, including some CHLPs, become defined and treated as medical disorders. These conditions may be misinterpreted by any or all stakeholders (i.e., affected workers, physicians, etc.), as injuries attributable to work-related events and conditions. A number of CHLPs (e.g., many low back pain cases)^{iv} have been medicalized and institutionalized into workers' compensation medical and administrative systems or once this occurs, reported concerns tend to be viewed from either the biomedical or psychiatric model, and normal conditions such as muscle pain, strain, dyspnea when deconditioned, general chemical intolerance, stress, periodic sleep issues, jet lag, workplace conflict or job dissatisfaction can be elevated to the status of disorders that need medical treatment. These conditions are often the subject of intense investigation by physicians, usually without conclusive demonstration of pathology. This usually results in unnecessary expense and worker discomfort, incorrect diagnoses, gratuitous or harmful treatment, unproductive prolongation of the diagnostic and treatment process, avoidable delay of return of the individual to the workplace or to productive work, and iatrogenic disability. It has been estimated that medicalization is a major driver of increased health costs in the U.S., accounting for \$77 billion or almost 4% of direct health care expenses in 2005.⁽⁷⁴⁾

Medicalization may occur when psychosocial issues are incorrectly interpreted as medical or psychiatric disorders. Relevant to the workplace, employers and workers may use the disability benefit system to sidestep difficult workplace issues that are obvious to them, but not disclosed to outside parties, particularly physicians and payers. (18) Common psychosocial issues that can be medicalized in the workplace, particularly impacting performance (productivity, quality or work or motivation) include:

- **Workplace organizational factors**, such as (lack of) training, degree of autonomy, or (failure to follow) workplace policies;
- **Workplace psychosocial issues** (e.g., co-worker disharmony, workplace behaviors disruptive to the workplace and/or offensive to others, supervisor-employee conflicts, work organizational disagreements and disputes);
- **Worker injury concerns including abilities to complete job tasks**, such as fear of physical discomfort or re-injury;
- **Worker's attentional needs** to ensure that their concerns are being taken seriously and addressed (which may precipitate symptom exaggeration);
- **Worker job security**, particularly in difficult economic climates with associated organizational down-sizing, layoffs and terminations; and
- **Personal psychosocial issues**, such as marital discord, parenting difficulties, coping, anxiety, depression.
- **Primary and secondary gain:**
Primary gain is internally motivated within an individual. It occurs, for example, when employees are relieved from normal responsibility due to significant medical or psychiatric conditions. Gain derives from the individuals' absolution from normal guilt or shame for the inability to perform because the failure can be solely and completely explained by the condition.

Secondary gain is typically externally generated, when individuals derive some reward for avoidance of a negatively perceived situation, such as performing an undesirable job task or occupation. Secondary gain may be tangible, as when individuals receive money or other benefits due to illness or injury. It may be intangible, as when attention, sympathy or

^{iv}Some workers' compensation jurisdictions and social security districts have medicalized disorders despite lack of quality data of relationships with work or need of disability; examples include fibromyalgia and multiple chemical sensitivity.

other positive reinforcement is obtained for a medical condition (which may also motivate symptom exaggeration). The desire to continue to receive the benefit may impede individual motivation to fully comply with treatment.

There is a profound and deeply ingrained acceptance and medicalization of CHLPs, particularly those manifested by musculoskeletal complaints, in present medical and workers' compensation systems; examples include neck and low back disorders and upper extremity disorders. As noted in other areas of this chapter, inaccurate diagnosis, unnecessary diagnostic testing (e.g., plain radiography, CT scanning, MRI), and needless and potentially harmful therapy (e.g., use of opioids) may be counterproductive and actually reinforce affected worker expectations with regard to illness and injury. The first responsibility of physicians is to the patient's well-being, and occupational physicians have a responsibility to accurately assess worker conditions presented to them, communicate that perception to all stakeholders (including affected workers), and to act in accordance with their beliefs, with employee welfare foremost in mind. In order to effect constructive change in this situation, physicians should:

- Improve their understanding of the differences between severe (SMCs) and common (CHLPs) conditions, with recognition that these entities are not discrete categories but rather lie on a continuum.
- Increase their skills and comfort levels with clinical recognition of these problems and communication of them to both affected workers and other stakeholders, particularly employers and payers.

It has been noted that, "Part of this entails better clinical recognition of SMCs and less reliance on imaging and other testing (i.e., physicians may need to work a little harder and have more faith in their own physician judgment)." (13)

Focus on Pain Relief vs. Functional Restoration

ACOEM's statement on the role of the personal physician in the go to/stay at/return to work and activity prescription paradigm (75) posits that the three fundamental purposes of medical care are: 1) restoration of health; 2) optimization of functional capacity; and 3) minimization of the destructive impact of injury or illness on affected workers' lives. Medically related withdrawal from normal social roles, including work, is destabilizing and may be detrimental to the affected worker's mental, physical, and social well-being. Maintaining or returning affected workers to all desired and relevant life activities as soon as safely possible has many beneficial physical and psychosocial effects for both individuals and their families, including enhanced recovery; reduction of personal, household, social, and economic problems; and prevention of lost productivity, needless work disability, and job loss.

It has been suggested that pain relief as a primary social role for the physician only became popularized and accepted in the early- to mid-20th century. (30) Pain in today's workplace presents a challenge to the occupational physician in this regard. A fundamental problem with workers' compensation and other no fault systems is the excessive acceptance of CHLPs and resultant pain as work related. As has been noted by Waddell & Burton, "We need to eradicate the presumption that [CHLPs] are SMCs (keeping in mind the continuum caveat – there is no clear threshold or dividing line). This is a systemic problem which rests on assumptions by all stakeholders – workers, employers, physicians, insurers, and others – and permeates the present system." (13) Thus, dysfunctional conditions that sometimes can be only remotely related to work (e.g., many episodes of cumulative trauma disorder^v) are assumed and accepted to be covered under some workers' compensation jurisdictions. Affected workers often also expect complete or near-complete relief of pain from work-related conditions, which may lead to a biomedical approach and promotion of iatrogenicity. There is a pressing need to change that fundamental assumption and acceptance at the affected worker, physician, employer, and payer levels.

Evidence that factors other than the nature of the injury are primary determinants of disability clearly suggests that treating pain, even in the acute state, should emphasize functional restoration rather than symptom relief, as the latter may reinforce psychological, environmental, and psychosocial factors that predispose progression to chronic pain states and needless work disability.

Several principles discussed in the Chronic Pain chapter are applicable here:

1. Brief periods of inactivity may reduce pain in the acute post-injury time frame, and judicious activity limitations to facilitate recovery may be appropriate. However, in subacute to chronic phases, inactivity may increase pain and delay recovery, particularly through physical and mental deconditioning. Dysfunctional movements and patterns such as antalgic gait, abnormal postures, or guarding may contribute to the chronicity of pain. If these movement patterns are actively normalized, symptoms may be reduced and function increased.

^vSee Initial Approaches to Treatment chapter regarding a discussion of this term and other inappropriate diagnostic labels.

2. The acute and subacute time frames are an important therapeutic window for preventive interventions. During this transitional period, affected worker pain may still be explainable by tissue damage, but individuals may exhibit some or all of the emotional and behavioral characteristics that are seen with chronic pain. Physician understanding, recognition, and appropriate management of these issues are often key to successful resolution of delayed recovery in pre-chronic individuals.
3. Both under- and over-treatment, particularly of pain, are clinical concerns. The latter may include management with medications (e.g., opioids) or invasive interventions (e.g., pain management) that may lead to adverse effects or morbidity which can result in harm to affected workers' quality of life, socioeconomic status, home life, and personal relationships that would not have otherwise occurred. Evidence is growing that the use of "passive treatments," such as passive stretching exercises are associated with substantially worse clinical outcomes.(76)
4. While affected worker complaints of pain should be acknowledged, both workers and physicians should remain focused on the ultimate goal of rehabilitation leading to optimal functional recovery rather than driven towards continued health care utilization. Emphasizing only pain relief may reinforce negative psychological, environmental, and dependent psychosocial factors that predispose progression to chronic pain states.

Physicians also should be aware that while complete cessation of pain may not be a realistic goal for some affected workers, self-care, functional restoration, and successful reintegration into the workforce can be attainable goals even though the complete elimination of pain may not be possible. As stakeholders in the care of ill and injured workers, the entire approach to nonspecific conditions such as CHLPs and pain may need to change from a fix it to an accommodate it approach. Both the aging of the workforce (with concomitant rise in degenerative conditions) and the profound influence of psychosocial factors on the experience of pain suggest that at least part of physician attention should shift from complete resolution of symptoms to accommodation and management with an emphasis on functional maximization. Both affected workers and physicians should remain focused on the ultimate goal of rehabilitation leading to optimal functional recovery, decreased healthcare utilization, and maximal self-actualization. Suggested interventions towards this end include(77):

- Target pain-related thoughts (e.g., cognitive restructuring, acceptance-based treatment);
- Target affected worker behavioral responses (motivational interviewing, operant conditioning); and
- Promote affected worker's ability to achieve states of perceived relaxation and comfort (relaxation training, hypnosis, placebo interventions).

In short, both the immediate and ongoing foci should be on functional improvement rather than abolishing pain. It may do well to adopt the term "maximum functional improvement" instead of the commonly used "maximum medical improvement."

The Critical Nature of Time

Unnecessary prolonged work absence work can cause needless, but significant harm to a person's well-being. Physical and mental deconditioning occurs early. This effect may be more pronounced and difficult to reverse in older workers. There can also be a loss of a major identity component – what the person does for a living, which may include the self-efficacy and satisfaction of doing a job well the self-esteem that comes from earning a living.(78)

During extended work absence, affected workers can lose social relationships with co-workers and experience stresses in familial life. Extended work absence may also adversely affect subsequent work patterns, including lower income and higher unemployment rates, particularly among women, older workers, and workers of lower socioeconomic status.(78, 79) For example, in a study of nearly 30,000 Swedes followed for 10 to 17 years and controlled for health factors, found a 50% increase in mortality among unemployed versus employed persons.(80)

People who never lose time from work have better outcomes than those who lose some time.(81) The longer the time employees are off work with low back pain, the lower their chances of ever returning to work. Once employees are off work for 4 to 12 weeks, they have a 10 to 40% risk (depending on the setting) of remaining off work at 1 year, and after 1 to 2 years absence, it is unlikely they will return to any form of work in the foreseeable future, irrespective of further treatment.(82) determined The likelihood of returning to work after injury has been determined as 70% after 20 days, 50% after 40 days, and 35% after 70 days.(83) Importantly, the odds of workers returning to work drop 50% by the 12th week of work disability, and studies have shown that the odds for return to full employment drop to 50% after 6 months of absence.

The SPICE Model

The SPICE model was advanced by Colledge in 1993,(84) with subsequent revision in 2000(85) and 2005. The model is based on the Forward Treatment approach developed by the U.S. military in response to iatrogenic illness and loss of combat effectiveness among high numbers of military personnel. Previous management methods had included complex diagnostic and treatment pathways, removal of affected members from proximity to battle fronts, delay in treatment, a lack of focus in management, and failure to appreciate the powerful self-fulfilling effects of expectations of affected soldiers. The military model contains many useful parallels for ill or injured workers. The civilian version comprises five concepts:

1. **Simplicity.** Simple, benign conditions, such as low back pain, become more complex when addressed in a complicated fashion. The use of unnecessary diagnostic testing, inaccurate terminology or labeling, potent medications, physical therapy, and work restrictions may create or validate an impression of serious pathology in the mind of affected workers, and serve to rationalize pre-existing attitudes, beliefs, and expectations.
2. **Proximity.** It is desirable to keep affected workers closely associated with the workplace, co-workers, and relatively normal activities during recovery from illness and injury. It includes the concept of developing workplaces as a desirable physical, mental, and social environment so that all workers – particularly those who are ill or injured – can gain fulfillment from working.
3. **Immediacy.** The critical nature of time in recovery from conditions affecting work absenteeism and presenteeism was discussed in the section on iatrogenicity. Early treatment, avoidance of delays in evaluation and management (which further distance affected workers from the workplace) and return to meaningful work as soon as possible decrease work disability.
4. **Centrality.** Affected workers need to perceive a sense of control and direction to their recovery and rehabilitation, with all stakeholders – individuals and their families, employers and co-workers, physicians, payers, and those managing the claim – communicating, sharing, and working in good faith toward a common goal of return to maximal functional capacity.
5. **Expectancy.** As discussed in the Psychological Factors section, affected worker beliefs and expectations are a strong influence on recovery, and negative perceptions can be self-fulfilling. All stakeholders have the ability and responsibility to positively influence worker expectations.

Taken together, these themes run through the literature on work disability prevention and the constructs discussed in the current chapter. For example, the concept of simplicity finds direct application in the medicalization of common health and life problems, as well as factors such as physician approach to the ill or injured worker, familial influences, and effects of the workers' compensation system. Proximity figures importantly in communication among employees, physicians, and workplaces, and in proactive and concurrent steps that can be taken by employers. Immediacy (the critical nature of time) is a well-established precept in optimal management of workers affected by illness and injury, and pertains to avoidance of unnecessary delays – in evaluation, diagnosis, treatment, provision of needed services, and payment – by all stakeholders. Centrality is a key concept for all stakeholders which runs through the administrative, medical, legal, and workplace management of ill and injured workers, who need to perceive a structured and comprehensive approach to their conditions, and understand their participatory role in the workers' compensation system and return to work, particularly joint goal setting. Expectancy is a powerful but underappreciated and underutilized concept, particularly by physicians, and includes sensitivity to worker attitudes and perceptions, establishment of appropriate goals and timelines for recovery, and reinforcement of progress.

Transitional Work and Activity Prescription: Go to Work/Stay at Work/Return to Work

Most workers who report work-related health concerns can return to regular or transitional (temporary or modified) duty immediately or within a few days. Staying at work in a capacity consistent with the stage of healing and functional recovery maintains physical conditioning, minimizes development of maladaptive illness behavior patterns, maintains and reinforces self-esteem, and improves ultimate therapeutic outcomes. Keeping employees productive at work during recovery and rehabilitation from illness or injury conveys respect and provides social support that has been demonstrated to hasten recovery. Maintaining ill or injured employees at work, with progressively fewer restrictions as recovery occurs, provides an optimal situation for both employees (shortened duration of disability and improved outcomes) and their employers (higher productivity and lower workers' compensation costs).(86) Occupational physicians and other health professionals who treat work-related illness and injury should optimize disability management by including specific prescriptions for appropriate levels of activity at every affected worker visit.

Consequences of Work Disability

If work absence persists beyond a few days, the consequences to individuals can be profound and multi-dimensional in scope, yet many workers and their families are unaware of the harm that may result. The longer the period away from work, the greater the chance of chronic disability and the lesser the chance of returning to any form of productive work. Work absence for three months correlates with only a 50% chance of ever returning to work; this figure is decreased to approximately 2% by 12 months of absence.(87)

Self-image and psychological well-being. Most adults derive a good deal of their self-identity from their work roles. The inability to do one's job erodes self-esteem and sense of well-being, and often results in profound psychosocial dysfunction affecting all aspects of the patient's lives.(88)

Physical decline. The overall physical activity level of most affected workers declines when they do not engage in normal work routines. Although relative rest may be beneficial in the healing process for some injuries, too little activity can rapidly result in impaired flexibility, decreased cardiovascular conditioning, and muscle atrophy. Within days of starting rest, bone and muscle mass and tendon strength begin to decline.(89, 90) These changes can encourage further inactivity, leading to a vicious cycle complicating the original illness or injury and delaying recovery. Reversing these changes often takes much longer than the inactivity that caused them, particularly in older persons. Even limited activity, which is easier to accomplish at the worksite, can prevent or mitigate these changes.

Economic implications. While absent from work, ill or injured workers frequently forego salary increases, medical benefits, bonuses, and overtime or holiday pay. In addition, they may incur added personal expenses, depending on the injury. For example, affected workers may need help with household or vehicle maintenance tasks which they were able to perform themselves prior to the illness or injury. Savings and other financial reserves may be depleted and debt may increase as usual income declines.

Familial and social effects. The consequences of disability can affect entire families, across generations, and often change and reverse traditional societal roles. Individuals may be unable to fulfill their normal roles as spouses or parents. Other members of the family may be forced to assume new roles which in turn become barriers to functional recovery.

Medically Unnecessary Lost Work Time

Medically necessary work absence was described in the Principles, Terms, and Definitions section. There are relatively rare situations including hospitalization, frequent attendance at a clinical facility, medically unstable disorders, difficult-to-manage conditions, illness or injury that precludes safe travel, and debilitating conditions that disallow even sedentary work. Each year, millions of workers develop illness or sustain injury that prevents them from functioning normally at work. In most cases, employees are able to stay at or return to work after a brief recovery period. A survey of occupational physicians found fewer than 10% of work-related injuries are estimated to require more than 2 to 3 days off work. This contrasts markedly with the 24% of injured workers who receive temporary disability benefits (typically after more than three days off work), and suggests that up to 80% of paid temporary disability is medically unnecessary and therefore preventable.(91) In the workers' compensation system, approximately 10% of workers who have a benign medical condition (e.g., soft-tissue musculoskeletal injury such as spine pain or extremity pain), which should result in only a few days of lost time, incur significant work absences and become involved in one or more of the disability benefit systems such as sick leave, workers' compensation disability, short and long term disability insurance or Social Security Disability Insurance. These individuals may end up with prolonged or even permanent withdrawal from the workforce.

Communication among Stakeholders

For medical care in general, effective communication is directly linked with improved compliance and outcomes. Similarly, the majority of lost workdays are not related to medical necessity but rather a breakdown in the communication and non-medical decision making process related to work ability.(69, 92) In the context of work disability, observational studies have demonstrated that adverse disability outcomes are inextricably linked with communication failures. A recent comprehensive review of the disability management process concluded that the *quality of communication* among key stakeholders (affected workers, physicians, employers, and insurers) was one of the major variables influencing disability outcomes.(69) Communication that is unidirectional, authoritative, and without regard for the specifics of the injured worker's life situation was identified as a common problem. After reviewing various models of disability management, the authors concluded that effective communication is a requirement for success regardless of the specific interventions employed.

There are multiple factors impacting the quality of communication that are not easily overcome by individual physicians(18, 93):

- Physicians usually lack specific information regarding the physical demands of affected worker job tasks, making restrictions and return to work recommendations problematic and often arbitrary.
- Physicians rarely have information about the psychosocial dynamics at the workplace (e.g., relationships with supervisors and colleagues) which may have a powerful impact on the individual's motivation to return to work.
- There are few opportunities for employer perspectives (e.g., production and skill requirements) to be considered before physicians make specific limitation and restriction recommendations, yet these recommendations require employer cooperation in order to be effective.
- Most occupational physicians do not feel competent to evaluate affected worker *tolerance* for work. This characteristic is a function of individual coping skills and motivation rather than their physical impairment and work capacity (see Principles, Terms, and Definitions).
- In current practice, physicians generally are not adequately reimbursed for extended face to face encounters to listen to and comprehend affected workers' perspectives and explain treatment plans in satisfactory detail. As a result, there is often a lack of trust and understanding, particularly regarding recommendations for transitional duty.
- Despite considerable scientific uncertainty, physician restriction and RTW recommendations are considered as final and authoritative from a practical and legal perspective.

Several techniques to improve affected worker-physician communication have shown positive results, and interventions designed to improve communication have been associated with improved disability management outcomes. Successful interventions have in common an acknowledgement that all stakeholders influence each other, as opposed to a linear model characterized by a one-way flow of information. For example, worker questionnaires allow greater information flow and more individualized communication of needs and belief systems.

Efforts to improve the quality of dialogue with greater emphasis on more interchange, direct contact and opportunity for all stakeholders to participate, have led to improved outcomes and fewer adverse events demonstrated across a range of conditions. Both effective information exchange and positive relationship-building are particularly important to develop the level of trust needed for agreement on restriction and return to work recommendations as reasonable and in the best interests of all involved.(18)

Transitional Work

In most cases of illness or injury involving loss of functional capacity, workplaces should be considered therapeutic environments of choice. At worksites, ill or injured employees continue to interact with supervisors and co-workers and maintain social and collegial contact important to prevent isolation. In addition, work environments provide opportunities to involve supervisors and co-workers in job accommodation and ergonomic modification of specific job tasks.(87, 94) Work environments are ideal sites for teaching optimal body mechanics especially while incorporating a given patient's condition, safe work practices and appropriate pacing of work activities.

Transitional work assignments can include a variety of changes depending on the specific limitations, restrictions, and the phase of rehabilitation:

- Temporary transitional work jobs are frequently assigned. These are particularly effective when involving incremental increases in activity as the condition improves.
- Specific job tasks may be ergonomically modified or temporarily eliminated from the employee's work assignments.
- Transition to full duty can be accomplished by gradually increasing the hours per day and days per week that employees participate in usual work activities.

Effective implementation of transitional work assignments requires frequent monitoring of and ongoing communication about performance and tolerance of assigned duties.

Formulation and Communication of the Activity Prescription

Description of medical limitations and restrictions, estimation of work capacities, and provision of precise guidance to all stakeholders about affected worker abilities to stay at work or return to work are among the most important concerns of the occupational health physician in the management of work related illness or injury. It is appropriate to view this activity as formulation of a functional activity prescription with a particular focus on work. Physicians should strive to provide unbiased, objective, and dispassionate advice. Reasoning and activity should follow a logical sequence such as that described here:

Step 1. Determine if absence from work is medically required. If not, then workers can be cleared to perform medically appropriate work during recovery. The next steps will determine the specifications for that appropriate work.

Step 2. Evaluate any obvious mismatch between individuals' medical condition and the demands of the regular job (or any proposed modified-duty job). For example, what parts of the body need to be protected? What kinds of activities or functions should be avoided? Is special protection, reduced demand on endurance, or a special accommodation needed? If so, what is the anticipated duration? Providing accurate limitations may require the physician to obtain input from employers. Relevant information includes job descriptions and tasks with specific information on physical demands; potential chemical exposures or physical hazards, and quantified job exposures (e.g., ergonomic or industrial hygiene analyses). Some employers also provide information on whether accommodations can be made allowing an employee to function in his or her original job category despite physical limitations. Regardless, limitations should be provided when there is potential for a worker to work with limitations. In order to assess the situation accurately, physicians may need to augment their clinical judgment with further input from employers. Relevant information includes job descriptions and tasks with specific information on physical demands; potential chemical exposures or physical hazards, and whether accommodations can be made allowing an employee to function in his or her original job category despite physical limitations.

Step 3. Describe any work and participation restrictions (i.e., activities which affected workers could do but which might interfere with the patient's healing or materially aggravate the underlying condition^{vi}). Distinct from work capacities and limitations, these are specific medical concerns or protective circumstances that are required in order to protect and keep employees safe while working (e.g., prohibition against working at heights for persons with seizure disorders, or avoiding metal cutting fluids that soak and extremity with a newly repaired laceration). Determining restrictions is a medical task, requiring the physicians' medical knowledge and information on potential hazards at work and at home. These restrictions should usually not be modified by either affected workers or employers without the physicians' knowledge and consent.

Step 4. Describe functional limitations, which represent the difference between affected worker current physical stamina, agility, strength, and cognitive ability and potential job requirements. If specific job demands are known, it will be possible to more precisely define the patient's current capability compared to the actual job requirements. Describing limitations involves an assessment of what affected workers are currently able and unable to do. This can often be done by querying the patient, with specific attention to current activities, and then extrapolating based on knowledge of workers and experience with other persons with similar conditions. It may be necessary to obtain a more precise delineation of worker capabilities than is available from the history and physical examination. A formal functional capacity evaluation may be useful in this regard, although the results are often complicated by "self-limiting behavior" or what individuals are willing to do, a measure of activity tolerance rather than capacity.(26, 95) Whatever the basis of work capacities or restrictions, physicians should state the source of the information. In particular, they should avoid relying solely on affected workers and/or employers for input, instead seeking objective information or third-party corroboration, especially when there is apparent controversy.

All stakeholders need to remember that impairment may or may not result in disability. Employers who provide accommodations based on essential job function matched to worker abilities often prevent the progression from the former to the latter. However, some employers may choose to not provide accommodations for workers who are medically able to do some productive work. If employers are unable or refuse to implement work prescriptions, health care providers should be available to discuss and explain the basis of the restrictions and limitations and the implications of not following them. Conferences with the patient, supervisor(s), an occupational health nurse, and/or physical or occupational therapist to discuss the importance of transitional work, allow for multi-lateral communications, potential for revision of the restrictions, and resolve misunderstandings related to work assignments can facilitate successful return to function.(96)

Many employers feel ill-prepared to make accommodations even though they are willing to do so (e.g., they may have a lack of knowledge about how to identify appropriate alternate duty jobs, adaptive equipment or creative solutions). Occupational health professionals can assist by suggesting practical and simple accommodations such as workstation adjustment, task alignment, unbundling heavy collections of objects, periodic rest breaks, assignment to required safety training, change(s) in position (sit/stand) and/or periodic assistance by co-workers for infrequent but demanding tasks. Employers can be referred to guides for accommodation under the Americans with Disabilities Act (ADA) as a model for

^{vi}Mild symptom modulation often occurs but does not require altered limitations, rather education to continue the work activities is appropriate. Moderate symptom modulation may require some alteration of limitations, but careful attention to the degree of symptoms and whether the symptoms are worse over a prolonged period of time, particularly if accompanied by objective evidence may require alteration of limitations. Moderate to severe symptom modulation by exposures, particularly if persisting beyond the exposure and with objective evidence generally requires readdressing limitations to preclude those activities that are materially aggravating the condition.

this process. (One caveat is that the work disabilities discussed in this subsection are generally temporary, whereas those covered by ADA are permanent).

Step 5. Identify any nonmedical obstacles that appear to be primary or secondary barriers to return to work. Medically unnecessary disability occurs whenever affected workers stay away from work because of nonmedical issues such as:

- The misperception that a diagnosis alone (without demonstrable functional impairment) justifies work absence.
- Other problems that masquerade as medical issues, e.g., job dissatisfaction, anger, fear, or other psychosocial factors.
- Poor information flow or inadequate communications.
- Administrative or procedural delay.

Extra time and effort is needed when affected workers are identified at high risk for delayed recovery (e.g., when psychosocial factors which result in poor coping skills and low motivation for return to work are present). Many experienced physicians believe that they can recognize these high-risk individuals relatively early in the course of treatment. However, there are validated, easily administered questionnaires now available that can provide more objective data.(97, 98) Results can be used to justify the need for more frequent visits, more face-face time and/or early referral for specialized management such as fear avoidant belief training and/or cognitive behavioral therapy to improve pain tolerance.

Step 6. Provide three intervals as part of the “prognosis,” on an ongoing basis, so others can plan accordingly:

1. When will the patient need to be seen?
2. How long will it take for a next-step improvement in functional capacity?
3. How much time should it take until the medical condition is fully resolved?

To monitor progress, physicians may use disability duration guidelines as long as the advantages and disadvantages of using such guidelines are understood.

Step 7. Let the affected worker and employer determine the actual return to work date (i.e., the extent to and speed with which physician recommendations regarding work capacities and restrictions are translated into actual employment decisions). While the physicians’ role is to assess work capacities and restrictions, the employers’ responsibility is to determine how and when they are accommodated.

Evidence-Based Medicine and Evidence-Based Management

Wide variations in medical care for similar health conditions have been identified as signs of quality issues. There is no quality evidence that this variability results in better patient care. In 2003, it was estimated that only slightly more than half of U.S. adults received medical management consistent with currently applicable recommendations.(99) Variations in diagnostic interpretations, and treatment approaches and methods, occur in many specialties. This may be a particularly acute problem in musculoskeletal medicine, in which there is wide overlap between common health and life problems (CHLPs) and serious medical conditions (SMCs). There are great differences in approaches to management for specific conditions such as low back pain among different health care financing systems; for example, medical care under workers’ compensation systems uses many more resources, without evidence of better outcomes (see Systemic Factors). Improving the consistency of practice improves clinical quality, and congruity with the best available scientific evidence is clearly most desirable.

The original definitions of evidence-based medicine (EBM) focused on the care of individual patients, using evidence to improve outcomes. In a 1996 editorial in the *British Medical Journal*, Sackett defined EBM as “...the conscientious, explicit and judicious use of current best evidence in making decisions about the care of individual patients.”(100) It was further noted that the practice “...means integrating individual clinical expertise with the best available external clinical evidence from systematic research.”(100) As the field has matured, the focus of EBM has evolved toward the use of evidence of effectiveness to allocate resources to those tests and treatments that are effective and efficient, rather those that are not. In 2005, EBM was defined as “... a set of principles and methods intended to ensure that to the greatest extent possible, medical decisions, guidelines, and other types of policies are based on and consistent with good evidence of effectiveness and benefit.”(101) Properly done, the use of EBM is a process which entails identification of high-quality scientific evidence, as defined by rigorous criteria, and synthesis of the entire body of evidence applicable to a given condition to guide (not dictate) medical practice. This is often done in the form of formally developed and stated guidelines such as ACOEM’s.

Evidence-based management (EBMgt) is an analogous concept which applies the same principles to operations management and change implementation in complex people-dependent processes and organizations. EBMgt bases management tools and techniques on the objective, cumulative results of scientific research about what works best, rather than anecdote, belief,

habit, tradition, or political expediency. Parallel to the medical research process, many social science disciplines (e.g., economics, human and organizational behavior, sociology, operations research) have amassed a considerable body of research about how normal human beings behave, how to implement change, and how to improve efficiency, effectiveness, and outcomes in complex systems. Logically, successful adoption of evidence-based approaches to medical treatment – on individual, group, organizational, jurisdictional, and systemic bases – requires accompanying evidence-based approaches to management as well. EBM and EBMgt have been described as complimentary processes, with the former delineating the “content” of care and the latter providing the “context” of care.(102)

Use of Evidence-Based Practice Guidelines

The appropriate use of EBM and EBMgt are not simple processes and in some ways greatly complicate clinical practice and medical management. As efforts have been made to adopt these methods within medical practices, organizations, and entire systems of care, the practical challenges of implementation have become more apparent. The development and utilization of evidence-based physician and management guidelines, such as the present document, have been one approach to the problem.(103) Guideline development and application is a complex undertaking, and includes the following aspects:

- The relevant literature should be continually monitored for new information, which should then be evaluated and judged for scientific merit, technical quality, and practical applicability.
- Bodies of experts should meet regularly to revise existing recommendations and generate new content in a manner that provides useful and practical information for end users, based on best available evidence or consensus (to date, this has largely been a volunteer process).
- Qualified sponsoring organizations should continually publish reasonably up to date revisions and expansions to the guideline repertoire; these materials include both carefully researched, considered, and developed comprehensive material constituting a core of intellectual property as well as more practical summary materials; both sets of materials should be documented rigorously enough to withstand challenge from ethical and legal and a wide variety of stakeholder perspectives.
- Physicians, senior and middle managers, and other stakeholders should accept the concept and practice of evidence-based practice guideline use, and be aware of and understand those guidelines relevant to their specific area of expertise and practice.
- The same stakeholders should have easy access, preferably in real time, to user-friendly versions of applicable guidelines.

The use of practice guidelines has been positively correlated with improved quality and patient safety and decreased costs in general medicine.(104) The effectiveness of guideline use in reducing work disability (time off work, time on modified duties, and recurrences) in Australian workers with low back pain has been demonstrated.(105) Use of the ACOEM *Practice Guidelines* is the presumed standard of care in California, and has resulted in decreased service utilization (particularly physical therapy and chiropractic) and decreased time off work.(106-108)

Deploying evidence-based practice guidelines in the process of clinical care, especially those concerning prevention and management of work disability, requires consideration of the following issues:

- Initial physician knowledge of guideline recommendations and recollection of or access to applicable guidelines in a given individual patient encounter.
- Physician knowledge and application of guidelines for ancillary activities such as patient and employer education and communication.
- Physician communication of rationale for diagnostic and therapeutic interventions “outside” of guideline recommendations, to avoid dispute.
- Quality assurance and utilization review, particularly for care ‘outside’ of recommendations.

Potential solutions to the above challenges include:

- Reliance on physician memory.
- Development and maintenance of body-part specific checklists or other visual reminders.
- Use of print educational materials and communications forms.
- Employment of electronic support systems in appropriate practice settings (e.g., APG-I – the ACOEM *Practice Guidelines* on line).
- Inclusion of rationale for deviation from recommendations in progress notes, billing statements, or other communications to employers, payers, and other stakeholders.
- Proactive person-to-person communication regarding deviation from recommendations with stakeholders.

- Educational activities on EBM for physicians.
- Staff meetings focused on evidence-based management of specific conditions of special interest identified through volume of patients seen, ICD-9 or CPT codes, utilization review denials or appeals, or aggregation through electronic medical records systems.

Disability Duration Guidelines

Disability duration guidelines are normative reference materials, generally based on actual patient data, which provide estimates of how long injured workers should be out of work for given medical conditions. They are typically organized by medical diagnoses (ICD-9 and DSM-IV-TR), body parts, or presenting symptoms. Prior to the development and promulgation of disability duration guidelines, case, benefits, and disability managers all had to rely on their personal experience or anecdotal advice from others in deciding whether disability durations were appropriate or not. Current guidelines can potentially be used for three main purposes: 1) guidance of return to work efforts; 2) estimation of future claim costs (to assist in setting reserves); and 3) measurement of disability management performance.

Disability duration guidelines have a number of specific applications:

- **Initial and Ongoing Prediction of Case Duration.** Initial estimates of anticipated case length and treatment durations may help physicians to plan treatment; they may also assist in budgeting and planning for case management. Ongoing revision of duration and outcome estimates during case evolution can provide decision-making guidance based on updated conditions for both physicians and managers.
- **Threshold or Trigger for Intensified Management.** Different expectations can be set and intensity of medical and case management pursued depending on how recovery and rehabilitation progress compared to originally predicted durations. Many physicians use median durations for given conditions as decision points for enhanced intervention.
- **Aid to Setting Insurance Reserves.** Guidelines for most likely case durations and outcomes can be utilized to estimate overall case costs to insurers and third party payers; in this context, they should be used in a conservative and realistic (as opposed to optimistic) fashion.
- **Communications Tool.** Duration guidelines developed by third parties can serve as an authoritative reference to help affected workers, physicians, employers and payers to establish and share appropriate expectations.
- **Performance Standards.** Although not absolute, guidelines can be used to compare estimated (or budgeted) and actual case durations for individual, group, or operating unit caseloads to provide a measure of performance and indication for areas of potential improvement. An extension of this application is use as an aggregate organizational or system benchmark, e.g., to track the effectiveness of changes or innovations in case and claim management. It may be useful for managers to track budgeted vs. actual case durations as an aid to evaluation and development of management team skills.

LIMITATIONS OF DISABILITY DURATION GUIDELINES

There are several important limitations and caveats that should be considered in the practical application of disability duration guidelines:

- Reliance on disability durations for management is not proactive, and instead generally involves management after a threshold is reached. Instead management from the first visit should be the goal.
- Transitional work is a poor fit for duration guidelines; transitional work assignments may have been designed to put little or no demand on the affected body part and have little or no relationship to the affected worker's usual job. These guidelines are based on actual data and as such reflect the current reality that unnecessarily prolonged disability is very common. The minimum or best practices durations shown for sedentary job classifications may be the best available data on the real durations of medically-necessary disability. The other (longer) disability durations shown for the same conditions for workers in other job classifications may be caused by a mismatch between the workers' current functional ability (which has been temporarily altered by the medical condition) and the demands of their usual jobs. In other words, the increased disability lengths

are **not** medically required; rather, they are caused by the demanding nature of the work itself.

- Data relied upon are frequently biased by jurisdictions or states that do not actively manage cases or otherwise have high lost time rates.
- As currently utilized, disability durations do not account for illness or injury severity (e.g., Grade I, II, or III sprain). Medical diagnostic databases do not specify information about severity; it should be inferred from treatment. This creates a paradox: although guideline users are concerned about over-treatment and excessive disability, they are forced to use the extent and nature of the treatment to infer severity and predict disability duration.
- There is great variability between injured workers with the same or similar diagnoses. Diagnoses can vary over time as conditions evolve from one problem to another (e.g., angina progressing to myocardial infarction) or as evaluation progresses and findings evolve (the etiology of hip pain is identified as arthritis or avascular necrosis necessitating total replacement arthroplasty).
- Other individual variations may include personal characteristics such as age (and corresponding general physical condition) and multiple medical co-morbidities. Disability duration guidelines usually recommend against reliance on them in multiple-diagnosis cases or cases with medical complications.
- Guidelines incorporate no consideration of the psychosocial and workplace context in which the illness or injury occurred. Variables may include affected worker psychological elements, employer factors such as attitudes, beliefs, and expectations (ABEs), and ability or willingness to support return to work, and other conditions such as legal representation.

Precise quantification of the effect of each of these variables on disability duration is beyond the scope of any existing guidelines. This limits, but does not eliminate the utility of disability duration information in work disability management. As with guidelines derived from the EBM and EBMgt processes, duration information should be used as another factor contributing information to guide the affected worker, physician, employer, and payer in the optimal management of a given case.

Physician Compensation for Work Disability Prevention and Management Activities

Most workers' compensation fee schedules do not properly recognize and reimburse physicians who go beyond traditional biomedical services and do the extra work required to restore injured workers to optimal function and promote rapid return to work. The provision of high-quality workers' compensation services requires more physician attention and time to worker education and client communication, increasing the cost of delivering these services when compared with routine health care.(51, 109, 110) As a result, low fee schedules can discourage the participation of qualified occupational physicians and undermine the economic viability of occupational health programs designed to meet the true needs of affected workers and employers. Appropriate fee schedules promote the development of quality occupational medicine programs and services, which in turn ensure higher quality of health care to injured workers while reducing the costs to employers and insurers. Outpatient provider fees are not a major cost driver in the workers' compensation system, but lack of access to high-quality, front-line health care increases costs. Several studies have documented that improved reimbursement to occupational health physicians – in conjunction with other interventions such as enhanced administrative oversight – can lead to better patient outcomes and reduced costs.(66, 106, 111-116)

Physicians seldom receive extra compensation for their time and effort in the disability prevention and management aspects of the stay-at-work/return-to-work (STW/RTW) process. As a result, they may give those aspects low priority, believing they have no market value. In more complex situations that could benefit from the physician's initiative or active participation, the monetary disincentive reflected by lack of payment often deters the provider from responding quickly or making the extra effort, often delaying return to work. Because most physicians do not consider disability prevention their responsibility, their passivity does not represent a failure to carry out their perceived duty to them. Although employers and insurers may assert that disability management should be included in the price of the medical visit, such assertions have little impact on physician behavior.

Appropriate fee schedules may increase the available number of high-quality providers and programs. When combined with evidence-based treatment guidelines (as discussed in the previous section), they may also improve the likelihood that affected workers will receive appropriate medical care in a timely manner, as well as help controlling costs by reducing

unexplained variations in care and ineffective services. ACOEM has developed a proposal for new multi-level CPT codes for disability management that reveals the variety and extent of the intellectual work physicians should do in performing this task. Adopting a new CPT code (and payment schema) for functional assessment and triage of affected workers could contribute to similar goals. Payers may be reluctant to pay all physicians new fees for disability management because of reasonable concerns about billing abuses (i.e., extra costs without outcome improvement). Completion of training in work disability prevention, and demonstration of an ongoing pattern of evidence-based care and good-faith effort to achieve optimal functional outcomes – provision of value, as defined by quality per cost – may successfully address those concerns.

It is appropriate for medical practices to charge separate fees (unless prohibited by law or contract) for communication, care coordination, and completion of reports designed to facilitate STW/RTW for affected workers. These services take time as well as professional knowledge and judgment by physicians and support staff. These activities provide added value to workers, other members of the health care team, employers, and insurers. Larger fees are justified in situations that require physicians to go beyond the provision of routine medical care, such as review of materials and formulation of responses to questions posed by employers or workers' compensation or disability benefits claims payers. Billing policies should be explained in advance of providing service and all activity performed should be documented.

Primary and Secondary Prevention

A major focus of this chapter is prevention of work disability by changing beliefs, approaches, and behaviors on the part of all stakeholders in anticipation of, during, and after the occurrence of work related illness or injury. It is intuitively obvious that primary and secondary illness and injury prevention measures to avoid or minimize the occurrence of these conditions should reduce work disability and reduce or obviate the need for management (see Prevention chapter).

Primary prevention measures depend on reducing or eliminating exposure to physical, personal, and psychosocial stressors which may develop into pathological conditions in susceptible individuals. Interventions discussed in the Prevention chapter include:

- Work design, particularly ergonomic modifications and tactics to reduce musculoskeletal illnesses and injuries.
- Personal risk modification, including worker health, wellness, and productivity promotion.
- Preplacement and periodic examinations to ensure initial person-job fit and ongoing fitness for duty.
- Physical hazard control, involving the classic cascade of engineering, administrative, and personal protective measures.
- Education of both management and employees with regard to risk factors and prevention measures.

Secondary prevention may be more cost-effective than primary prevention, particularly when targeted at high-risk cases (when they can be identified). Screening and surveillance programs are designed to identify early indicators of potential injury or illness as well as intervention to avoid the worsening of conditions and/or re-injury. This form of prevention is also aimed at reducing disability and hastening recovery once a health concern has become apparent.

Attitudes, Beliefs, and Expectations: a Fundamental Theme

Stakeholders

Attitudes, beliefs, and expectations (ABEs) of all stakeholders are a powerful influence on the perception, management, and resolution of worker illness and injury and work disability prevention. Affected worker ABEs are one of the most important drivers of recovery and rehabilitation. The ABEs of physicians determine their approaches to occupational medical practice, affected workers, other stakeholders, and the workers' compensation system in general. ABEs of other stakeholders, particularly employers and payers, may strongly channel their behavior towards workers, physicians, and the entire work disability prevention process and affect outcomes in positive or negative ways.

Affected Workers

ABEs shape peoples' feelings, perceptions, intentions, values, presumptions, motivations, and viewpoint, and exert a profound influence on their response to illness and injury and their recovery and rehabilitation.(117) Affected worker beliefs have been found to be associated with psychological functioning,(118, 119) physical functioning,(119, 120) coping efforts,(121) behavioral responses,(118) and response to treatment.(122) Some examples of the effects of worker ABEs:

- Patient beliefs and expectations with regard to illness and injury, and subsequent functional recovery, can markedly affect outcomes.(123)

- Positive affected worker recovery expectations were associated with reductions in grading of pain and improvement in functional status outcomes and were predictive of duration of disability benefits.(124)
- Worker belief about severity of back pain lasting at least 4 to 6 weeks was a significant contributor to a multi-variable model predicting RTW 3 months later.(39)
- Expectations of recovery and perception of health change were key psychosocial predictors of return to work, as well as work disability duration and cost.(125)
- Low self-assessed ability to work and perception of inability to return to work predicted delay in actual return to work.(126)
- Worker recovery expectations significantly influenced time to RTW in persons with low back pain(127); these results were confirmed in a 2010 study by the same authors.(128)
- Recovery expectations, measured using a specific, time-based measure within the first 3 weeks of non-specific low back pain, strongly predicted poor outcome.(129, 130)
- Self- efficacy beliefs influenced task performance and spinal function, including lifting ability spinal function, in workers with chronic low back pain.(131-133)

Factors which may affect worker ABEs include: 1) education, past experience, and socioeconomic status; 2) personality, motivation, readiness to change, and willingness to accept personal responsibility for recovery; 3) preparation for illness or injury within the workplace; 4) treatment accorded within the medical and workers' compensation systems; and 5) the presence or absence of legal representation.(134, 135) However, the most important ABE determinant regarding RTW may be past experience and a realistic assessment by the worker about what is possible. Thus, expectations about RTW may be the result of a careful and well-informed assessment of all of the factors that can impact return to the workplace.

Some worker ABEs which may contribute to work disability include(13, 136):

- Attribution of health condition to work;
- Belief that work is harmful or will exacerbate condition;
- Self perception of current and future ability to work;
- Belief about being too ill, injured, or disabled to return to work;
- Belief that condition must be resolved prior to return to work;
- Expectation of fatigue or pain upon work resumption;
- Low self-efficacy;
- Low expectation about return to work; and
- Beliefs and expectations about (premature) retirement.

Physicians

The psychology of health care providers may be just as important as that of affected individuals in the management of disabling musculoskeletal pain.(17) Many physicians persist in a biomedical approach out of: 1) lack of knowledge of these impacts; 2) inertia and a preference for intuition (an amalgam of beliefs, experience, and habit) over evidence(137, 138); 3) a persistently paternalistic model of decision making; 4) belief that psychological illness dimensions are not within their scope of practice; and 5) conviction that psychosocial issues will resolve after the nociception is addressed. Physicians who do appreciate the psychosocial dimensions of illness may have difficulty addressing them because of their own lack of familiarity and comfort in these areas and the stigmatization of psychological illness in society (including among all stakeholders in the disability prevention process). Studies suggest that the fear-avoidance beliefs and behavior of physicians may be more influential in affected worker management than previously realized.(139, 140) Time and financial pressures and the relative difficulty of managing workers with poorly defined symptom complexes (i.e., CHLPs) may also contribute to suboptimal practice.

Affected worker ABEs will markedly influence their perceptions and behaviors in the evaluation and treatment processes, and their ultimate return to work. Recognition of the contribution of worker ABEs to the maintenance and exacerbation of symptoms may be more important than specific therapeutic techniques to address them.(141) Interventions should be focused on fostering self-control and self-management that will encourage an affected worker to replace their feelings of passivity, dependence, and hopelessness with activity, independence, and resourcefulness. However, ABEs may or may not be accurate, and physicians should thoughtfully explore them to understand what individuals anticipate will occur.(142) Initial and regular re-assessment of affected worker ABEs should occur as part of the ongoing treatment process in order to address any problematic misunderstandings or misperceptions that would impede individual progress.

Physicians may approach affected workers from a biomedical or psychiatric perspective; however, both models artificially separate clinical conditions into either physical or mental categories.(143) This duality does not address other interacting issues (e.g., psychosocial factors) that may negatively impact management. This may result in affected workers receiving treatment but not making significant gains in functioning and needlessly extend the length of disability.(144-146) With the incorporation of the biopsychosocial model, professionals take a more comprehensive approach to thoroughly evaluate and identify the physical, psychological, and psychosocial factors that are occurring with each affected worker being treated in order to enhance the treatment outcome. Worker expectations – and self-efficacy – may be influenced by physician attitudes, instructions, and counseling.(147, 148)

Employers

The organizational response of employers to work-related musculoskeletal problems includes all employee interactions, personnel actions, and labor management communications that result from a reported injury.(149) These include both formal and informal mechanisms, and immediate responses and subsequent actions.(150) Dysfunctional ABEs on the part of employers' representatives may include:

- Failure to take human capital approach (i.e., treating workers as commodity);
- Erroneous perceptions of medical conditions and management;
- Failure to create and practice go to/stay at/return-to-work policy;
- Hostility towards the ill or injured employee;
- Excessive concern about and focus on costs of illness or injury;
- Lack of priority of workers' compensation matters.

Employers can have a major influence on the ABEs of affected worker (see Workplace Factors). Employer approaches and actions (or lack thereof) before, immediately after, and during the ongoing management of employee illness or injury, whether work or non-work, related, can significantly affect the course of recovery and rehabilitation and the work disability outcome.

Payers

Payers have a statutory and fiduciary responsibility to employers and affected workers, and, like employers, are in a position to exert major positive and negative effects on the course of individual cases. Case managers and adjusters generally carry very high caseloads, and the potential for excessive stress and burnout are high. Frustration with the demands of the task, including affected worker unfamiliarity with the workers' compensation process or unreasonable ABEs, inappropriate physician or employer practices, and/or suboptimal communication by and among all parties, may engender cynicism and distrust by payer representatives. Payers should provide a benign but intelligent approach to case management, balancing the legitimate needs of affected workers and other stakeholders with their own needs for cost-effective claim resolution.

Specific Considerations and Potential Interventions in Work Disability Prevention and Management

The following sections address specific considerations in the context of the six domains of influence presented in the conceptual model above, as well as the general considerations.

Medical Management Factors

Table 1. Medical Management Factors Which May Contribute to Work Disability

Appropriate Initial Management

Physician Training and Orientation Factors

Use of Occupational Medicine Trained and Experienced Physicians

Use of Physicians Trained in Work Disability Prevention and Management

Physician Performance

Avoidance of Mischaracterization of Conditions

Avoidance of Overemphasis on Specific Diagnosis

Appropriate Interpretation of Diagnostic Testing

Appropriate Intensity of Treatment (Avoidance of Overtreatment)

Physician-Affected Worker Interaction

Physician Behavior Towards and Positive Influence on Affected Worker

Cultural and Educationally Appropriate Interaction

Affected Worker Education and Reassurance

Affected Worker Empowerment and Facilitation of Self-Management

Specific Physician Practices

Contribution to Medical Co-Morbidity Management

Prompt, Evidence-based Treatment by Quality Guidelines

Appropriate Use of Opioids

Appropriate Work and Activity Restriction

Maintenance of Physician Contact with Workplace

Timely Specialist Referral

Introduction

The Hippocratic Oath states “First, do no harm.” However, this is not always the case in the medical management of working persons, and some physician practices may fail to prevent or actually promote eventual work disability. In addition to the general concerns advanced in the Iatrogenicity section above, the following discussion addresses specific factors and practices relevant to the health care system in general and medical physicians in particular. Dasinger noted that “overconcern, overdiagnosis, overtreatment, and mismanagement of early treatment, including advice to remain off work and stay in bed, early and multiple referrals to specialists, and attitudes of suspicion or denial about the legitimacy of the worker’s complaints, may promote and prolong disability.”(51) Evidence for the factors considered here is variable, but all merit consideration by thoughtful physicians, as well as further research and study.

This section addresses the following medical aspects of affected worker management in the prevention of work disability:

- Attitudes, beliefs, and expectations of both affected worker (see Psychological Factors) and physician.
- Inappropriate initial management.
- Physician orientation towards an occupational medical approach and use of best practices.
- Physician-affected worker interaction.
- Physician performance.
- Specific physician practices, including management of medical co-morbidity, use of opioids and work restrictions, maintenance of contact with the workplace, and appropriate specialist referral.

Physicians should generally be guided by the goal of doing what is best for affected workers, *based on the best available evidence*, even in situations in which individuals disagree (e.g., return to work).

Other Factors Considered

Medical management factors included in other sections of the chapter include the use of evidence-based guidelines and disability durations; transitional work and activity prescription; and physician management of affected worker psychological factors and psychiatric co-morbidity.

Inappropriate Initial Management

Initial management by non-occupational or occupational first providers (in urgent, emergent, or primary care settings) may later contribute to preventable work disability by creating or validating inappropriate worker expectations (injury mindset) or delaying definitive treatment. Potential examples are unnecessary testing (blood, plain radiography), use of durable medical equipment (limb immobilization), medications (opioids, muscle relaxants), unnecessary time off work, and failure of early referral and management transfer to occupational physicians. Common and routine features of initial stabilization and treatment of work-related injuries (particularly in emergency departments in the U.S.) unfortunately consist of performance of plain radiography, especially for acute onset of non-traumatic low back pain; prescription of opioids, and placement of the affected worker in a no-work status for variable periods of time.

The content of care can modify patient expectations and “through the example of their practice habits, physicians may unconsciously teach their patients what to expect from medical care.”(151) An evaluation of ways in which emergency

physicians approach the diagnosis and treatment of the common presenting complaint of low back pain was reviewed.(152) For acute cases (less than 1 week from onset), the authors found that 22 to 36% of physicians would recommend CT or MRI; 32 to 61% would recommend specialist consultation; more than 75% would recommend bed rest for an average of 3.5 to 4.5 days; 16 to 40% would suggest physical therapy; and 41 to 81% would refer immediately to surgical specialists (orthopedic or neurosurgical). The authors suggested that the measures favored by many emergency physicians would add little to management except expense, and recommended simpler, less costly and more reassuring approaches to emergency department patients with low back pain. The association between initial physician initial management of work-related LBP and disability duration was examined in 98 randomly selected workers' compensation claimants with acute, uncomplicated, disabling work-related LBP.(153) Increased disability was significantly associated with increased utilization of specialty referrals, provider visits, early diagnostic imaging (first 30 days of care), use of magnetic resonance imaging, and use of opioids for more than 7 days. Patients whose treatment course did not involve extended opioid use and early diagnostic testing were 3.78 times more likely to be off disability status by the end of the study. Another study found that emergency physicians were most likely to follow guidelines for diagnostic studies and most symptom control interventions, and to select fewer diagnostic studies than most other specialty groups for cases with nonspecific LBP.(154) However, they more often made treatment recommendations that were likely to promote inactivity (e.g., ordering bed rest, opioids, and recommending exercise less often).

Physician Training and Orientation Factors

OEM Training and Experience

Occupational medicine is unique in that it is practiced by a wide variety of physicians with markedly varied backgrounds, including emergency medicine, family practice, internal medicine, orthopedics, general surgery, and others. The vast majority of physicians who practice occupational medicine do so with knowledge gained by self study, attendance at short courses, and practice experience; most of these practitioners are not formally trained or Board certified in occupational medicine.(155) Although the correlation between training and certification and use of best practices is unclear, intuitively it seems likely that physicians without the benefit of the former would be less likely to be familiar with and engage in the latter. A 1998 study described several ineffective medical practices, barriers to return-to-work, and risks for iatrogenesis can originate from the treating physician and delay functional recovery, including(156):

- Significant departure from guidelines;
- Request for unusual tests;
- Excessive physical therapy;
- Excessive pain medication;
- Physician request for consultation;
- Request for work hardening;
- Request for pain management clinic;
- Request for rehabilitation program;
- Pre-existing medical problems; and
- Polypharmacy, opioids, psychotropics.

A survey of 300 occupational physicians with regard to previous affected worker management by primary care physicians found that the occupational physicians considered treatment by the latter group to be a significant factor in delay of return to work and work disability.(157) A subsequent study of 555 workers with mental health problems found poor agreement in diagnosis and management between treating and occupational physicians.(158) Another study reported that workers managed by occupationally trained physicians using evidence-based practice guidelines lost less time from work, spent less time on transitional duty, and had significantly higher rates of recovery and lower rates of recurrence and chronicity than those managed by private (non-occupationally trained) physicians.(105)

PHYSICIAN TRAINING IN WORK DISABILITY PREVENTION AND MANAGEMENT

Work disability prevention is a complex undertaking with vitally important implications for workers and many other stakeholders. An understanding of factors affecting the entire process, its many facets, and their interactions may assist physicians and other stakeholders in being more effective and improve outcomes. Few physicians, except those specializing in occupational medicine and physiatry, ever receive training in disability prevention and management. Although function is now acknowledged as having a greater impact on quality of life than serious illness, most medical schools have not integrated evaluation of function into their curricula.

The extent to which practicing physicians and other stakeholders actually understand the complexities of the process is unknown. Formal training in a set of principles such as those elucidated in this chapter may be conducive to improvement of understanding and effectiveness of all stakeholders in the process. ACOEM has made the following recommendations(18):

- Educate all treating physicians in basic disability prevention and management and their role in the stay-at-work and return-to-work process, making knowledge and skills to be taught consistent with current recommendations that medicine shift to a proactive health-oriented paradigm from a reactive, disease-oriented paradigm;
- Focus attention on treatment guidelines where adequate supporting medical evidence exists, providing advanced training in the most effective methods; and
- Make appropriate privileges and reimbursements available to trained physicians.

Both ACOEM and the American Academy of Orthopedic Surgeons offer courses on disability-related topics. Employers in West Virginia and Idaho award quality points towards bonuses to local physicians who attend a training session or take a short, web-based course in disability prevention and return-to-work communications. The State Compensation Insurance Fund of California recently made disability management training a requirement for key physicians in its medical provider network. Workers' compensation health care provider networks in California and Florida strongly encourage their physicians to take a course in disability prevention, and networks in other states are developing similar programs. However, to date, there is no clear evidence on the effects of this training on affected worker outcomes in any measure of work disability.(159)

PHYSICIAN PERFORMANCE

In 2002, Lax wrote: "Clinicians attempting to serve the needs of their worker/patients are ... caught in a bind between complex health problems and demands to reduce the complexity using inappropriate methods and criteria. Physicians are forced to participate in this process if they want any ability to facilitate treatment, accommodations, and benefits for their worker/patients. The predominant response to this problem is a redoubled effort to find and use "objective" means to identify occupational disease. According to this approach, the problem is essentially one of inadequate knowledge and the need is for the development of more powerful tools to accurately assess exposure, risk, effect, and impairment/disability....This approach has fallen short in its ability to identify and treat work-related conditions effectively, as it is based on a partial assessment of the underlying issues."(160)

Physician performance in work disability prevention and management encompasses four related concepts:

1. Appropriate characterization of a clinical presentation as work- or non-work-related and as a serious medical condition or common health and life problem, and honest communication of physician perception to all stakeholders.
2. Avoidance of overzealous pursuit of definitive pathoanatomic or pathophysiologic diagnosis, particularly when management is not altered.
3. Appropriate interpretation of the diagnostic testing performed, correlation with previous test results and current clinical findings, and use of obtained information.
4. Judicious clinical management to avoid unnecessary and possibly psychologically or physically detrimental treatment.

AVOIDANCE OF MISCHARACTERIZATION OF CONDITIONS

Physicians should accurately identify the nature of affected worker conditions to establish a sound basis for appropriate medical care and case management. Inaccurate characterization may lead to:

- Establishment or reinforcement of inaccurate affected worker ABEs.
- Inappropriate diagnostic testing (discussed in the following section).
- Inappropriate therapy, particularly pharmacotherapy and physical modalities, which may psychologically reinforce worker perceptions of serious injury and illness behavior and have untoward side effects (e.g., opioids, discussed below).
- Imposition of unnecessary work restrictions (discussed below).

This process entails three aspects:

1. Differentiation between work- and non-work related conditions.
2. Correct characterization of work-related conditions as serious medical conditions (SMC) or common health and life problems (CHLP), as discussed in the previous section on iatrogenicity. SMCs are the primary focus of OEM physician diagnosis and management, applying both biomedical and biopsychosocial models, whereas CHLPs require management with a biopsychosocial approach.
3. Clear communication of this characterization to all stakeholders, including most importantly themselves and affected workers, despite expectations by some or all stakeholders which may not be consonant with the reality; physicians

should usually be guided by their belief as to what is best for the individual, even in the face of disagreement or opposition by other stakeholders (including the affected worker).

AVOIDANCE OF OVEREMPHASIS ON ESTABLISHMENT OF SPECIFIC DIAGNOSIS

The exact diagnosis of medical conditions, including precise anatomic localization of a locus of symptoms (“pain generator”) is often not critically important to patient management (or in the case of spine pain, may never be known), particularly when initial or on-going conservative treatment is not affected. Examples can be found in the Cervical and Thoracic Spine Disorders, Low Back Disorders, and Hand, Wrist, and Forearm Disorders chapters which state that the most common clinical presentation is “non-specific pain” without an objectively established cause (i.e., no proven pain-generating structure or lesion). Diagnostic findings in non-specific low back pain are often uninformative and only 10 to 20% of subjects can be assigned a precise pathoanatomic diagnosis.(161) Most red flag conditions can be ruled out by history and physical examination.(162)

Diagnostic testing assumes more importance in affected workers who fail to respond to conservative measures and for whom more specific guidance is needed to determine the need for more aggressive and invasive interventions. Physicians use and potentially overuse certain tests for a variety of reasons: habit, inexperience, peer pressure, patient reassurance, patient demands, and fear of malpractice charges.(163) Inappropriate diagnostic testing may be:

- expensive;
- time consuming;
- disruptive of employer operations;
- causative of more work absence to little positive effect;
- subject to misinterpretation; and
- injurious to affected workers (e.g., ionizing radiation).

Both mischaracterization of conditions and overemphasis on diagnosis relate to the concept of *diagnostic labeling*, which is described as “unintended, and usually adverse, consequences of simply assigning a diagnostic label to an anxious individual.”(85) Diagnostic labeling has been shown to adversely affect patient outcomes.(82) The simplicity aspect of the SPICE model in stating that non-objective diagnoses should be stated in clear and non-threatening terms, focusing on explanation of the most likely pain mechanisms, reassuring affected workers that serious disease was absent, and reinforcing the generally favorable prognosis of the natural history of most disorders.(85)

Based on observation of 200 low back pain(LBP) patients over 5 years, once study concluded that findings on MR imaging within 12 weeks of serious LBP inception are highly unlikely (84% of cases) to represent any new structural change.(164) Most new findings noted in the study (loss of disc signal, facet arthrosis, and end plate signal changes) represented progressive age changes not associated with acute events; some primary radicular syndromes had new root compression findings associated with root irritation. Another study of LBP patients found no significant differences between immediate lumbar imaging and usual care without immediate imaging for primary outcomes (pain or function) at either short-term (up to 3 months) or long-term (6 to 12 months) follow-up. (165) And, a 2010 study which examined relationships among early magnetic resonance imaging (MRI) utilization for workers’ compensation cases with acute, disabling LBP, low or high propensity to undergo early MRI, and disability duration, medical costs, and surgery found that the majority of cases had no early MRI indications, and suggested that iatrogenic effects of early MRI were increased disability, medical costs, and surgery, unrelated to severity.(166) These results recommended that physicians should refrain from routine, immediate lumbar imaging in affected workers with acute or subacute LBP and without features suggesting a serious underlying condition.

A study of LBP patients found they assign a high priority to having their symptoms explained.(167) A follow-up study done the next year, reported that patient education and delayed radiography, in lieu of standard immediate imaging, did not miss serious diagnoses; produced similar levels of patient symptom resolution, functional improvement, and satisfaction; and drastically reduced radiology charges.(163) This study suggested that affected workers can be reassured without necessarily obtaining x-rays, and bridged assertions that most individuals with uncomplicated mechanical LBP need explanation rather than diagnostic imaging.(168, 169)

APPROPRIATE INTERPRETATION OF DIAGNOSTIC TESTING

Excessive diagnostic testing *will* be performed as long as the current medicolegal climate prevails. Despite sometimes intense pressure to order diagnostic testing from affected workers, colleagues, employers, payers, and other stakeholders, physicians need to:

- Be knowledgeable in the appropriate interpretation of commonly used diagnostic testing and avoid misinterpretation of diagnostic studies that *are* performed (e.g., spinal disc bulges as herniations).
- Explain to workers that a spine image will not be normal regardless of symptoms *before it is ordered*, otherwise it should not be ordered by that provider.
- Be cognizant of the clinical significance of test results and their usefulness in patient management.
- Correlate test results with clinical findings (e.g., the symptoms and signs of carpal tunnel syndrome in the worker with electrophysiologic studies suggestive of compressive median neuropathy at the wrist).
- Be aware of previous testing and compare results to avoid assumption of new or extended lesions when they may in fact have been present on a prior study.

Basic principles in this regard are discussed in *Guidelines* chapters addressing specific body areas and include:

- Performance of testing only when test result will change management (i.e., appropriate indications).
- Knowledge of test characteristics (e.g., sensitivity, specificity, positive and negative predictive value in given population).
- Familiarity with general characteristics of testing facilities and radiologists utilized.
- Consultation with interpreting radiologist prior to or after testing, in potentially problematic cases or unclear results.
- Action plan for results of testing.

Inappropriate interpretation of diagnostic testing may contribute to unnecessary work disability by:

- Establishment of inaccurate affected worker perceptions (particularly of seriousness of condition), reinforcement of maladaptive cognitions and behaviors, and failure to reinforce adaptive traits.
- Resultant misguided management and potential complication of case management, including inappropriate further diagnostic testing, therapy, work restriction, and possible specialist referral.

AVOIDANCE OF OVERTREATMENT

Overtreatment, particularly with excessively assertive diagnostic and therapeutic intervention, has three common facets:

1. Overly aggressive management in the acute phase.
2. Continuation of serially ineffective therapy.
3. Overly aggressive, ineffective, and possibly harmful management in the subacute and chronic phases, particularly by invasive interventions.

The natural history of uncomplicated LBP is resolution without intervention in under a week in most cases and up to 4 to 6 weeks in a minority. It has long been recognized that many individuals do well with little intervention,(96, 170) and overly aggressive early treatment may iatrogenically prolong work disability.(170-172) As discussed, early imaging does not significantly contribute to patient management and has the potential for undesirable effects. Recently, the results of two unpublished studies of LBP management by the Liberty Mutual Research Institute for Safety were presented.(173) One study indicated that the most effective physician action in the acute phase (less than 30 days) is supportive care with non-steroidal anti-inflammatory agents and encouragement of regular activity (see Low Back Disorders chapter). The second found that worker self-forecast of return to work ability in 30 days was greater than 90% predictive of actual attained work status, independent of treatment during this period. Another study also found worker self-prediction of timing of return to work to be a significant component of a multi-variate model.(63) A literature review, concluded that the precise intervention pursued in the subacute phase (particularly 6 to 8 weeks after condition onset) was less important than relationship to the workplace, specifically the goal of return to work.(4)

The second broad principle is avoidance of serially ineffective therapy, particularly continuation and extension of occupational and physical therapy for musculoskeletal conditions when the target condition and resultant worker function are not improving. The disorder chapters of these *Guidelines* contain specific evidence-based recommendations for method, intensity, and duration of treatment for various body areas and conditions. Variation from these guides should be based on individual clinical factors specific to affected individuals and not on physician lack of alternative interventions. Similarly, the third broad principle is addressed in detail in the Disorder chapters, with specific recommendations for various body areas and conditions.

Physician-Affected Worker Interaction

PHYSICIAN BEHAVIOR TOWARDS AND POSITIVE INFLUENCE ON AFFECTED WORKER

The first consideration in physician behavior is the general approach of physicians toward affected workers (bedside manner) and how the overall worker experience contributes to rehabilitative progress in illness and injury. The second consideration is the proactive and focused use of providers' positions, influence, and power to positively respond to affected worker ABEs, manage maladaptive traits, and encourage and reinforce adaptive behaviors and characteristics in recovery. A physician needs to use her or his position and skill to educate, reassure, and sometimes cajole affected workers, doing everything possible to discourage a disability mindset. This is a theme that runs throughout the entire topic of WDPM and may be one of the most powerful influences in the pursuit of this goal.

Physician occupational medicine orientation (understanding affected workers' jobs, discussing how to avoid re-injury, and suggesting appropriate work restrictions) and interpersonal aspects of care (such as provider ability to communicate, treatment of affected workers with courtesy and respect, and discussion of treatment options) are integral parts of appropriate care and injured worker satisfaction.(174) Affected workers with positive treatment experience as determined in seven areas (e.g., satisfaction with different aspects of clinical care) have been found to be more than three times less likely to be receiving lost time benefits at 6 and 12 months.(175) Physician communication about time of injury, natural course of healing, and work restrictions appears to affect disability duration during only the acute phase.(51) This effect was overcome by physical and psychosocial factors of the work environment in the subacute and chronic phases, although physician recommendations for go to/stay at/return to work were associated with shorter disability duration in the later periods.

Specific actions or inactions of physicians may affect the perceptions and expectations of affected workers and have important effects on eventual work disability. Physicians can exert significant influence over affected worker functional recovery from illness and injury.(176-179) For example, physician specification of a RTW date and provision of guidance on re-injury and recurrence prevention were found to be positively associated with early return to work.(180) Conversely, inappropriate initial counseling and instruction (e.g., failure to describe the anticipated or "usual" clinical course, reassure, encourage recovery, and/or establish expectations) may set a suboptimal tone for workers' subsequent clinical courses. It has been suggested that in many mild, early cases of LBP, physicians respond to affected worker concerns about return to work imposing unnecessary restrictions, thus preventing workers from returning to work as early as they could.(177) In the context of medically unexplained symptoms, the actions of primary care physician actions can exacerbate (unnecessary specialist referral, use of diagnostic testing as a means of reassurance, labeling) or alleviate (adequate assessment, reassurance) these conditions.(11) It has been suggested that early communications with affected workers with low back pain should include reassurance about the favorable prognosis of the condition, avoid alarming or misleading terminology (e.g., "injury"), and encourage early return to work.(176)

It may be that appropriate physician attention can compensate for work disability promotion by other factors, e.g., employers, payers, or other stakeholders. However, the effect of direct advice from health care providers on RTW rates needs to be examined within the larger context of severity of injury, socio-demographic factors, and workplace factors.(65)

CULTURALLY AND EDUCATIONALLY APPROPRIATE INTERACTION WITH AFFECTED WORKER

Modern developed societies comprise populations of both workers and physicians with widely varying cultural, educational, ethnic, and linguistic backgrounds. For optimal care, affected workers should comprehend the system in which they are involved and their interactions with providers (and other stakeholders), and understand (if not accept) medical management. Lack of understanding by workers may engender fear, resentment, and other maladaptive characteristics which may compromise recovery and rehabilitation. For example, a study of injured worker satisfaction and outcomes, found that Spanish-speaking individuals were less likely to be satisfied with physician communications than their English-speaking peers.(181)

Similarly, lack of physician understanding of affected worker cultural and educational characteristics may lead to suboptimal care and case management. Physicians should strive to interact with workers and significant others at culturally and educationally appropriate levels. Evidence-based consensus recommendations of the Australian Acute Musculoskeletal Pain Guidelines Group include: 1) physician-affected worker concurrence on management plans; 2) information conveyance in neutral terms, avoiding alarming diagnostic labels and jargon; 3) direct physician address of inappropriate affected worker expectations, fears, and mistaken beliefs; and 4) adaptation of communication methods to meet specific patient needs, with verification that information is understood.(182)

AFFECTED WORKER EDUCATION AND REASSURANCE

Physicians should strive to present accurate and realistic pictures of affected worker conditions, prognoses, outlooks, and anticipation for recovery. Affected workers both need and deserve an honest appraisal of their conditions and appropriate counseling and instruction. Physicians should be sensitive to signs of inaccurate or inappropriate worker perceptions and expectations and address them as soon as possible. For appropriate workers, explanation of the risk-capacity-tolerance paradigm(26) may be helpful. One study determined that low back pain patients placed a high value on the efforts of physicians to understand their pain complaints, provide education about the condition, understand their physical job requirements, and recommend ways to prevent re-injury, and found that physician communication was as important to patients as short-term (less than 1 month) improvements in pain and function, and concluded that patients have high expectations of provider communication and counseling, especially during the acute stages of LBP recovery.(109)

Physicians are cautioned about the power of language, particularly the use of frightening metaphors and medical jargon.(183) Physician language should adapt and respond to patient experience, conveying reality, empathy, and hope, and that physicians should routinely elicit feedback (verbal or nonverbal) from affected workers to ensure that intended meanings were conveyed.

The effects of physician communication are controversial. While positive effects on outcome were noted, others have opined that physician communication may have affected disability duration during only the acute phase, with the effect overcome by physician and psychosocial factors in the subacute and chronic phases. Based on the literature, the effects of reassurance on pain-related problems are inconsistent, sometimes small, sometimes transient, and sometimes paradoxical.(51) Physicians are cautioned that general recommendations for reassurance appear premature and a better understanding is needed.(139)

AFFECTED WORKER EMPOWERMENT AND FACILITATION OF SELF-MANAGEMENT

Passive reliance on physicians, employers, payers, and others to manage recovery and rehabilitation (as opposed to taking responsibility and an active role) may lead to preventable work disability. For example, affected workers who believe they can control their pain, who avoid catastrophizing about their condition, and who believe that they are not severely disabled appear to function better than those who do not. A passive approach to treatment has been shown to increase disability and distress in many pain conditions.(184)

The fundamental tenet is that affected workers have a responsibility to contribute to their own recovery, and that this process needs to be facilitated by all stakeholders. Physicians can use their influence to encourage this process by educating workers in the facts of their situation, empowering them to take whatever measure of control they can, and facilitating self-management. This may include control of medication dosages and home exercise programs and affected worker participation in determination of realistic and appropriate work restrictions.

Rehabilitation of common health problems (CHLPs) has been stated to “often involves personal change: a shift in perceptions, attitudes and behavior, not only about symptoms and the sick role, but about health, capacity and work.”(13) It was further noted that the concepts of “enablement” and “empowerment” were central to education and modern rehabilitation, the goals of which include:

- Breaking the cycle of low expectations and achievement;
- Building motivation, confidence and self-esteem;
- Changing their self-image;
- Taking control of how they lead their own lives;
- Personal development; and
- Accepting responsibility for contributing to the well-being of themselves, their family and the community.

This raises questions about the appropriate division of responsibility and balance of power between physicians and affected workers. When workers assume a more active role in their health care, the role of health professionals becomes more one of supporting and facilitating the process. This can lead to a broader and more balanced division of responsibility among physicians, affected workers, employers, and payers which is particularly applicable to CHLPs.

Four components to patient empowerment in rehabilitation are(185):

1. Intrapersonal components, particularly sense of control or self-efficacy;
2. Interactional components such as critical awareness of the resources needed;

3. Knowledge and skills for managing resources; and
4. Behavioral components such as participatory behavior and coping behaviors.

A survey of 290 single-claim injured Canadian workers found negative impacts attributable to both the injury and compensation system involvement in economic, medical, psychological, and social areas of the subjects' lives.(186) Confirming a number of points established in other areas of this section, the authors recommended:

- Increase affected worker involvement in treatment and rehabilitation plans, in conjunction with physicians trained and experienced in occupational medicine.
- Use a more holistic approach to treatment and rehabilitation, including application of a BPS model, and integrated and multi-disciplinary care and case management.
- Create a more supportive climate for injured workers, including proactive employee education, maintenance of the employer-employee relationship during recovery, and access to counseling services.
- Improve worker knowledge of their rights and access to information.
- Recognize legitimacy of worker claims and issues, particularly involving avoidance of stigmatization.
- Increase sensitivity and accountability on the part of the compensation system.
- Increase employer responsibility, including provision of transitional work.

In a qualitative study of patients with medically unexplained symptoms, patient accounts of their physician's explanations of their condition fell into three types: rejecting, colluding and empowering.(187) The authors suggested that empowering explanations – i.e., those that were perceived as tangible and involving, and that made patients feel they have some influence over their symptoms – are most beneficial. A review of the medical literature on the effectiveness of empowerment-based intervention programs in systemic (not musculoskeletal) illnesses found positive effects on employment status, obtaining work accommodations, and psychological outcome measures.(188) The authors concluded that the most beneficial vocational rehabilitation interventions pay attention to training in requesting work accommodations and feelings of self-confidence or self efficacy in dealing with work-related problems.

Specific Physician Practices

MEDICAL CO-MORBIDITY MANAGEMENT

Certain medical conditions, particularly diabetes mellitus, may compromise recovery from injury or surgery by retarding tissue healing,(189, 190) although the overall contribution of this factor to eventual work disability is unclear. Other, less well defined conditions, such as fibromyalgia, may complicate both diagnosis and treatment of work related illness or injury.(191) The current movement towards workplace disease management (as part of integrated health management),(192) on-site health care clinics, and integration of occupational and urgent care in one setting may lead occupational physicians to a broader scope of practice in the future. Under certain state workers' compensation laws (e.g., Washington State), treatment by occupational medical physicians for co-morbid conditions such as fibromyalgia is permitted under workers' compensation claims, if such treatment is felt to be relevant to resolution of the work-related condition. The role and potential contribution of occupational physicians in these areas, in the context of eventual work disability prevention, is speculative at present.

USE AND MISUSE OF OPIOIDS

The Chronic Pain chapter addresses the general lack of scientific support for the use of opioids for nonspecific pain complaints, particularly the common health and life problems (CHLPs) that are a major concern of the present chapter. The following considerations apply to the use of opioids:

Significant adverse effect profile, including elevated death rate. Opioid analgesics are an option for symptom control, but only for a time limited course due to their side effects, which may include drowsiness, debilitation, impaired judgment, and reaction time.(170, 193) Numerous other studies have documented an epidemic of opioid-related deaths over the past 10 to 15 years.(194-199) A study of Washington State workers' compensation patients treated between 1996 and 2002, found that prescriptions for the most potent opioids (Schedule II), as a percentage of all scheduled opioid prescriptions (II, III, and IV), increased from 19.3% in 1996 to 37.2% in 2002, with an increase by 50% in the average daily morphine equivalent amount (MEA) to 132mg a day.(197) Thirty-two deaths were definitely or probably related to accidental opioid overdose. A later study in a similar population, treated between 2002 and 2005, found that total morphine equivalent dose (MED) increased significantly from the first to the fourth quarter of case duration.(198) However, improvement by at least 30% in pain and function measure scores occurred in only 26% and 16%, respectively, of long-term users. Opioid doses increased substantially over time in all but those for whom function improved. A study of 2,378 workers undergoing lumbar fusion, found that

analgesic-related complications were responsible for 21% of all deaths and 31.4% of all potential life lost.(199) The risk of analgesic-related death was higher among workers who received instrumentation or intervertebral cage devices compared with recipients of bone-only fusions and among workers with degenerative disc disease, and was especially high among subjects between 45 and 54 years old with degenerative disc disease (rate ratio, 7.45).

Potential for counter-therapeutic effects. One study described accumulating evidence that opioid therapy might not only be associated with the development of tolerance but also with an increased sensitivity to pain, a condition referred to as opioid-induced hyperalgesia (OIH).(200) This preliminary study in 6 affected workers with chronic low back pain found that all became hyperalgesic as well as tolerant after 1 month of oral morphine therapy. However, this effect is not well established as there is not sufficient evidence to support or refute the existence of OIH in humans except in the case of normal volunteers receiving opioid infusions.(201)

Questionable prescribing and usage practices. The behavior of both prescribers and recipients of opioid analgesics is suspect, in that pain intensity is not clearly predictive of prescription practices. A 1997 study reported that patient pain behaviors were closely correlated with opioid prescribing, whereas pain severity was not found to influence physicians' prescribing decisions.(202) A study of U.S. Veterans Affairs health care system patients, found that pain intensity did not predict opioid use.(203) These authors found a strong association between age, depression, personality disorder, and history of substance abuse and opioids use for the treatment of chronic low back pain in preference to non-steroidal anti-inflammatory drugs alone; their model was predictive in 79% of patients. In a study of more than 25,000 patients with back pain, those using opioids were found more likely to be unemployed, use tobacco, and have higher bodily pain scores on a SF-36 subscale.(204) Another study suggested that patients with back pain had similar pain scores whether or not they used opioids, but opioids users had more affective distress and self-reported disability than those who did not use opioids.(205)

Noncompliance with prescribed opioid therapy. Data obtained for chronic pain patients from a national testing center found only 27.1% of patients to have samples in compliance.(206) In 38.1% of the spine clinic's population, similar to the 37.0% of the national database, the prescribed drugs were not found in the patient's urine sample. Illicit drug use was identified in about 12% of patients. A retrospective analysis performed on 938,586 patient test samples between January 2006 and 2009 and found that 75% of patients were unlikely to be taking their medications in a manner consistent with their prescribed pain regimen; 38% were found to have no detectable level of their prescribed medication; 29% had a non-prescribed medication present; 27% had a drug level higher than expected; 15% had a drug level lower than expected; and 11% had illicit drugs detected in their urine.(207)

Association with prolonged work loss and disability. An analysis of the relationship between early opioid use and outcome in 8,443 workers' compensation claimants with acute low back pain found that mean disability duration, mean medical costs, and risk of surgery and late opioid use increased monotonically with increasing MEA.(208) Those who received more than 450mg MEA were, on average, disabled 69 days longer than those who received no early opioids. Compared with the lowest MEA group (0mg opioid), the risk for surgery was 3 times greater and the risk of receiving late opioids was 6 times greater in the highest MEA group. A study of 2,005 workers' compensation patients with low back pain compared those who had received opioid analgesics with a no-opioid reference group and found that odds of chronic work loss were 6 times greater for claimants using Schedule II opioids and 11 to 14 times greater for claimants with opioid prescriptions of any type during the chronic period (greater than 90 days after acute pain onset).(209) Three years after injury, costs of claimants using Schedule II opioids averaged \$19,453 higher than costs of claimants in the reference group. Costs for claimants using any opioids averaged \$25,678 higher. The authors concluded that "the strong associations observed suggest that for most workers opioid therapy did not arrest the cycle of work loss and pain."(209)

USE AND MISUSE OF WORK AND ACTIVITY RESTRICTIONS

Work activity is fundamental to recovery and rehabilitation and restriction of regular job activity should only be based on risk to affected workers or others (see special conditions in Transitional Work and Activity Prescription: Go to Work/Stay at Work/Return to Work). Work restrictions carry an inherent risk of promoting unnecessary disability, given that they prevent affected workers from maximally participating in life activities of which they may be fully capable. Unnecessary restrictions may delay optimal recovery, reinforce maladaptive psychological characteristics, complicate case management for all stakeholders, and generally move the "tenor" of the case away from recovery and resumption or maximization of function and towards the disability mindset. Restrictions that are based on pain complaints have been found to lead to unnecessary vocational disability.(178) Arbitrary activity restrictions after posterior lumbar discectomy have been found to lead to a similar result.(210, 211)

Determination of affected worker risk and appropriate work restriction can be difficult, and can be markedly affected by non-objective factors. A 1988 study found that 41% of family physicians were pressured to write unwarranted work excuses, and felt manipulated by their patients.(212) Another study found that almost half of physicians surveyed were willing to exaggerate clinical data to obtain disability certification for patients who they believed deserved it.(213) As a possible rationale for this behavior, the authors noted that 80% of physicians in their study thought that completing disability forms could adversely affect physician-patient relationships, and 62% thought that it constituted a conflict of interest. Others contend that in many mild, early cases of LBP, physicians respond to affected workers' anxieties about return to work (or their perception of them) by imposing restrictions, thus preventing workers from returning to work as early as they could.(177) Others noted that "the vast majority of medical restrictions... are based more on each physician's anecdotal experience and common sense than on data. Supporting and administering such restrictions is sometimes difficult because their justification depends on a medicolegal concept of the 'immediacy' of the risk. In the absence of data, estimating the degree of risk is difficult."(214) It has also been suggested that the interaction of patients' beliefs, behaviors, and demands with internal physician characteristics of professionalism, social desirability, and negotiation strategies can profoundly influence disability recommendations, and that significant discordance about whether a given condition justifies work limitations often occurs between affected workers and physicians.(215) Given such findings and the known beneficial effects of continued work on health and recovery from illness or injury, physicians should carefully consider the necessity, potential costs, and benefits of work restrictions, in general avoiding those that are based on pain complaints or unsubstantiated fears of re-injury, and those lacking objective and/or scientific support.

MAINTENANCE OF PHYSICIAN CONTACT WITH WORKPLACE

The need for improved communication among all stakeholders – particularly physicians, affected workers, employers, and payers – is vital (see Systemic Factors). An important component of this is two-way communication between physicians and workplaces. (Other involved health professionals may include chiropractors, ergonomists, occupational and physical therapists, and nurses).(216) Although physicians play an important role in the RTW process, they are typically given too little information to act effectively. An accurate, useful description of affected worker regular job functions and requirements is usually not available. Employees may be an inaccurate or suboptimal source of information with regard to availability and quality of transitional work. There may be workplace administrative concerns relevant to a given case (e.g., under the Family Medical Leave Act) into which physicians can have significant input, and other factors such as interpersonal relations and human resources concerns may impact case management.(18)

Physician contact with the workplace has been found to be associated with affected worker RTW, with an adjusted odds ratio of 1.72.(180) Another study found that although 48% of employers took no action in response to worker MSDs, a physician's recommendation for change doubled the likelihood of a response.(217) There is strong evidence that early and frequent contact between physicians and workplace representatives can reduce work disability duration.(218-226) Some of the same studies also provided evidence for positive economic benefits in terms of overall cost savings.(113, 224, 227-229) Similar findings have been reported in Baltimore and Louisiana.(230-234)

APPROPRIATE AND TIMELY SPECIALIST REFERRAL

Physicians should recognize when recovery and rehabilitation progress has stalled (use of guidelines and disability durations may assist in this process) or their capabilities in managing the affected worker have been exceeded, and seek appropriate specialist referral. (See critical nature of time in recovery from work disability discussed in the Iatrogenicity section.) This is related to avoidance of overtreatment (particularly continuation of ineffective therapy as previously discussed. Physicians may be hesitant to refer for a variety of reasons:

- Reluctance to accept their own limitations;
- Fear of 'losing' the patient to a specialist;
- Fear of negative reaction from the employer or insurer;
- Delays in the authorization process; and
- Lack of availability of healthcare providers willing to see workers, or specialist access in certain geographic areas or markets (including physical presence or willingness to treat workers' compensation cases).

As noted previously in the context of workplace depression,(235) it is extremely helpful for physicians to develop ongoing referral networks, and to know the characteristics of referral sources whenever possible. Occupational medical providers should ensure that referrals are made to specialists whose approaches and quality of care are known and acceptable.

Personal Factors

Table 2. Personal Factors Which May Contribute to Work Disability

Possible Associated Factors

Age (including approaching retirement)
Gender
Race
Educational level
Cultural background
Socioeconomic background and status
Occupational experience and skills
“Job lock”^{vii}
Job insecurity or instability
Pending layoffs
Financial and housing concerns
Individual attitudes about work
Psychological disorders
Prior experience with claims and litigation

Lifestyle Factors

High risk behavior
Substance (alcohol, drug, and tobacco) abuse/use

Familial/Significant Other Factors

Marital/family status
Family member caring responsibilities
Family members on disability
Physical and sexual abuse

Litigation Status

See Advocagenic discussion that follows

Introduction

This group of potential influences on work disability includes basic affected worker characteristics which may be:

- Essentially unmodifiable, such as age, gender, race, and socioeconomic background.
- Modifiable with behavioral treatment, particularly alcohol, other substance, and tobacco abuse disorders.
- Modifiable with extensive effort, such as education, social skills, and family and other social relationships.

Some of these characteristics are possibly associated with work disability, without clear evidence of causal contribution or mechanism. Others have been shown to exert indirect or direct influence on disability in affected workers.

Possible Associated Factors

An extensive literature review which examined evidence for association between low back pain and sciatica and an array of “individual factors” including age, gender, height, weight, and personal attributes such as strength, flexibility, and exercise fitness, found conflicting evidence for each factor studied, and concluded that “none of the risk factors covered in this overview are strong predictors of future back or neck pain.”(236) The authors noted methodologic difficulties with the research, including incomparability of studies due to differing outcome measures and methods. Additional problems include variable data gathering methods ranging from telephone interview to analysis of insurance data, and a paucity of long-term cohort studies.

AGE

In a literature review for factors predicting chronic work disability, age was found the most consistent predictive factor of poorer outcomes, whether classified by number of days of compensation (nine studies) or work status at follow-up (two studies).(237) The authors also described a single study that suggested that older workers were more likely to withdraw from

^{vii}Job lock refers to the economic necessity for workers of retirement age to remain in the workforce for income or health insurance.

the work force and to experience multiple disability episodes. The authors also noted that four studies did not find an age effect, and that one demonstrated an effect at 6 months, but not at 1 year.

GENDER

The prevailing pattern is for modestly worse outcomes among females. Women are generally at higher risk for experiencing work injury,(238, 239) slower to recover from extremity injury,(240, 241) and less likely to return to work after an injury.(239, 242, 243) Significant gender differences have been found in injured workers, with females more likely to experience negative employer response, future work concerns, and decrease in income.(244)

RACE

Numerous studies have demonstrated associations between variability in pain and disability management and patient race.(245-250) A study of African Americans and lower socioeconomic status (SES) claimants demonstrated worse post-settlement outcomes (in terms of mental health status, residual pain, catastrophizing, disability, and financial strain) than Caucasian and higher SES counterparts.(251) The authors described potential interactions between negative provider attitudes (e.g., among physicians who commonly treat pain) and class- and race-based stereotypes to affect physician judgment in a given case. (In addition, minority distrust of the health care system in general may potentiate distrust of the workers' compensation system.(252) African American race, lower SES, and dissatisfaction with care have been found to predict application to the U.S. Social Security Disability Insurance program in claimants with low back pain.(253)

Significant differences have also been found in care and case management.(250) African Americans (controlled for SES) and lower SES claimants incurred lower treatment costs, fewer compensated work absences, shorter claim periods, lower disability ratings, and smaller settlements. African Americans were much less likely than Caucasians to be diagnosed with a disc injury and to undergo surgery. The authors concluded that because "workers' compensation mandates equal access to treatment and disability reimbursement for all injured workers, the differences observed in this study may reflect sociocultural biases in disability management among healthcare providers."(250) A subsequent study again found negative associations between diagnosis, medical costs, surgery rates, and disability ratings and race.(254)

EDUCATION LEVEL

Using national survey data, a strong inverse relationship was found between educational level and disability due to low back pain.(255) Greater education level correlated significantly with fewer disability days (defined as activity limitation, absence from work, confinement to bed, or reduced housework), even after controlling for severity, presence of sciatica, occupation, and age. The effect was found only in men, and low income was a stronger correlate than education for work absenteeism. Previous studies that demonstrated an inverse association between education and back pain disability have been confirmed, noting less initial disability in affected workers with 13 or more years of formal schooling, and that disability improved more in persons with more education over the 2-year course of the study.(256) The study suggests that job factors (professional, technical, and managerial work as opposed to more physically demanding jobs) and psychological characteristics of the subjects, as evidenced by lower scores on depression and somatization inventories, were primary explanatory factors for the effects of educational level. The previously described review cited five studies that showed a positive association between low educational level or low IQ and LBP and five that did not.(236) More recently, a study of more than 2.5 million ethnic Norwegians found a strong increase in the prevalence of persons granted disability pensions with decreasing years of education across all levels of education. The disparities were especially strong for persons with musculoskeletal diagnoses.(257)

CULTURAL BACKGROUND

Culture has been defined as "the broad, shared pattern of values, attitudes, and behaviors that may interact with low back pain and disability."(258) These characteristics may vary by society, by subcultures within societies, and over time. With regard to neck and back pain, the authors suggested that:

- Back pain is common to all societies.
- Perception and response to such pain is different among different cultural groups.
- Social and cultural attitudes and beliefs, pressures, and learning are important.
- Attitudes and beliefs, expectations, and the meanings of pain vary in different societies and over time.
- Culture may be associated with how people express pain and emotions and pain behavior, whether and how they communicate their pain to others (including health professionals), and how they seek and respond to treatment.
- Cultural patterns are not fixed but fluid, and may change with acculturation into a new society (e.g., American).
- Broad cultural patterns are subject to individual variation within individuals within the cultural group.

In summarizing a classic 1952 study by Zborowski,(259) the authors noted that experimental pain thresholds are more or less the same regardless of age, gender, or nationality, but that social background (i.e., culture) affects pain expression and tolerance.(258) They further suggested that culture may be more strongly related to attitudes and beliefs about pain, whereas individual background and peer pressure may be more strongly related to pain behavior. Different cultures and ethnic groups have also been found to experience and express pain in markedly different ways, with consistencies noted within groups, suggesting that pain behavior is a social learning phenomenon dependent upon normative standards within the developmental group.(260)

Lifestyle Factors (High Risk Behavior; Alcohol, Drug, And Tobacco Abuse)

High-risk behavior (such as routinely driving without passive restraints) may contribute to a higher incidence of injury,(261) although the contribution of this factor to both work injury and subsequent disability among workers is unknown. In addition, there may be personality characteristics which may affect worker behavior on the job (e.g., risk taking, response to safety training and recommended practices) which may further contribute to illness and injury occurrence. The problem of substance abuse may have two implications:

1. There may be higher rates of work disability among people with substance abuse disorders as a primary or secondary function of the disorder itself (causative or contributory problem). A study of a group of workers not involved in manual labor, found that a history of anxiety or depression was a significant predictor of both greater work loss and longer term disability.(262) Among this same group, cigarette smoking was also found to be related to greater long-term disability from acute low back pain. A 1997 report,(263) cited six studies(264-269) in which substance abuse was implicated in the transition from acute to chronic upper and lower back pain. Another study found consistent odds ratios between 1.84 and 1.88 in multinomial models associating problematic alcohol use and entrance into work disability.(270)
2. At a physiologic level, use of substances such as alcohol and tobacco may provide a barrier to recovery in terms of impaired wound and other tissue healing. A recent study noted that the first study to show an association between smoking and increased post-operative complications was published in 1944, and more than 300 papers have now confirmed this association.(271) It has been shown that smoking impairs healing of skin, bone, and soft tissues, thus resulting in flap necrosis, non-unions, delayed unions, failure of wound-healing, infection, and anastomotic leakage. Conversely, smoking cessation intervention initiated 6 weeks prior to elective hip or knee replacement has been shown to reduce the post-operative complication rate (from 52% to 18%).(272) Smoking cessation interventions for as short as 3 to 4 weeks prior to general surgery can reduce the complication rate by half (from 41% to 21%).(273) A summary of the evidence showed that smoking has adversely affect bone mineral density, lumbar disk disease, the rate of hip fractures, and the dynamics of bone and wound healing.(274) Work disability rates for patients with a single DSM Axis I disorder have been found highest for patients with schizophrenia only (76.3%), followed by those with alcohol and other substance use disorders.(275) Work disability rates due to physical or mental illness were 54.1% for patients with an alcohol use disorder and 45.7% for those with other substance use disorders. (For comparison purposes, 29.2% of patients with isolated bipolar disorder were unable to work, while 20.8%of patients with depression only were work disabled.) Rates of Global Assessment of Function scores below 50 (indicating poor overall function) were similar (53.2 and 52.8%, respectively) for patients with schizophrenia and alcohol use disorder, slightly lower (46.5%) for those with other substance use disorders, and markedly lower for those with bipolar disorder and depression (25.8 and 19.3%, respectively). The authors further noted that 45% of patients with co-morbid substance abuse disorders were work disabled, as opposed to 30% without such disorders.

Familial/Significant Other Unit

A 2000 review summarized available evidence up to that time and suggested that family influences *may* be associated with treatment outcome and the development and maintenance of chronic pain and disability, with different aspects of family support and reinforcement having positive (promoting wellness behavior and staying at work) or negative (promoting illness behavior) effects.(258) The authors cited 15 studies which suggested that, for most affected workers with non-specific back pain, good family and social support may be associated with better recovery and less disability. Conversely, they cited 12 studies suggesting that physical or sexual abuse or spouse reinforcement may be associated with more chronic pain and disability. The authors concluded that “Unfortunately, despite the potential importance of family issues, there is little evidence on exactly which family influences are most important, how they operate, or how they can be modified.”(258)

Follow-up interviews of 35 highly selected patients with chronic pain (50% with back pain) who were involved in litigation and who had compensation neurosis (an apparent desire for secondary gain – see Systemic Factors)

suggested that families could play a major role in the process and identified four distinct patterns, although they often overlapped: 1) family over-protectiveness; 2) providing the family with a role; 3) family “total belief”; and 4) role change and entrenchment.(276) A study describing restructuring of family and social roles due to limitations of participation in household, parenting, sexual, and leisure activities, with resultant depression and anger among affected workers and disruption of family relationships; found that the relationship to resultant work disability was unclear.(277) A cognitive systems approach was proposed in 1998, whereby maladaptive beliefs are developed and reinforced in dysfunctional family systems, and in turn maintain familial dysfunction, suggesting that families are one of the primary environments in which adaptive or maladaptive beliefs and behaviors develop.(278) In 2004, the same author cited five familial factors supported by the literature up to that time(279):

1. Family functions not being carried out,
2. Reinforcement of disability by family members,
3. Other family members on disability,
4. Marital conflict/dissatisfaction/instability, and
5. Recent marriage, separation, divorce.

It has been posited that a strong influence of family members exists in the modeling or reinforcement of illness behavior on the part of affected workers.(279, 280) A direct observational technique was used on 50 chronic back pain patients and found that spousal solicitous responses to non-verbal pain behaviors were significant predictors of physical disability in the more depressed patients, and were significant predictors of rate of non-verbal pain behavior in patients who reported greater pain, but did not predict psychosocial dysfunction or total self-reported pain behaviors.(281) The National Advisory Committee on Health and Disability of New Zealand has defined reinforcement of pain behaviors by family members as a psychosocial risk factor in low back pain.(134)

Psychological Factors

Table 3. Psychological Factors Which May Contribute to Work Disability

Medicalization of Common Health and Life Problems (CHLPs)

Normal Human Responses to Illness or Injury

Adaptive Responses to CHLPs and Serious Medical Conditions

Validation of Normal Responses

Setting of Treatment Outcome Expectations

Use of Evaluation Process as Educational Opportunity

Encouragement of Physical Activity

Maladaptive Responses to CHLPs and Serious Medical Conditions

Negative or passive coping strategies (e.g., catastrophizing)

Preoccupation with health

Fear avoidance

Lack of motivation and readiness to change

Inappropriate illness behavior

Lack of acceptance of personal responsibility for one’s own behavior

Lack of readiness to change

Psychiatric Co-morbidity

Introduction

An individual’s ability to function is the result of the complex interaction of physical (biological), psychological, and social domains. Recognition of the multi-factorial contributors to a person’s overall state of health has led to the development of the biopsychosocial (BPS) model(146, 282, 283) as discussed earlier. The term behavioral health (BH) subsumes the combination of psychosocial issues and mental health conditions.(284, 285) Both normal psychosocial factors (e.g., family relations, personal life-work balance, job satisfaction, etc.) and mental health disorders (e.g., anxiety, depression) can greatly impact the individual’s health and functional capability.(143)

There is now a large body of evidence that BH issues play a significant and sometimes predominant role in the etiology and perpetuation of chronic pain and work disability.(26, 286-294) Delay or failure in identifying and managing these factors may be one of the major contributors to work disability (and barriers to disability prevention). A review of 36 prospective cohort and 3 meta-analytic studies noted the following(295):

“The results of this review suggest the need for major changes in the way in which we view and clinically deal with neck and back pain disability. The data clearly show that psychosocial factors are important not only in the development of long-term disability resulting from neck and back pain, but also in the earliest stages ... The research indicates that psychosocial factors are not simply an “overlay,’ but rather they are an integral part of the pain disability process that includes emotional, cognitive, and behavioral aspects. Because psychosocial factors were found to have more impact on disability than biomedical variables, treatment and preventive approaches that only address biomedical factors may be questionable. Rather, psychosocial factors may need to become a normal part of a comprehensive assessment and treatment routine even in patients with early neck and back pain. Including psychosocial factors in medical practice may give insight into the patient’s problem and may provide new avenues for treatment and management. Moreover, preventive efforts may benefit greatly from incorporating these factors into their programs.”

Physicians who are caring for affected workers may be untrained, inexperienced, and/or uncomfortable at recognizing and managing BH factors. However, the preponderance and profound influence of these elements on work disability strongly suggests that physicians should strive to become more skilled at recognition and management. Major goals of this chapter include: 1) familiarization of primary treating physicians, particularly occupational physicians and other providers, with BH issues; 2) increase in stakeholder understanding of the contribution of these factors to work disability; and 3) enhancement of primary physician skill and comfort with initial diagnosis and management, including recognition of serious conditions mandating appropriate referral to more specialized practitioners.

Role of Attitudes, Beliefs, and Expectations

The influence of attitudes, beliefs, and expectations (ABEs) on response to work illness and injury and work disability prevention was discussed in the Medical Management Factors section. Although the ABEs of all stakeholders may influence the course of recovery and rehabilitation from employee illness and injury, this section focuses on the ABEs of affected workers and appropriate responses of physicians and behavioral health specialists.

Psychological Factors and Physician Roles

MEDICALIZATION OF COMMON HEALTH AND LIFE PROBLEMS

Medicalization occurs when the normal human conditions and common health and life problems (CHLPs) experienced by most people are inappropriately identified and addressed as medical considerations (see iatrogenicity for discussion of medicalization of CHLPs). Psychosocial issues subject to this process are normal occurrences such as stress and periodic sleep disturbance, as well as workplace performance problems (including worker motivation), interpersonal conflicts (particularly between employee and supervisor), and job security concerns. Medicalization of psychosocial issues elevates them to the status of disorders that need to be addressed by physicians, with the potential for unnecessary diagnostic and therapeutic interventions and possible iatrogenicity. All stakeholders – particularly physicians – need to be vigilant for the medicalization process. Identified medicalized problems should be openly discussed with affected workers (and other involved individuals as needed) to correct misperceptions, and clarify and focus treatment plans, including anticipated outcomes and stay at and return to work goals.(16, 296) It is important for physicians and others to clearly separate medicalization of CHLPs and true psychological or psychiatric co-morbidity, as the latter may require more extensive evaluation by BH professionals. This differentiation may be difficult, particularly in subtle anxiety or depressive disorders, but identification of psychiatric conditions is crucial to appropriate diagnosis and treatment and optimization of management.

NORMAL HUMAN RESPONSES TO ILLNESS AND INJURY

Illnesses and injuries whether work related or not, disrupt lives. Normal human responses include concern, low levels of anxiety, intermittent sleep disruption, and brief periods of dysthymia (without meeting the full DSM-IV-TR criteria for dysthymic or major depressive disorder). Particular concerns may include apprehension about medical diagnosis, treatment concerns, worry about a possible need for surgery, reduced physical and mental capacity, anxiety about performing work, daily living responsibility concerns, fear of re-injury or exacerbation, and unfamiliarity with workers’ compensation and disability benefit processes.

The ability to function and deal with life problems varies among individuals,(146) and coping with illness or injury can be stressful for affected workers. (It is important to note that stress by itself is not a clinical disorder, but rather a normal part of life.) The amount of stress a specific individual experiences will vary, based on the magnitude of the medical problem, personality, coping skills, and personal, family, and workplace situation (particularly level of support). In the absence of diagnosable psychopathology, affected worker coping style and skills most strongly influence their ability to manage particular stressors.(284, 297) With relatively minor medical conditions, stress responses tend to be minimal and self-limited. Most individuals consistently improve and full function is restored without ongoing or residual distress or impairment.(298)

However, if situational demands exceed individual ability to cope, and no assistance is provided, the personal adjustment process may stall and recovery and RTW may be delayed. Current management practices often do not acknowledge these emotional realities, and affected workers are frequently left alone to manage regardless of their situation and coping skills.

Even when ill or injured workers recognize these emotional factors, effective assistance is not routinely available. Under workers' compensation systems, many employers and payers are reluctant to acknowledge BH issues and authorize mental health services, for reasons discussed below. However, most of these ill or injured people do not need extended psychological or psychiatric care. They need education, minor supportive counseling, and simple reassurance that can be provided by the physician, a friend, family members, a job or health coach, social worker, counselor, or employee assistance program professional.

Treating physicians need to recognize, respond to, and provide support for these normal reactions. Appropriate management includes communication of honest assessment to the affected worker, careful evaluation and recognition of worker responses (e.g., anxiety, fear, and uncertainty), and provision of accurate information about the affected worker's condition, thorough explanation of prognosis, proposed interventions, and anticipated clinical course, and reassurance of positive expectations about outcome. Physicians can alleviate much uncertainty and stress by clearly pointing out the functional aspects of medical conditions, options, and length of treatment, and empowering affected workers to cope on their own. Again, physicians should be vigilant for diagnosable and treatable psychiatric conditions such as anxiety and depression, and maintain a low threshold for referral to appropriate BH professionals for management of these disorders.

ADAPTIVE RESPONSES TO CHLPS AND SERIOUS MEDICAL CONDITIONS

Adaptive responses to illness and injury include resilience, positive coping strategies, acceptance of responsibility for recovery, motivation, and readiness to change. As previously discussed, the physician's attitude and management style may influence these reactions, as well as worker ABEs.(148) It is essential that the physician identify, advocate, and reinforce adaptive cognitions and behaviors in order to promote the patient's physical and psychological health. There are several actions that a physician can take to encourage adaptation in affected workers:

Validation of normal reactions. As noted, ill or injured employees are often concerned and anxious about their ability to comfortably and successfully return to the workplace. Many people avoid discussing such emotions for a variety of reasons, including social stigma, shame, and concern about how issues will be perceived by others. This response should be anticipated, recognized, and openly addressed by the physician as a means to normalize and legitimize it, so that workers understand that these feelings are common and can be managed to reduce distress and to enhance treatment outcome. A forthright approach corrects misperceptions, provides continued support, and helps to restore focus on the treatment plan. It is possible the physician will need to discuss and review the normal emotional response to an injury/illness and how it is managed within the treatment process on multiple occasions.

Setting of treatment process and outcome expectations. Physicians should outline the treatment plan and its expected progression, including medication use, therapy modalities, transitional work, and home and self care, for the affected worker. As early in the clinical relationship as possible, physicians should set the expectation for active participation in all treatment modalities and explain the consequences of lack of involvement (e.g., slower treatment progress and recovery). Reluctance to engage in some interventions may occur, particularly when individuals are experiencing physical discomfort from therapy. This may lead to missed appointments or failure to complete prescribed home exercise programs. These reactions should be gently but firmly addressed by physicians.

Use of evaluation process as educational opportunity. Physicians should use each worker encounter as an educational opportunity to explain the anticipated treatment and timeline for improvement, emphasizing the need for workers to be active participants in all aspects of management as well as reinforcing the expectation for return to work as a part of treatment goals.

Encouragement of physical activity. Physicians should encourage physical activity and exercise, both in work and daily living activities, as an integral part of the treatment and recovery process (see Transitional Work and Activity Prescription: Go to Work/Stay at Work/Return to Work). Individuals who have been ill or injured rapidly become both physically and mentally deconditioned, and generalized physical activity, in addition to focused treatment modalities, may play a significant role in rehabilitation. For example, a study of the relationship between mental health and physical activity was explored and found that physical activity promotes(299):

- Increased energy and stamina;
- Reduced fatigue, which can increase mental alertness;
- Better endurance;
- Stress relief (which provides a means to manage stressors more effectively);
- Improvement in mood;
- Improved sleep (which promotes improved mood);
- Increased interest in sex; and
- Weight reduction (which can enhance self-esteem).

Participation in everyday activities improves mental health and reduces the likelihood that the affected worker will move toward acceptance of the role of a disabled person.(300-306)

MALADAPTIVE RESPONSES TO CHLPS AND SERIOUS MEDICAL CONDITIONS

Maladaptive responses to illness and injury may derive from personal factors such as attitude towards work, education, past experiences, and psychological factors such as motivation and personality.(16, 291, 307, 308) Cognitive factors may include inappropriate or dysfunctional ABEs (e.g., about pain, disability, and health care), negative coping strategies (e.g., catastrophizing), preoccupation with health, fear avoidance, lack of motivation and readiness to change, and non-acceptance of responsibility for recovery.(140) Examples of maladaptive behaviors are noncompliance with treatment, selective participation in some but not all treatment modalities, and symptom exaggeration or other inappropriate illness behaviors.(146, 308)

It is important to recognize that the majority of these maladaptive responses are not a part of a true psychiatric condition, and behaviors are typically under affected worker voluntary control. Negative cognitions and problematic behaviors should be identified, openly acknowledged, and directly addressed by professionals as part of the treatment process. Many of these reactions are amenable to relatively simple management techniques, as described later in this section. It may also be helpful to inform and reassure affected workers that open communication and collaboration will occur among treating professionals, within professional limits, to address any barriers that arise. The results of such collaboration should be discussed with affected workers to clarify how issues will be addressed within the treatment process, with actions taken documented in the treatment plan.

PSYCHIATRIC CO-MORBIDITY

Psychiatric co-morbidities meeting the full diagnostic criteria of the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR)(309) may complicate or confound management of conditions leading to needless work disability. Workers may function in life and in work despite having significant baseline psychopathology, including any of the anxiety spectrum disorders, borderline personality disorders, and major depressive disorder (MDD). Even if they meet diagnostic criteria (i.e., DSM-IV-TR), these conditions may be undiagnosed and untreated but compensated by affected workers, or may be well-controlled by medication or other treatment. The stress of illness or injury may exacerbate such conditions to a level at which they become symptomatic or manifest in maladaptive behavior, with interference with recovery and rehabilitation. Caution is warranted against using diagnosis alone as a basis for making assumptions of impairment or disability as diagnosis is only one of the initial flags to indicate further evaluation of individuals.

Psychiatric conditions tend to occur concomitantly with serious or chronic illnesses or injuries,(288, 307, 310-314), although cause and effect are controversial. Affected individuals may experience strong initial emotional responses that interact with their ABEs and, if adequate recovery does not occur, develop into serious psychiatric conditions such as MDD (stress-diathesis perspective).(315, 316) For example, a study found that Axis I and II psychiatric disorders (particularly MDD, and personality and substance abuse disorders) occurred at a much higher rate in individuals with work-related musculoskeletal conditions causing significant impairment, with a prevalence rate of 64% in those studied versus the expected 15% in the general population.(317) The authors noted that prevalence rates for psychopathologic states were elevated in the study population

(when compared to the general population) only after the occurrence of musculoskeletal injury, suggesting but not conclusively demonstrating a causative mechanism.

Symptoms of anxiety or depression do not constitute diagnosis or the existence of valid psychiatric conditions, however they may be indications of risk and further objective evaluation. Affected workers can be screened through direct clinical assessment or with standardized, objective screening tools.(9, 318) Examples of the latter, which have been validated with medical and/or pain patients, are the Brief Battery for Health Improvement 2 (BBHI2) and Pain Patient Profile (P3). Even if screening tools suggest psychopathology, results cannot be employed to make definitive diagnoses. Many screening tools do not have validity measures to assess test cooperation, motivation, or symptom exaggeration, or to objectively confirm psychiatric diagnosis, and produce a significant false negative rate.(9, 284) Psychiatric diagnosis is typically made after more comprehensive evaluation by skilled mental health physicians. Such evaluation may include objective psychological testing. In this context, the *AMA Guides to the Evaluation of Permanent Impairment* recommends use of at least two standardized psychological tests. The scope of testing should generally be focused and limited in nature, and the tests should be specific to the reported concern. It is important to reiterate that, as with physical conditions, a psychiatric diagnosis alone does not constitute absolute or objective evidence of functional impairment or disability.

At the primary physician level, failure to recognize, diagnose, initiate treatment for, or refer patients with psychiatric comorbidities may contribute to suboptimal prevention or management of needless work disability. It is critical that physicians maintain a high level of awareness and index of suspicion for psychiatric contributions to delayed recovery from worker illness or injury. For example, a discussion of occupational physician identification and management of workplace depression (generalizable to other psychiatric disorders) found that if physicians are uncomfortable with this role (with or without the application of screening tools) they should not hesitate to refer the patient to an appropriate mental health professional.(235, 319) In general, because of the considerable complexity in the assessment of these conditions, professionals such as clinical psychologists and psychiatrists (preferably with occupational medicine experience) should be involved in the collaborative treatment process. With few exceptions, there is evidence-based treatment for the majority of mental health disorders, and resolution and recovery to previous levels of function are common.(284, 297, 298, 320) Clinical interventions appropriate for valid psychiatric conditions are discussed later in this section.

Potential Levels of Management of Psychological Factors

Occupational Physicians

Occupational physicians may be the first responders in affected worker psychological states, screening for, identifying, and providing initial evaluation, intervention, and referral for psychosocial issues and psychiatric conditions as described above. The following concerns should be addressed:

- Perceptions of the nature of the condition and its seriousness.
- Proposed diagnostic and therapeutic intervention.
- Anticipation of positive and negative effects of the management plan.
- Expectations with regard to patient compliance with and participation in diagnostic and therapeutic interventions and progressive return to work and daily living activity function.
- Plans for alternative diagnostic and therapeutic interventions.
- Expectations of clinical course and recovery.

Physicians should remain focused on the overall treatment objective of doing what is best for affected workers and facilitating return to work. As described above, occupational physicians can and should:

- Provide validation of normal responses to illness and injury.
- Provide education about the treatment process, including overall counseling as to why specific treatment modalities are recommended, and why others, such as behavioral health professionals, are involved in the treatment of what appears to be a primarily physical concern.
- Set expectations for rehabilitation progress and goals.
- Enlist the affected worker in overall management, including encouragement of physical activity.

By virtue of training, experience, interest, temperament, and skill, physicians will have variable levels of comfort with management of psychological issues, including psychological distress or psychopathology in affected workers. Physician activities may include careful history, informal or formal screening, and provision of initial counseling and treatment (e.g.,

with antidepressant medication). Physicians should strive to expand their capabilities in these areas in routine practice. Interested individuals may develop expertise in the use of screening tools (as described in Psychiatric Co-morbidity). The repertoire of techniques available to physicians is expanding beyond traditional therapeutic interventions, including the use of motivational interviewing,(321) brief psychotherapeutic techniques such as solution-focused therapy,(322) and cognitive behavioral therapy (see Cognitive Behavioral Therapy (CBT)) (323) by occupational physicians.(235) Physician compensation for these activities is not well established, although some progress is being made (see Physician Compensation for Work Disability Prevention and Management Activities). Again, physicians should maintain a low threshold for referral to more qualified professionals, particularly psychologists and psychiatrists, in the collaborative treatment process should occur if potentially serious concerns are identified.

Intermediate-Level Professionals

Affected workers with relatively minor levels of psychological distress due to illness or injury may respond to management by an intermediate level of care giver between occupational physicians (non-mental health providers) and behavioral health professionals (clinical psychologists or psychiatrists), to furnish counseling, support, and reinforcement of coping skills. Examples include job or health coaches, licensed social workers, and master's level professionals. Interventions may include individual or group counseling or CBT. Advantages to this approach include level of intervention appropriate to need; possible avoidance of mental health diagnosis (and resultant labeling and stigma); and relatively easy access (particularly in rural areas) and low cost. Other allied health professionals such as occupational therapists are trained to address psychosocial aspects of illness and injury in the course of care provision, and may incorporate interventions specifically targeted at behavioral health issues.(324)

A potential disadvantage to this level of care is that many such professionals are not appropriately trained in or focused on the beneficial aspects of the go to/stay at/return to work and activity prescription paradigm which is fundamental to work disability prevention. In addition, these providers typically are not able to conduct the requisite objective psychological testing to fully evaluate cognitive, emotional, and psychological functioning of an individual who has reported impairment, due to the lack of professional training in this area as well as the restrictions that many state laws have as part of the particular professional licensure status. They may not prioritize functional improvement within the context of the affected worker's condition, and may permit empathetic but misguided concerns (e.g., that work is harmful to the affected individual) to supersede the clear benefits of transitional work during recovery. Other problems in more complex cases are failure of providers to recognize their own clinical limitations and make timely referral to more skilled physicians (which may be more cost-effective) and a medical or psychiatric diagnosis with a need for pharmacotherapy or psychotherapeutic intervention.(325) The primary occupational physician should carefully monitor ongoing treatment progress and maintain overall responsibility for care management in conjunction with use of this level of mental health care.

Behavioral Health Professionals: Clinical Psychologists and Psychiatrists

Clinical Psychologists. These providers complete the Doctor of Philosophy (PhD) or Psychology (PsyD) degree in clinical or counseling psychology, which usually includes systematic training in psychotherapy. They are also extensively trained to perform formal psychological testing and evaluation. Overall training after the undergraduate degree is at least 8 years. Psychologists may practice independently or provide collaborative care with physicians to more fully evaluate and treat individuals; they currently do not prescribe medications other than in limited venues.^{viii} They are licensed by state jurisdictions.

Psychiatrists. These providers complete the Doctor of Medicine (MD) degree and then undergo 4 years of postgraduate training in psychiatry, which includes extensive training in psychotherapy. They undergo less formal training in psychological testing than psychologists. Overall training after the undergraduate degree is at least 8 years. By virtue of completion of medical training, these physicians can prescribe medications, which are used in approximately two-thirds of their patients.(325) They are licensed by state jurisdictions and may obtain optional specialty board certification.

Potential Interventions

The basic principles that are emphasized throughout these *Guidelines*, including application of the SPICE model, adherence to scientifically credible care, and incorporation of the go to work/stay at work/return to work and activity paradigm, are central parts of any management plan. Application of these principles is often adequate to address many of the psychological issues

^{viii}Psychologists currently can prescribe in Guam, Louisiana, New Mexico, Puerto Rico, and all branches of the U.S. armed services.

described in this section; however, more focused and intensive approaches may be required to optimize outcome in any given case.

COUNSELING, ADJUVANT TREATMENT, AND PHARMACOTHERAPY

As noted, both primary occupational physicians and intermediate level behavioral health professionals may intervene in recognized workplace psychosocial problems. Simple counseling of affected workers with relatively minor psychosocial issues may be effective; supportive counseling may include problem recognition and affirmation, specific advice, and referral to community resources.(326) This approach, particularly education and reassurance, should be utilized by physicians at every encounter. Affected workers may be amenable to referral to self-help and support groups focused on their specific concerns, or to company sponsored employee assistance programs (EAPs).

The use of a number of adjuvant awareness and cognitive therapies has been described; these include structured activity scheduling and training in coping skills, progressive goal setting, relaxation, and stress and distress management.(136) These modalities may be helpful to affected workers in managing symptoms and building self-efficacy in self-management of less severe problems. These nonspecific treatments do not address underlying causative factors (e.g., family problems, work conflicts) or significant psychiatric disorders (e.g., anxiety).(326)

Primary physicians who are licensed to prescribe medications may judiciously use anti-anxiety agents and anti-depressants in selected cases.(235, 319) As with all medications, physicians should be well versed in the characteristics of the preparations they prescribe, and vigilant for untoward effects and appropriate clinical response.

OBJECTIVE, STANDARDIZED PSYCHOLOGICAL TESTING

Psychological testing, particularly the assessment of biopsychosocial issues with instruments such as the BBHI2 and P3, should be objective, standardized, performed for specific clinical concerns and conditions, and utilize instruments that have been validated with populations relevant to subject affected workers. The use and interpretation of standardized psychological testing is beyond the scope of this chapter. However, some caveats on the use of psychological testing include:

- Specific administration rules should be followed to ensure valid and interpretable results; generally speaking, these conditions are the same for each individual to whom the test is administered.
- Testing must be specific for the reported concern; indiscriminate testing is inappropriate.
- No single instrument exists to fully evaluate individuals across all cognitive, developmental, emotional, and psychological domains; a minimum of two standardized tests should be conducted evaluate suspected psychiatric conditions.
- All professionals who conduct standardized psychological testing are bound to follow American Psychological Association testing standards,(327) even non-members of the organization.(9, 284, 285)

PSYCHOTHERAPY

Psychotherapy is generally reserved for more severe psychological dysfunction which directly impacts affected worker function (primary) or complicates or imposes barriers to recovery from other potential causes of work disability such as musculoskeletal conditions (co-morbid). In general, cognitive-behavioral approaches may work more quickly for surface behavioral change, whereas interpersonal approaches are more effective at addressing underlying emotional drivers. The role of psychotherapy in workplace mental health quality, has been extensively described and the following characteristics noted(326):

- It comprises a wide variety of psychotherapeutic approaches based on different basic ideologies and individual therapist technique.
- It is always based on a therapeutic relationship focused on affected worker personal characteristics and intended to address emotional distress or maladaptive personal traits.
- It requires specific evaluation to allow for precise diagnosis, and carefully defined and focused treatment to address underlying causes.
- Optimal treatment is dependent upon accurate diagnosis, and may involve a combination of modalities, including appropriate pharmacotherapy and cognitive-behavioral or insight-oriented therapy.
- The quality of treatment is the most important determinant of outcome.

COGNITIVE BEHAVIORAL THERAPY (CBT)

A review of a number of psychological models used to conceptualize chronic pain concluded that the cognitive behavioral approach had the greatest amount of empirical support.(141) The authors emphasized the importance of this perspective (rather than specific techniques) on the role of patients' beliefs, attitudes, and expectations in the maintenance and

exacerbation of symptoms. Interventions should be focused on “fostering self-control and self-management that will encourage a patient to replace their feelings of passivity, dependence, and hopelessness with activity, independence, and resourcefulness.”(141)

Cognitive behavioral therapy is one of the most common forms of BH treatment. CBT is designed to identify problematic thoughts and behaviors that serve as potential barriers to successful treatment and return to work. It specifically addresses affected worker ABEs and provides tools to re-direct self-defeating thoughts and behaviors, helping the individual to cope with life and workplace difficulties in a proactive manner. In this modality, “patients learn to: 1) challenge their negative pain cognitions and replace them with positive/adaptive thoughts; 2) engage in activities in spite of pain; and 3) learn self-soothing (e.g., relaxation and mindfulness) techniques.”(17) CBT is typically time-limited in nature, in most instances being provided for a period of 12 to 16 weeks (which may address employer and payer concerns of open-ended treatment). It should be provided by professionals who have undergone specific training.

CBT has been found to be both effective and specific for a variety of psychiatric conditions, including MDD.(328) As part of a multi-disciplinary treatment approach, the technique is efficacious for migraines and daily headaches,(329) musculoskeletal pain,(330) arthritis pain,(331) fibromyalgia, (332) chronic low back pain,(333) and wrist pain.(334) It has been suggested that an optimal approach to chronic pain combines pharmacological, physical, and psychological components (including CBT) tailored to each patient's needs.(141)

CBT has strong scientific support for preventing and reversing unnecessary disability.(17, 330, 335) A review of 205 studies of patient with low back pain, most of them high-quality RCTs found, overall, that CBT and other psychological interventions (such as relaxation therapy and biofeedback) were more effective than standard biomedical treatments, including surgery, for decreasing pain intensity, pain-related disability, and depression and for improving health-related quality of life.(286) A 2006 study showed positive effects of a short (6 hour) CBT intervention in low back pain patients, including lower risk for long-term disability leave for back pain (odds ratio 2.6) and any illness (odds ratio 2.9).(336) Another study demonstrated that a combination of brief CBT and work stressor reduction was more effective than extensive CBT in both partial and full return to work.(337)

INTERPERSONAL PSYCHOTHERAPY (IPT)

Compared to CBT, there is a relative dearth of literature on the effectiveness of interpersonal psychotherapeutic approaches in work disability prevention; however, some studies have suggested both positive and cost-effective outcomes. In a retrospective long-term study based on health insurance records, an assessment of work loss and hospitalization days before, during, and after psychoanalytic treatment found that absenteeism from work declined strongly from pre-treatment to the end of treatment (66% fewer days of sick leave) and remained fairly stable throughout the 7-year follow up period.(338) The authors also noted large reductions in ambulatory medical consultations and psychotropic medication use. A systematic review of cost effectiveness of long-term psychoanalytic therapy in work disability, established that therapy effected long-term and persistent reductions both in health care utilization and sick leave, with a cost breakeven point at approximately 3 years after treatment termination.(339) An assessment of health care utilization and work impairment (absenteeism and presenteeism) in 231 patients in long-term psychoanalytic treatment indicated higher work productivity (quantified by monetary value) immediately after treatment (increased 44%), with positive effects persisting at 2-year follow-up (increased 71%).(340)

It is recommended that primary treating physicians be trained, able, provided enough time, and compensated to employ basic evaluative techniques for detection of risk for prolonged work disability such as:

- Administration, interpretation, and communication of results of screening questionnaires to patients;
- Exploration of affected worker ABEs and their effects on work disability risk;
- Delivery of basic therapeutic interventions such as correcting misinformation or reframing issues in the routine counseling of most patients; and
- Recognize more serious psychopathology and make appropriate referrals to (and work collaboratively with) health care professionals with higher levels of behavioral health training.

It is also recommended that affected workers who have demonstrated a significant delay in functional recovery should be considered for referral to behavioral health professionals trained in mental health counseling who have demonstrated:

- The ability to develop relationships of trust and respect with worker populations, and increase their commitment to functional recovery and their willingness to engage fully in treatment;

- Familiarity with the specific issues that are likely to be delaying recovery, including those specific to the workplace setting;
- Professional competency in delivering behavioral health interventions that address and resolve those issues; and
- Willingness to collaborate and communicate with primary treating physicians and other relevant stakeholders.

Individual and Systemic Reluctance to Address Behavioral Health Issues

There is a reluctance bordering on phobia on the part of physicians, employers, insurers and other payers, and other stakeholders to recognize, address, and pay for management of the psychological factors discussed in this section. Possible reasons for this reluctance include:

- Inertia and a tendency to ‘stay with the known’ (i.e., the biomedical model) among all stakeholders;
- Fear of opening a psychological claim in addition to a physical disorder;
- Lack of occupational physician training and experience and resultant discomfort with addressing and managing these problems;
- Lack of (compensated) physician time to perform proper assessment and management;
- Employer and payer fear of excessive claim expense;
- Payer concern (valid or not) over low quality of available mental health care, lack of focused attention on treatable diagnoses, and general lack of return on investment in mental health services(341); and
- Employer and payer failure to appreciate the tangible and intangible impact of employee mental illness and associated costs.(342)

This system-wide failure to address psychological concomitants of work disability has a profound impact on the incidence and prevalence of this problem in Western society. The human and societal costs of confusion of common health and life problems and serious medical conditions have been extensively documented. A review of the workplace costs of anxiety and depression for affected workers, employers, and co-workers in terms of lost work time and presenteeism, advanced a strong case for the cost-effectiveness of quality mental health care for individuals, employers, and payers.(343) Other factors which may influence the current state of workplace mental health care are described below.

Medical Factors

Within the health care system, collaboration among treating professionals is often suboptimal. Because of laws such as the Health Insurance Portability and Accountability Act (HIPAA), mental health treatment is still artificially separated from traditional “medical” care. Even with appropriate signed release from affected workers, treating professionals do not always collaborate in the care provided. This creates a potential for confusion regarding treatment recommendations and increases the likelihood of disjointed care, particularly with regard to SAW/RTW goals. Furthermore, because of societal factors, physicians tend to delay involvement of BH treatment until later in the overall treatment process, sometimes until after the worker has been deemed to have reached maximum medical improvement (MMI).

Societal Factors

In many Western societies, there is still a stigma associated with receiving professional BH treatment. Individuals tend to be wary of receiving a mental health diagnosis and being perceived or labeled as “mentally ill.”

SYSTEMIC FACTORS

Workers’ compensation systems. These systems generally utilize an imprecisely dichotomous classification of conditions as work-related or non-work-related. Because some psychiatric conditions occur earlier in life or are related to development issues, there may not be a direct causal link between a workplace incident and a reported psychiatric condition. This creates inherent problems with attempts to utilize the more complex biopsychosocial model of evaluation and treatment in the BH context in managing work-related issues. Furthermore, some states, such as Montana, do not accept mental health concerns as a component of workplace injury. Thus, in those jurisdictions, affected workers who have been objectively identified as having true psychiatric conditions are not eligible to receive BH treatment or compensation for those concerns.(284)

Legal systems. Legal systems typically employ the same dichotomous approach as workers’ compensation, focusing on determining whether harm was done to workers and whether such harm was directly related to workplace events. Establishment of direct causal links to potentially work related psychiatric conditions is not always possible, for the reasons noted in the workers’ compensation section.

WORKPLACE FACTORS

The negative effects of employee psychosocial factors and psychiatric illnesses are not always readily apparent, or perceived. Individuals may experience gradual onset and escalation of work related problems or symptoms. Affected worker may demonstrate subtle decreases in ambition, interpersonal effectiveness, work quality, and productivity (presenteeism).(326) All stakeholders should remain cognizant of the possibility of BH etiologies for these problems. While many organizations have absence policies for physical concerns, they often do not have such policies for psychiatric conditions, and occurrences may be managed in an ad hoc and inconsistent manner. Workplace psychosocial issues such as those discussed earlier in this section should be addressed as workplace performance issues, not psychiatric conditions. While it is tempting for professionals to advocate for affected workers, employers and workers have a legal relationship regarding employment; thus, there are potential legal issues that should not be addressed within the context of receiving treatment. Again, a primary issue for professionals is avoidance of practice beyond the scope of training.

Many organizations do not have transitional return to work policies. This situation is particularly problematic for individuals with symptomatic co-morbid psychiatric conditions, since it often mandates that affected workers be symptom-free in order to return to work. Analogous to the situation with physical signs and symptoms, the American Psychiatric Foundation (APF) asserted that: 1) the presence of psychiatric symptoms does not automatically define impairment; 2) some symptoms may be expected when affected workers are absent from the workplace; and 3) workers can and should return to the workplace, even if having continued symptoms (as long as those symptoms are not disruptive to workplace operations).(298)

Societal and Cultural Factors

Table 4. Sociocultural Factors Which May Contribute to Work Disability

Medicalization, Socialization, and Culturalization of Work Disability

- The Influence of Popular Media
- The Influence of Special Interest Organizations and Support Groups
- The Role of Free Will in Work Disability

Introduction

Culture is the collection of knowledge, attitudes, beliefs, customs, and behavior that characterize a particular social group. It is not a static context of normative standards. It differs among societies, among societal subgroups, and within societies over time.(258) Attitudes, beliefs, and expectations (ABEs) lie at the heart of culture and drive behavior. To a large extent, ABEs are development and a product of social learning, but can be modified by experience and can change over time.(7, 260)

One of the pioneers of modern social medicine saw that “illness is a mode of behavior of a person or a community. It is the person not the organ that is ill.”(344) Although disease and impairment may be diagnosed and measured in individuals, disability is essentially a social compact. It may be implicit, determined by the unspoken cultural norms of a particular society, or explicit, delineated specifically in a written contract. The latter may be subject to legal requirements or restrictions, argument, arbitration or judicial review. However, disability does not exist outside of a social context.

Work disability, particularly which associated with CHLPs, is thus partially dependent upon both individual and societal perceptions and expectations about health and work. In addition to individual ABEs, workplace culture has been found to be a strong motivator for affected worker return to work.(92) A 2010 study noted that beliefs about back pain can be influenced by prevailing community views, health policy involving access to and payment for health care, legislation regarding work disability and compensation, and political agendas of governing parties.(345) The “welfare culture” of a given society has been described as ideas and values driving its function as a welfare state.(346) In terms of disability, these values may be widely divergent. A study of sickness certification in Europe found rates per 100 person-years varying from 18 in Norway to 239 in Malta.(347) Thus, transforming the “culture of incapacity” ultimately depends on shifting core beliefs about work, health, and sickness.(348)

Medicalization, Socialization, and Culturalization of Work Disability

As previously defined, iatrogenesis usually refers to acts by which physicians and other health professionals cause or prolong undesirable events in patients (see Iatrogenicity). The term “social iatrogenesis” was suggested in 1976 as a descriptor for illness caused or prolonged by wider sociopolitical inputs.(349)

A comprehensive and detailed analysis of the history of low back pain, found that the salience of this condition began to arise in Western societies in the early 20th century.(32) The authors relate the increase in reported incidence and prevalence coincidentally (but not clearly causally) to the establishment of workers’ compensation systems and the growth of influence of psychology and psychiatry. They posited that it may best be understood as a social epidemic “in the absence of any evidence of change in the physical pathology or prevalence of back pain over the last 3,500 years.”(279) Others have also noted the rise in disability claims for “non-specific syndromes and diagnoses defined in terms of symptoms rather than physical etiology.”(350) The rapid increase in absolute number of claims for work-related injuries leading to lost work time has been documented dating from the 1960s.(351)

A number of authors have suggested reasons for the changes noted above. Some have stated that “Compensation does provide the social support which makes chronic disability possible.”(32) and noted that “... changed patient attitudes and expectations, changed medical ideas and management and changed social provisions have all combined to cause low back disability.”(32) Aylward(352) cited his earlier work(350) in attributing the increase in disability as “due primarily to a cultural shift in medical practice in [the United Kingdom and United States].” He had noted that “the indiscriminate acceptance of subjective health complaints by many in the medical profession as the sole manifestation of a variety of ill-defined medical conditions reflected a significant change from past practices which had been reluctant to accept subjective complaints as the sole or necessary basis for diagnosis, chronic disability, and incapacity for work.”(352) He also described the “insidious medicalization” of “growing numbers of syndromes and disorders defined in terms of symptoms rather than pathology...”(352)

A “disability epidemic” has been described in Western countries and characterized as a major public health problem in the U.S. and other countries in which entitlement programs are believed to be appropriate alternatives to gainful employment.(353, 354) Others have proposed that employer behavior has changed as a result of the rapid expansion of supply of labor over demand, with greater choice of workers leaving disabled people disadvantaged and excluded and suggested – without speculating on cause – that the culture has changed to one in which society more readily accepts that people with work-limiting health problems need not work and are entitled to society’s support in the form of social security benefits.(355) Issues related to the moral hazard inherent within workers’ compensation wage replacement benefits and the changing nature of the provision of medical care, specifically the general movement toward managed care and HMOs in the 1980s, have been identified.(356)

Several hundred studies of social influences on back pain and disability have been identified and reviewed (see Table 5, below).(258) These social influences are complex and interact with considerable variability in the strength of association and magnitude of effect, but they nonetheless identify the spectrum of social issues which may well be important in promoting or perpetuating illness and/or disability related behaviours.

TABLE 5. SOCIAL INFLUENCES ON LOW BACK PAIN AND DISABILITY

<p>Culture</p> <ul style="list-style-type: none"> Family and Social Support Social Class Job Satisfaction and Psychosocial Aspects of Work Unemployment (Early) Retirement Workers’ compensation Litigation
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Summarized from Waddell G, Waddell H. A review of social influences on neck and back pain and disability. In Nachemson A, Jonsson E, eds. Neck and Back Pain: The Scientific Evidence of Causes, Diagnosis and Treatment. Philadelphia: Lippincott, 2000:13-55.

The Influence of Popular Media

The impact of popular media on worker ABEs, the “culture of incapacity” described above, and work disability in developed societies is not clearly established; although it seems likely that there is a reciprocal or circular relationship.

Some have opined that the Internet and other media were a strong influence on illness behavior,(17) noting that the popular media: 1) stigmatizes normal aspects of human development such as the effects of aging on appearance, 2) interferes with the necessary adaptation to the physical and functional aspects of aging which provides people with a sense of comfort and

well-being with such changes, 3) offers cures and imply that miraculous results are possible; and 4) suggests that patients request other treatments or change their doctor if their pain is not cured promote the illusion that it is possible to be pain-free. Based on focus groups, in-depth stakeholder interviews, and cognitive employee interviews, as well as analysis of traditionally published and on-line materials, a 2007 study found a “fundamental disconnect between the central tenets of evidence-based health care and the knowledge, values, and beliefs held by many consumers.”(357) Another cited an unpublished Liberty Mutual study in which 100 articles from popular publications in the U.S. were selected and analyzed.(173) The study found that: 1) low back pain was usually depicted as chronic and/or catastrophic; 2) treatments considered by medical authorities to be experimental were routinely touted as effective; 3) case reports were preferentially cited over group experience; and 4) few articles emphasized a non-medical approach.

Positive effects of focused and targeted media campaigns designed to alter public attitudes and perceptions have been demonstrated, but results have been mixed. A public information advertising campaign conducted over the course of 2½ years in Australia demonstrated the positive influence of a multi-media campaign on general population beliefs about back pain, and found suggestive evidence of altered clinical behavior and improved outcomes (decline in back claims of 15% and reduction of medical costs by 20% per claim).(358)

Importantly, the work illustrated how attitudes and beliefs associated with work disability might be broadly targeted even before work injury occurs.(359) A follow-up study found significant sustained improvements in population beliefs about back pain 3 years later.(360) In 2007, Waddell effected a significant change in population beliefs about the roles of activity and rest in management of back pain which persisted over 3 years, however, no change in work-related outcomes (decrease in sickness absence or new social security awards) was found.(361) After a limited media campaign, a small but significant improvement in population beliefs was found, but no change in sick leave, or performance of imaging studies of surgery for low back pain.(362)

The Influence of Special Interest Organizations and Support Groups

Patient support groups may have an important role in the dissemination of information about illness.(11) However, both information and support are not always unbiased.(363) Sometimes the views promulgated by these groups can encourage maladaptive illness behavior. Two studies found that membership in a patient support organization is associated with a worse prognosis.(364, 365) These findings raise the possibility that some aspects of group culture and membership are counterproductive, perhaps providing emotional support and validation at the expense of continued disability.

The Role of Free Will in Work Disability

This chapter examines the potent effects of various biopsychosocial domains of influence (e.g., treatment by employers and the medical system, personal factors such as familial influences, and psychological and societal factors) on the worker affected by illness or injury. It has been argued that some descriptions of the biopsychosocial model are mechanistic and deterministic and fail to allow for volition and intentionality, bringing into question the contention that disabled person are the passive victims of biopsychosocial forces over which they have no control, and asserting that humans are endowed with the capacity to make value-driven choices even in the face of genetically programmed behavior, instinctive responses, and emotion.(352) As previously noted, most people with common health problems (and many with mental health problems) do not have any absolute physical or mental incapacity for work, but may be constrained by physical or psychological dysfunction, individual ABEs and perceptions, and social forces beyond their comprehension or control.(7) However, for most of these individuals, taking sickness absence and claiming benefits are conscious, rational decisions with full awareness and intent, for which they should remain accountable.(7) As noted by Franche and Krause, “...the employee remains the ultimate agent of change in the return-to-work process in that only he or she takes the final decision of going in for a day’s work.”(65)

Systemic Factors

Table 6. Systemic Factors Which May Contribute to Work Disability

<ul style="list-style-type: none"> Overview of the Workers’ Compensation System Suboptimal System Performance <ul style="list-style-type: none"> Higher Costs in the Workers’ Compensation System Worse Outcomes in the Workers’ Compensation System Attorney Involvement Other Concerns

Overview of the Workers' Compensation System

Workers' compensation systems represent a dynamic balance among the sometimes aligned and sometimes competing interests of businesses seeking affordable costs of care and restored worker productivity; affected workers demanding adequate and timely medical care and other benefits as specified by law; and insurers attempting to secure reasonable profits for cost coverage and other services provided.(366) Workers' compensation has been described as "social" insurance, concerned with both the adequacy of disability benefits (i.e., no-fault payments with statutory minimums) and system efficiency (in terms of reduction of costs to all parties involved, including the affected worker, employer, insurer, and system itself).(367) This entity has been described as a "health care payment system within the legal system."(368) It has also been noted that the system is unique among government "social" programs in that it operates (in most states) as a partnership between the public and private sectors, with legislatures establishing rules by statute; executive branches providing oversight, regulation, and dispute resolution; and the private sector (insurers and self-insured employers) administering the system on a day-to-day basis.(369)

In the majority of affected workers, these systems may facilitate the process of return to former levels of health and function after work related illness or injury, particularly in those who are motivated to do so. However, the same systems may provide significant and sometimes difficult barriers to rehabilitation and disability prevention. For affected workers who experience medical, personal, psychological, or socio-cultural factors (as previously discussed) or workplace factors (discussed in the next section), or who are not motivated to return to work, these systems can provide both barriers to recovery and perverse incentives which in the short term rewards work disability at the long-term expense of employers, payers, and society. Various forms of moral hazard encountered in workers' compensation systems, including positive correlation between maximum benefit and claim frequency, the Pareto distribution of claims (including a 3- to 6-fold incidence of repeat claimants in the highest consumers of benefits), and preferential classification of claims as work related in health maintenance organizations have been described.(367) A qualitative study of workers' compensation claimants in Ontario identified numerous subtle system-level problems which can accumulate into a "toxic dose" providing significant and sometimes insurmountable barriers to return to work.(62) The legal system is intended to protect affected workers from potential lapses or abuses by the health care system, employers and payers, and often does so, but claimant resort to this system may entail similar incentives that can reward work disability in direct proportion to its extent and severity in susceptible individuals. Finally, the societal economic and employment climate may affect worker motivation to return to work as well as participation in and response to the workers' compensation and legal systems.

A detailed discussion of the controversies surrounding systemic factors, including workers' compensation systems and their legal components, is beyond the scope of the current chapter. The remainder of this section will present evidence for suboptimal system performance and some clinical concerns, and provide some general recommendations for physicians caring for individuals involved in workers' compensation cases.

Evidence for Suboptimal System Performance

HIGHER COSTS IN WORKERS' COMPENSATION SYSTEMS

An increase in the growth rate of workers' compensation cost per injury three times that of general medical inflation was documented between 1996 to 1997 and 2001 to 2002.(370) A 2007 study contrasted recent success in control of workplace illnesses and accidents with the failure of efforts to manage continued annual inflation of medical and indemnity costs (currently 7.4% and 9.5% respectively).(371) The recent increase in medical costs as a proportion of total workers' compensation costs (36% in 1987 to 47% in 2005) is well known.(372) Various reasons for this disproportional cost expansion have been proposed, including:

- Documented substantially higher charges for workers' compensation patients than for those with similar conditions covered by Blue Cross.(373)
- Higher charges for workers' compensation services (particularly radiography) – the authors argued that price discrimination played a prominent role in the higher costs of workers' compensation when compared to "traditional" insurance.(374) (This assertion and its underlying assumptions were later challenged.)(375)
- Workers' compensation insurers in California were charged more than health insurers for the treatment of injuries of similar nature and severity. The differences were attributed to the use of more health care providers and services in the workers' compensation cases.(376)
- A detailed analysis of practice costs for service provision to various types of insured patients found that by far the highest costs for both value-added (e.g., scheduling, direct service provision, and billing) and non-value-added (e.g., obtaining

insurance authorization and resolving billing disputes) activities were incurred in cases covered under workers' compensation.(377)

- In the treatment of low back soft tissue injuries, use of medical services beyond the recommended levels of care was strongly associated with higher medical and indemnity costs, prolonged medical treatments and delayed return to work.(114)
- Studying the time period 1996 to 1997 and 2001 to 2002, three factors were identified that accounted for most of the escalation: 1) increases in billed medical treatments per claim contributed more than half; 2) a shift to more costly injuries accounted for a fifth; and 3) the increase in the average cost-per-treatment generated about a quarter.(378)
- A study of short- and long-term determinants of cost for low back pain patients treated by both physicians and chiropractors, found workers' compensation insurance to be a prominent cost driver in both provider types.(379)
- Variability in treatment of common injuries financed by the workers' compensation system leads to higher costs (380); this finding has been confirmed by other studies.(75, 86, 114, 381) Costs in a Louisiana workers' compensation preferred provider organization (PPO) were also studied and found that less than 4% of physicians accounted for 72% of costs, with average claim cost four times higher than that of other physicians. The cost and claim duration differences were greatest among minor conditions where the greatest variability in treatment options were available.(380)

POOR OUTCOMES IN WORKERS' COMPENSATION SYSTEMS

One of the great ironies of a workers' compensation system is the harmful effect that it may have on the health of claimants. Health outcomes for the same or similar conditions are often worse when care is provided within such systems than without. The following is a sample of research documenting these findings:

- An early meta-analysis of 18 studies comprising more than 2,300 patients found a moderate negative effect of financial incentive (workers' compensation) on symptoms and disability in patients with closed-head injury.(382)
- Outcomes of multi-disciplinary pain treatment were worse in workers' compensation claimants who had completed litigation than in the claimants of other insurance companies.(383)
- A follow-up (mean 45 months) study of primary rotator cuff tear repairs, found that 54% of workers' compensation claimants rated their results good or excellent compared to 92% of non-workers' compensation patients; at final assessment, 42% of the former and 94% of the latter group had returned to full activity.(384)
- A meta analysis of data from 32 studies on chronic low back pain, found workers' compensation to be related to increased report of pain and decreased treatment efficacy, with effect sizes between 0.48 (conservative) and 0.60 (liberal).(385)
- Workers' compensation claimants reported more pain, depression, and disability at 3 and 12 months, both before and after rehabilitation interventions, than those without compensation involvement.(386)
- A pair of studies found non-significant differences in likelihood of return to work at follow up intervals ranging from 4(387) to 10(388) years. However, at 4-year follow-up, persons who had been receiving workers' compensation at baseline reported worse functional status, were more likely to be receiving disability benefits, and had significantly less relief from symptoms and improvement in quality of life. At the 10-year follow-up, those initially receiving workers' compensation had worse disability and quality of life outcomes.
- The unintended effects of disability compensation programs discourage full participation in vocational rehabilitation and result in poorer rehabilitation outcomes.(389) Participants who were receiving disability benefits worked fewer hours in compensated work therapy each week, earned less income, had a higher dropout rate, and were less likely to be competitively employed at discharge. The amount of compensation and the type of program were modestly but significantly associated with participation in compensated work therapy and with outcome.
- A meta-analysis of 211 surgical intervention studies found that workers' compensation status at the time of surgery was associated with poor outcome (defined by assessments such as the Low Back Outcome Score(390) and Short Form 36,(391) or general function, patient satisfaction, or pain scores) in 175/211 (83%).(392)
- Patients assessed 1 year post-operatively after rotator cuff repair demonstrated worse performance on the SST, the DASH, three visual analog scales, and the SF-36 ($p = 0.0007$ to 0.05) and had worse improvement on the DASH, visual analog scales for shoulder pain and function, and the SF-36 Bodily Pain and Role Emotional scales.(393)
- Worse outcomes in terms of changing job or stopping work with time loss from work due to carpal tunnel syndrome (significant odds ratio 5.1) were found in workers' compensation cases, with these individuals more likely to have surgical and physiotherapy treatments and reporting greater loss in income than those not seeking compensation.(394)
- Workers receiving disability benefits recover less quickly and have poorer clinical outcomes than those with the same medical conditions who do not receive disability benefits.(86) The researchers reported that 175 of the 211 studies meeting their inclusion criteria reported worse surgical outcomes for individuals on workers' compensation or involved

in litigation. (One study reported better outcomes in compensated patients while 35 studies reported no difference.) Of the 86 studies which excluded workers in litigation, the odds of an unsatisfactory outcome were nearly four times higher for the persons on workers' compensation than for those not receiving compensation.

Poorer outcomes for workers' compensation claimants have thus been demonstrated on an array of objective, semi-quantitative, and qualitative measures in a variety of nonsurgical and surgical interventions. Reasons for this disparity are unclear; although most of the authors cited above have speculated on causative factors, definitive answers are elusive. Another study found older age, number of co-morbid health conditions, litigation, time delay from injury to surgery, and (paradoxically) assignment of a nurse case manager to be consistently and statistically significant predictors of poor outcomes.(395) In an accompanying editorial, the editors note that "Compared with non-workers' compensation management, there are fundamentally different clinical dynamics influencing outcomes and better information to direct optimal care is needed."

POOR OUTCOMES WITH ATTORNEY INVOLVEMENT (ADVOCAGENIC ISSUES)

Attorney representation within the workers' compensation system is also predictive of a worse outcome, with a higher risk of disability, more severe financial difficulties, more severe pain complaints, and more severe psychological distress after settlement of the workers' compensation claim.(48, 253, 371, 396-404) These effects have been described as "advocagenic."(405) Attorney involvement was found to be the most important characteristic of workers' compensation claims which were initially felt to be low cost but which eventually migrated to high cost events (2% of claims consuming 32% of total claim costs over a 5-year period).(371) Another study found that early attorney involvement in workers' compensation claims, particularly those of low severity, was associated with longer claim durations and higher medical, indemnity and claims handling costs of workers' compensation.(406) The authors suggested that attorney involvement lengthens the time a claim is open, accruing higher expenses. Population-based evidence from Ohio's workers' compensation system also suggests *lack* of attorney involvement is associated with substantially better outcomes including a 3.4-fold higher rate of return to work among those without attorney representation.(400)

One author related two potential mechanisms for the negative effect of attorney representation.(407) In what is described as "compensation neurosis,"(407) the litigation process represents an increased risk of a work injury being used by the plaintiff for secondary financial gain, with effects of "injuries" maintained not by pathophysiological processes but by the plaintiffs' wish for monetary compensation. The author also posited "nomogenic influences"(407) in which the stress of involvement in the medicolegal process and litigation slows the recuperative process. The most cynical view is that workers' compensation plaintiff attorneys are customarily compensated on a contingency basis, incentivizing them to maintain their clients in a disabled state (354) and evidence of suborning testimony has been reported although such extreme behaviors are believed to be present in only a small minority of cases.

Other Concerns About Workers' Compensation

The ACOEM statement, *Preventing Needless Work Disability by Helping People Stay Employed*,(18) addresses a number of concerns about current workers' compensation system processes from the physician perspective:

- Although physicians play an important role in the return to work process, they are typically given too little information to act effectively. Employees often are the physicians' only source of information because employers usually do not send any information to the physician about an employee's functional job requirements, their stay-at-work/return-to-work programs, their commitment (or lack of it) to employee well-being, how to quickly answer questions or address problems.
- Claim administrators often request information from physicians to help in managing their claim. They tend to use a generic approach that does not match the information requested with the simplicity or complexity of the situation. Questions often seem designed to determine eligibility for benefits rather than to find a way to help employees return to work.
- Discussion of affected worker functionality, which is not subject to confidentiality restrictions, lacks sufficient focus. Employers and claims administrators often find it easier and more efficient to send volumes of material to physicians instead of reducing the available information to the essential questions for the physician's convenience.
- Many physicians seem unaware of employers' and benefit administrators' needs for information. When physicians receive poorly conceived requests for guidance or opinions, they have little tolerance or time to review irrelevant or redundant information to find the few useful pieces of data.
- Many physicians simply do not know how their delays or inadequate responses impact optimal functional outcomes for their patients.

- There is little or no standardization of communication methods, particularly paper and electronic forms, among stakeholders.

Interviews with 402 workers with back injuries and workers' compensation system involvement in Florida and Wisconsin found some positive interactions with the system; however, the workers' overall experience was negative.(277) The authors posited three aspects of workers' compensation insurer behavior to explain this experience:

- The perceived suspicion that many injured workers are undeserving beneficiaries of the workers' compensation system, which the authors suggest reflects a common belief among insurers that many workers' compensation claims are fraudulent.
- Insurer tactical behavior, whereby payments are delayed to pressure workers to return to work quickly, discourage medical care provision by worker-chosen physicians, or to affect the worker bargaining positions for negotiated settlements.
- Failure of insurers to pay required payments promptly due to their own system deficiencies.

Based on a study of 1,472 workers' compensation claimants with low back pain, the validity of the entire disability determination process for this condition was questioned.(254) The authors noted very weak associations (all r values <0.10) between affected worker final disability ratings and post-settlement pain, distress, or disability or occupational status; disability rating shared only 3% of its variance with the outcomes. They questioned the utility of the disability ratings "beyond the administrative function of bringing closure to a protracted medico-legal process."(254)

A somewhat different viewpoint has also been presented.(258) The authors described a number of positive correlations between compensation benefits and claims incidence (e.g., 10% increase in benefits associated with 1 to 11% increase in claim number and 2 to 11% increase in claim duration) suggesting a significant moral hazard associated with workers' compensation. However, they note a number of alternative explanations for this effect, including the nature of claimant work; demographic factors such as age, gender, education level, social class, and immigrant status; differing occupational, economic, and societal influences; and different selection and referral patterns. They noted that 75 to 95% of claimants respond well to health care and return rapidly to work, and that secondary losses usually outweigh secondary gains in those who do not.

Recommendations for Physicians

Physicians can exert only limited control over systemic factors, and there are few if any interventions that can be affected by physicians. A phenomenon termed "non-credible health care" has been described and noted that workers' compensation systems "simply do not provide the safeguards against non-credible care that are inherent in many major medical insurance systems, Medicare, Medicaid, and especially in socialized medicine in other countries."(408) Some of the clinical practice factors relevant to avoiding non-credible health care and facilitating system performance were discussed in the Medical Factors section; these include:

- A focus on work disability prevention and management.
- Appropriate evidence-based medical practice, including:
 - Appropriate interpretation of diagnostic testing.
 - Avoidance of mischaracterization of affected worker conditions (particularly CHLPs), overemphasis on specific diagnosis (escalating case time and costs), and overtreatment (escalating case time and costs and potentially exerting negative psychological effects on workers).
 - Avoidance of specific practices known to have harmful effects, such as the unnecessary use of opioids and work restrictions.
- Optimization of physician-worker interaction.
- Maximization of communication with other stakeholders, particularly employers and payers (including required regulatory paperwork), to facilitate diagnostic and therapeutic interventions and return to work, and minimize time delays.

A report on a dedicated workers' compensation PPO in Louisiana, described positive effects of the organization in both affected worker lost time days and costs.(409) The authors attributed the differences to the use of experienced physicians and other providers trained in case management; care coordination by occupational physicians; early case management; and diagnostic and therapeutic intervention based on medical indication, not third party approval. They concluded that all four elements were necessary for the outcomes they achieved, but concluded that the managing care physicians and case

managers were integral to the positive results. This may provide some guidance – and inspiration – for physicians (and other stakeholders) in dealing with the vicissitudes of the present systematic influences on affected worker outcomes.

Workplace Factors

Table 7. Workplace Factors Which May Contribute to Work Disability

Workplace Culture
Pre-Placement Evaluation
Proactive Supervisor Training
Proactive Employee Training
Early and Continued Employer/Employee Communication
Role of Co-Workers
Role of Labor Unions
Ergonomic Worksite Visits

Introduction

The influence of workplace factors on work disability has been recognized, and stakeholders “must come to understand work disability in an employment context versus a medical process alone and maintain the employment situation as the focus and goal of activity.”(410) An extensive analysis of various rehabilitation models in pain related work disability, described a Labor Relations Model, placing management of work disability into the sociopolitical context of the workplace.(67) The authors summarized the three major tenets of the model as follows:

1. The needs of workers and employers are complementary, and optimization of work disability management provides a mutually beneficial situation in which disruption of both affected workers’ personal situations and enterprise operations are minimized.
2. The importance of work to individuals is paramount and disruption of occupational status should be avoided.
3. Employers are primarily responsible for the success or failure of return to work and the long-term maintenance of the employment relationship.

Although the third component of their description de-emphasized affected worker contributions to recovery (a viewpoint not shared by the present authors), the Labor Relations Model emphasized a workplace-based multi-faceted team approach to disability prevention. Similar to other components of the conceptual framework presented in this chapter, a multi-dimensional and trans-disciplinary approach is necessary to understand the contribution of workplace factors and their interactions to work disability.(218)

Analogous to those of affected workers, employer attitudes, beliefs, and expectations about work disability and their expression in enterprise policy and procedure may affect the course of an individual employee’s recovery and rehabilitation. Comparative studies across employers show that organizations with established policies and procedures – for safety diligence and training, response to work-related injuries, and proactive return to work programs – report fewer lost workday cases, fewer workers’ compensation wage-loss claims, and fewer total lost workdays, and achieve better outcomes.(411) Job-person mismatch may predispose the worker to illness or injury, but may or may not be detected by pre-placement evaluation for task suitability. Supervisor response to worker illness and injury has been shown to exert a prominent effect on outcomes, and may be positively affected by proactive training. Studies of injured workers have repeatedly demonstrated that proactive, positive employer responses are associated with fewer lost-time injuries and better return to work outcomes.(277, 412, 413) The effects of proactive employee training in process and expectations in the event of work disability are less clear. Both co-workers(414, 415) and labor unions (416) can exert significant positive and negative influence over the process and the net effect is unclear in both cases. The employer’s provision of transitional work (discussed in a previous section) is crucial to worker recovery and rehabilitation, and there is some evidence for positive effects of ergonomic worksite evaluation and intervention(417-420) (see Low Back Disorders chapter).

WORKPLACE CULTURE

“People-Oriented Culture” has been identified as one of eight independent variables in a multivariate model of factors affecting work disability.(411) This factor represented behaviors and policies that cultivated company human resources in positive ways, including attention to interpersonal skills and open communication, cultivation of trust between management and employees, cooperation and information sharing in the work environment,

regular and meaningful involvement of employees in company operation and decisions, and encouragement of positive work relationships and employee morale. A study of 220 Michigan companies found positive associations between these company attributes and lost workday case rate, lost workdays per case, and the workers' compensation claim rate.(411) In a qualitative companion study of 32 of the original enterprises, correlations among managerial styles, company cultures, and performance metrics were observed.(221) Many enterprises that were successful in their disability efforts practicing a human resource philosophy that explicitly recognized their employees as valuable resources, invested in their workers, shared information about business operations with employees, and involved their employees in decisions that affected their jobs. Conversely, a number of firms with negative cultures and adversarial work climates noted declining or poor work disability performance.(218) The same concept was used and found it to be predictive of affected worker return to work status 6 months after carpal tunnel ligament release, confirming results from previous studies in the same context.(421, 422)

Pre-Placement Evaluation

Inappropriate worker-job fit may lead to worker illness or injury (e.g., attempting to perform physical work beyond worker capability) or excessive psychological stress on employees (due either to physical or psychological job characteristics or control-stress mismatch). Poor fit may decrease resilience or motivation to continue working, particularly in the presence of CHLPs, and lead workers to consciously or unconsciously seek an escape from the situation through a disability mechanism such as workers' compensation, or short- or long-term disability.

A pre-placement questionnaire has been used to stratify new employees as low-, medium- or high risk for subsequent (short-term) work disability (sickness absence).(423) Later comparison with mean work disability experience (both number of episodes and total hours) over employment periods of 3.5 to 6 years demonstrated strongly significant differences among the three groups. However, the limitations of this approach were emphasized by the ability of a multivariate model (combining risk category, gender, smoking status, and previous experience with low back pain and work disability experience) to explain only 10 to 12% of the variation encountered. A functional capacity evaluation has been used to assess physical capacity of food production and manufacturing employees.(424) Although strength testing per se was not predictive of work injury, incidence of low back injury was 3% in workers who demonstrated capability to perform the defined job description, particularly with regard to lifting, and 33% in those who did not. Cost analysis led the authors to conclude that the testing was cost-effective.

A series of studies summarized a battery of ergonomic functional screening tests for pre-placement evaluation of applicants for physically demanding jobs.(425) Meta-analysis of employed affected workers before and after test battery implementation indicated a 41% reduction in workers' compensation injuries. Meta-analysis of predictive studies indicated that new-hires who satisfactorily completed the test battery had a 47% lower workers' compensation injury rate and 21% higher job retention. Workers under consideration for physically demanding jobs were screened with an isokinetic dynamometry procedure and compared the subsequent incidence of musculoskeletal disorders with unscreened controls.(426) In a 33-month follow-up period, significant reductions were found in the frequency and severity of musculoskeletal disorder injuries in the screened employee population. Unscreened applicants were 2.38 times more likely to experience an overexertion injury of the knees, shoulders or back than screened hires, and incurred 4.33 times higher workers' compensation claims costs.

Proactive Supervisor Training

Employee supervisors serve as a direct link between senior enterprise management and workers as well as one of the agents (in concert with the payer) of physician return to work and activity prescriptions. Supervisors interpret corporate policy (in conjunction with HR and benefits), influence access to corporate personnel and medical resources, facilitate go to/stay at/return to work processes, monitor affected worker health and job function, and communicate the corporate culture (negative or positive) to the individual.(427) Three key factors in engaging and empowering supervisors in work disability prevention efforts have been cited, including(50):

1. Support by senior management in their efforts to promote the well-being and safety of workers.
2. Skills facilitating comfortable performance of activities such as accurate judgment of the seriousness of worker health complaints (including first aid and initial illness and injury management), and appropriate workplace accommodations based on activity and restriction recommendations of health care providers.
3. A vested interest in improving go to/stay at/return to work (often through personal and departmental accountability for both costs and outcomes).

It has been suggested that supervisor support may represent the most important aspect of employer response to worker illnesses and injuries.(150) However, individuals may differ in their approaches and capability levels in dealing with these conditions. If workers have not undergone specific training in company policy and procedure for managing these events (discussed in the next subsection), they may encounter both the stated and actual practices and cultural influences of the organization for the first time in a stressful and compromising situation. Workers have been noted to characterize employer actions as more important than written policy(428); the company response to first report of illness or injury may be paramount in determining eventual positive or negative outcome.(429, 430) The perceptions of 23 supervisors were examined in a series of focus groups.(431) The authors concluded that supervisors perceived themselves as key actors in the creation of positive and healthful work cultures and environments and as the primary drivers of affected worker rehabilitation. The participants also noted the complexity of the rehabilitation process, with influences at the workplace and societal levels and interactions among many stakeholders. The results of a small study found that employees and supervisors identified trust, communication, and knowledge of disability as key elements of successful employee return to work.(432) A pilot training program for supervisors was found to decrease employee perception of negative supervisor responses (including blaming employees for event, not treating events seriously, and discouraging employees from reporting events and filing claims) at the time of work related injury; effects on work disability (lost time) were not determined.(412) Inclusion of supervisors in training programs designed for employees does not decrease work disability in musculoskeletal conditions,(433) but supervisor skills can be developed and enhanced through management-supported training programs.(434-439)

Proactive Employee Training

Affected worker attitudes, beliefs, and expectations (ABEs) were discussed in the Psychological Factors section. These characteristics exert important influences both on ill or injured worker behavior and recovery. It can be extremely disconcerting for ill or injured employees to be faced with initial involvement in employer policies and procedures and the workers' compensation system at a time of life disruption due to illness or injury. Proactive employee orientation and training in the mechanics of these systems may reduce uncertainty at a critical time and may reduce employee tendencies to seek information and stability from other sources, such as an attorney. Results of an employee survey by CIGNA Intracorp(440) suggested that when employees feel that they have a good understanding of their disability benefits before they need to navigate the benefit system, they are likely to rate their insurance company higher and to have a higher overall level of satisfaction with the claims process. This may in turn translate into better outcomes, as demonstrated in a prospective survey on back pain which quantified the effect of worker satisfaction with their employer's management of disability claims.(441) The authors found that dissatisfied workers were more likely to have time lost claims and are more likely to have multiple spells of joblessness; this factor was more important in explaining successful return to work than satisfaction with health care providers or expectations about recovery.

Although no quantitative studies are available to demonstrate the positive effects of proactive employee training, results of qualitative studies, such as those utilizing focus groups of affected workers, have suggested that employees may benefit from such an intervention. For example, a study on worker peer-support groups noted that these groups offered "hands-on procedural support with compensation claims, return-to-work negotiations, and financial support for those workers who had little knowledge about how to interact with the systems involved with return to work."(415) A participant remarked that "There's a steep learning curve for the person who gets injured who in the past has never had to know all these things about who does what."(415)

Early and Continued Employer/Employee Communication

In a review of the quantitative literature on RTW interventions, mixed results were reported,(420) with several high-quality studies supporting early contact between workers and workplaces in work disability reduction (59, 113, 218-220, 222, 224-226, 228, 411, 442-445) and a lesser number not supporting the practice.(223, 446, 447) There was insufficient evidence to support the intervention beyond 1 year.(113) Cost-benefit analysis again showed positive effects, with several studies supporting net cost savings.(59, 113, 224, 225, 228, 230-234, 417, 444, 445) Support for positive effects on affected worker quality of life was not strong.(59, 113, 219, 220, 223, 228, 417, 444, 445) A report(448) of three studies,(444, 449, 450) demonstrated positive effects of meeting between physicians, employers, and employees when combined with subsequent and resultant work modifications.

Role of Co-workers

A literature review on the relationship between workplace social support and risk of work-related musculoskeletal disorders, found 52 relevant cross-sectional, case control, and prospective studies, published between 1985 and 2003, and concluded

that there was evidence for associations between: 1) poor social support and an increased risk in musculoskeletal morbidity; 2) poor social support and work disability (including work absence, activity restriction, and failure to return to work after absence); and 3) good social support in prevention of musculoskeletal morbidity and in helping workers cope with problems.(451) Other relevant research included:

- Results analyzed from a national work environment survey of more than 53,000 Swedish workers, found a generally progressive relationship between support from both supervisors and work colleagues and the occurrence of musculoskeletal pain and long-term work disability.(452) Those with good support from both co-workers and superiors had lower symptom prevalence and long-term sick leave incidence than those with poor support from both sources. The latter was associated with particularly high prevalence of physical symptoms. The groups with either poor support from superiors or from co-workers were in an intermediate category with regard to symptom prevalence, with colleague support producing somewhat less long term disability.
- A 2009 study noted that most return to work models ascribe primary responsibility for getting the worker back to work during the sickness absence process to supervisors.(453) However, the study indicated that in practice this responsibility shifts over to affected workers and co-workers. Colleagues seemed to take a simultaneously active and transparent role, navigating informally through problematic situations in an ad-hoc manner by relying on their own experiences of sickness or that of their relatives and friends and trying to do what is required to “make it work” for themselves and re-entering workers (e.g., re-arranging work schedules and task assignments).
- A trial of workplace coaching (the “Active Back” project) for Norwegian workers with low back pain successfully diverted them from unnecessary medical care.(454) The intervention, which was combined with a general media campaign, was use of trained peer advisors to provide information aimed at reducing fear avoidance, supportive advice, and facilitation of transitional work and activity. The authors found that back pain prevalence did not change, but there were significant improvements in measured affected worker beliefs; a small decline in health care professional use; and decreases in low back pain and total work disability by 49% and 29%, respectively.
- A 2007 study also found that peer advocacy, particularly by individuals with previous work injury experience, was a key element of recovery for affected workers.(415) Peer advocates served three important roles: 1) allies who were focused on assisting affected workers without competing agendas (e.g., union loyalty); 2) sources of practical experience and knowledge about workers’ compensation and return to work processes; and 3) providers of empathy and non-judgmental support, particularly in the more personal aspects of illness and injury recovery.

Conversely, the occurrence of resentment was noted among co-workers when assigned to previously unrequired tasks or extra work due to affected workers’ temporary or permanent inability to perform them.(92) Such resentment occurred when colleagues perceived that they were replaced by affected workers in relatively light duties formerly reserved for older workers or those with higher seniority, or unfairly burdened with provision of assistance.

Role of Labor Unions

The influence of labor unions is complex, and markedly differing effects have been described. Studies of disability management interventions in which strong union support was present have reported positive results, including reductions in both work disability duration and cost.(113, 223, 234, 444) The importance of labor union involvement has also been emphasized in qualitative studies, particularly labor-management relations.(92, 455) Creation of transitional duty strategies has been suggested as a natural area of collaboration between labor and management.(456) Strong union involvement in the design, implementation, and evaluation of an integrated primary prevention and early intervention program for work illness and injury at Vancouver General Hospital was cited as a key success factor, noting that the goodwill created by the cooperative alliance was instrumental in the decision by the national Occupational Health and Safety Agency for Health Care and other health authorities to fund pilots in other regions.(457)

On the other hand, several ways in which union support for return to work efforts can be circumvented by other considerations have been delineated(416):

- Legal requirements for employers to provide alternative or modified work can conflict with seniority clauses in collective agreements.
- Jurisdictional issues with multiple unions within a given workplace can interfere with temporary reassignments in the transitional duty period.(455, 458)
- Unions can also be reluctant to cooperate with transitional duty assignments if they support the right of workers to stay off work while they cannot do their job and if they have not accepted the concept and benefits of transitional duty.(92)

- Union support for transitional duty may be compromised by perception of production statistics as an important priority of management, views of return to work as a cost-saving mechanism, and workers' obligations to return to modified work without voluntary consent.(458)

The perception of stakeholders involved in the RTW process of ill and injured workers, in both individual interviews and focus groups, has been extensively explored.(92) Union-management relationships were perceived to have a strong impact on return to work efforts, and adversarial behavior decreased when the parties shared the common goal of affected worker welfare and safe and successful return to work. However, participants noted that union involvement was most often restricted to advocacy for injured workers, monitoring of company compliance with physician-prescribed work restrictions, and ensuring that return to work efforts did not contravene standing collective bargaining agreements. Careful consideration of collective agreements and full involvement of labor in the creation, coordination and problem-solving involved in return to work programs, even in joint labor and management health and safety committees, was relatively rare. In a qualitative study of stakeholder perspectives on barriers and facilitators of return to work, the perception was described of union rigidity and obstructionism by occupational health professionals after experiencing union objections to contact with workers' treating physicians by occupational health professionals and regular physician communication with workers without involvement of union representatives.(58) Some employees in this study expressed dissatisfaction with their own union, with particular emphasis on the need to educate union members and representatives on the benefits of transitional duty and activity prescription.

Ergonomic Worksite Visits

Suboptimal work practices may compromise rehabilitation progress or engender recurrent illness or injury in affected workers returned to unchanged work situations (as well as lead to new problems in other workers exposed to the same conditions). A study of 165 U.S. government employees with work-related upper extremity disorders, suggested that improved function in this population may require both facilitation of active problem solving and pain coping techniques and reduction of workplace ergonomic risk exposure.(459) In a pair of literature reviews, (418, 419) 24 studies were identified(113, 227, 417, 442, 460-479) which supported the use of ergonomic interventions, some with positive cost-benefit analyses. Leyshon and Shaw(480) noted that the theory and practice of rehabilitation ergonomics (for secondary disability prevention after initial illness or injury) is relatively underdeveloped, and proposed a conceptual framework based on the International Classification of Functioning, Disability, and Health advanced by the World Health Organization.(481) The use of early intervention using participatory ergonomics and RTW coordination was explored in affected workers with low back pain.(482) This approach involves a collegial effort among affected workers, ergonomists (occupational or physical therapist trained in ergonomic analysis and methods), and treating physicians (usually occupational physicians) in identifying employee and workplace barriers to return to work, developing solutions, devising actionable plans, and coordinating return to work activity. This approach has demonstrated improvement in RTW rates when compared to clinical interventions.(444, 483) Recent systematic reviews(420, 484) have also suggested that participatory ergonomics can make an important contribution to the return-to-work process.

Disability Risk Prediction

Though most individuals with work-related health problems recover quickly, a small percentage continues on to long-term disability. This small percentage accounts for the majority of the cost – to individuals and their families, employers and payers, communities, and society – associated with these problems.(485, 486) Identification of potential risk factors and the use of predictive instruments may permit stakeholders – particularly physicians – to identify affected workers at higher likelihood of future work disability and selectively titrate intervention, particularly focusing on secondary prevention.

Risk Factor Analysis

Although research has identified general work disability risk factors as well as those related to injuries to a variety of body areas, including the spine and extremities, study of the low back has engendered the bulk of the available information. Non-specific low back pain (i.e., unrelated to identifiable lesion such as disc herniation with radiculopathy) is nearly always largely a benign condition.(487, 488) However, low back pain may persist in a significant proportion of sufferers for a year, and there is a high recurrence rate in those in which symptoms initially resolve.(489-492)

Over the last three decades, several hundred studies have been published in area of prognostic indicators for poor outcome in low back pain. Recent reviews suggest that only a few dozen of these are of high enough quality to allow extrapolation.(493, 494) In addition many of the results of these studies are contradictory with different prognostic indicators

being found in the different studies. Table 8 identifies individual risk factors which have been considered as predictive of delayed recovery in the general medical literature.(261, 495-500)

Several systematic reviews have identified higher-quality studies and collated them to identify significant predictive factors or groups of factors which might allow predictive modeling of risk:

- Fifteen identified studies (from a total pool of 4,988) which meet inclusion criteria requiring prospective cohorts of non-specific low back pain with function related outcome, found that the predictive instruments or models showed moderate ability to predict function related outcome (maximal 51% of the variability).(497)
- A report of six studies identified psychological distress and depressive mood, and to a lesser degree somatization, as indicators for chronic symptoms and/or work disability.(498)
- A summary of 28 studies ranking factors by the quality of evidence and strength of the factors, identified age, psychological distress, job dissatisfaction, duration of sickness absence, unemployment, unemployment rates, and expectation of return to work as the strongest indicators. Pain intensity, functional disability, poor perception of general health, depression, fear avoidance beliefs, catastrophizing and pain behavior were of lesser strength.(500)
- A review of 18 studies found high disability levels, age, female gender, social dysfunction and isolation, heavy work and higher compensation as predictive of later work disability.(499)
- Another review (493) examined 20 prospective studies, comprising a total of 10,842 patients assessed at less than 8 weeks from onset, and identified nonorganic signs, maladaptive coping behaviors, low general health status, high baseline functional impairment and psychiatric comorbidities as the most useful predictors of worse outcome at 1 year. Low fear-avoidance beliefs and low baseline functional impairment were useful for predicting better outcomes at 1 year.

Though there are many other reviews, they vary by design, inclusion criteria and quality. A recent review of 17 low back prognosis studies was able to identify several consistently reported prognostic factors.(494) These included: older age, poor general health, increased psychological or psychosocial stress, poor relations with colleagues, physically heavy work, worse baseline functional disability, sciatica and the presence of compensation. These authors concluded that there was an “immediate need for methodological work in the area of prognosis systematic reviews. Because of methodological shortcomings in the primary and review literature, there remains uncertainty about reliability of conclusions regarding prognostic factors for low back pain.”(494)

There is evidence for temporal phase specificity of risk factors.(6, 65) Although high workplace physical demands appear to be significant predictor of work disability in all three phases,(501) injury severity and physical factors have been demonstrated to be more influential in the acute phase,(51, 502, 503) with psychosocial factors predominant in the subacute and chronic phases.(19, 49)

Use of Predictive Instruments

An alternative approach to risk prediction has been the development of prediction instruments. Table 9 identifies several of the evaluation tools which have been used in various studies.(497-500) An early study(504) used a 21-item questionnaire. Using a cut-off score of 105 resulted in a sensitivity of 71% and specificity of 77% with 86% accurate identification of those at risk of up to 30 days off of work. It reported an 83% identification of those who would miss more than 30 days from work. Another study used eight factors including work in construction, age, delayed presentation for evaluation, leg pain, three or more non-organic signs, presence of intermittent pain, previous episodes of back pain and a questionnaire to develop positive and negative predictive values.(52) The first five questions had a positive predictive value of 66.7% with a negative predictive value 95.4% for the last three questions. Durand(496) performed a review of the literature and formulated an initial tool which was tested over four years to produce a second version. This was called the Work Disability Diagnosis Interview and required 3 to 5 hours to administer. It was not recommended for acute care but rather as a tool for chronic cases.

A more recent study used a simple three point questionnaire (assessing pain interference with ability to work, current work status, and presence of radiating leg pain) administered 3 weeks after claim filing for new back injuries predicted a work disability status at 1 year, accurately classifying 77% of workers.(505) Another article reviewed the validity of the Back Disability Risk Questionnaire BDRQ).(506) This 16-item questionnaire was given to individuals with acute work-related back pain with outcomes measured at 1 and 3 months. There was a 73% correct classification for 1 month return to work. Classification accuracy at three months was 76.3%.

In summary, limited progress has been made in developing practical methods of identification of predictive indicators for poor outcome and work disability, particularly for workers affected by low back pain. Methodological problems include

outcome definition and inconsistency in the quality of studies. As noted in Table 8, the number of potentially predictive variables is still too large to allow practical use in forecasting poor outcome and excessive risk for later work disability.

TABLE 8: INDIVIDUAL PROGNOSTIC INDICATORS FOR DELAYED RECOVERY

Workplace Factors

Large versus small employer
Current work status
Availability of alternative duty
Poor relationship with supervisor and co-workers
Self report of pain interference with current work
Perception of work-relatedness
Union membership
Physical demands of work
Belief that work is harmful
Short job tenure

Demographic Factors

Age
Sex
Weight
Race/Ethnicity
Marital status
Education

Individual Factors

Previous injuries
Past prolonged or recurrent absences from work
Being a victim of prior abuse
Chemical abuse
History of smoking
Perceived poor health or poor general health
Disrupted sleep patterns
Work satisfaction
Prior back surgery
Decreased concentration, irritability, nervousness
Extended inactivity
Disturbed sleep
Smoking
Increased BMI

Social Factors

Family history of disability
Change in family role
Over protective or punitive spouse
Unemployment rates

Clinical Factors

Pain intensity on presentation
Functional status on presentation
Initial treatment approach
Delay in seeking care
Pain below the knee
Non-organic signs
Referral for physical therapy
Use of opioids for more than one week
Self estimate of recovery
Physician-employer communication
Duration of sickness absence
Satisfaction with care
Accident type falls, lifting)
Specific diagnosis

Psychological Risk Factors

Fear avoidance beliefs
Somatization
Catastrophizing
Depression
Stressful life events
Psychological distress
Impaired coping
Social dysfunction
Anxiety

Administrative/Legal

Attorney involvement
Compensability
Litigation pending

TABLE 9: EVALUATION TOOLS

BDI Beck Depression Inventory)
BDRQ Back Disability Risk Questionnaire)
CSQ Coping Strategies Questionnaire)
DRAM Distress and Risk Assessment Method)
FABQ Fear Avoidance Beliefs Questionnaire)
GHQ General Health Questionnaire)
LBPRS Low Back Pain Rating Scale)
MMPI Minnesota Multiphasic Personality Inventory)
MSPQ Modified Somatic Perception Questionnaire)
Modified Work Apgar
Orebro Musculoskeletal Pain Screening
ODQ Oswestry Disability Questionnaire)
PCI Pain Coping Inventory)
PDI-14 Psychiatric Symptom Index)
RMDQ Roland Morris Disability Questionnaire)
VAS Visual Analogue Scale)
SCL-90-R Symptom Check List 90 Revised)
SF 12 and SF 36 Short Form Health Survey in 12 and 36 question versions)
SIP Sickness Impact Profile)
WoDDI (Work Disability Diagnosis Interview)
Zung Modified Zung Self Rated Depression Scale)

Case Management and Coordination

The respective roles of stakeholders in the recovery and rehabilitation of affected workers was conceptually reviewed in the section on Multi-stakeholder Collaboration. This section addresses the practical problem of connecting and unifying those stakeholders in the complex problem of work disability prevention.

A fundamental problem with the current workers' compensation process appears to be a profound lack of stakeholder understanding of each others' perspectives, priorities, and responsibilities. Affected workers may be unfamiliar with and baffled by systemic processes and requirements, particularly if they have not undergone proactive education and training (see Workplace Factors), with resultant frustration, anger, and possible resort to legal representation in an effort to achieve some sense of orientation and progress. Physicians may approach affected workers from a lofty medical or even biopsychosocial viewpoint, but fail to comprehend the needs of employers (which often involve limitations on the ability to provide transitional work) and insurer regulatory and practical requirements. A recent study described the silo effect which occurs among different departments (benefits, HR, risk management, safety) within employer organizations, with overlap of coverage and duplication of services.(507) A study of workplace interventions for workers affected by musculoskeletal disabilities noted a marked lack of coherence among components of interventions, including objectives, activities, and outcomes in the 21 studies assessed.(508)

Possible windows of opportunity to improve this situation have been suggested, (66) and include workplace based ergonomic interventions and return to work planning meetings, as both activities benefit from the participation of various stakeholder groups.(225, 233, 417, 444) An example of efforts to engage multiple stakeholders in developing organized, collaborative, and systematic approaches to the stay-at-work and return-to-work process is the grassroots non-profit initiative known as the 60Summits Project (see <http://www.60summits.org/>).

Case Management and Coordination

A series of articles in the 1999 *AAOHN Journal*, explored various aspects of the occupational health nurse as case manager.(509-516) The authors concluded that occupational nurse case managers (NCMs) can:

1. Be perceived as positive or negative influences by all stakeholders in the management of worker illness and injury.
2. Provide sensitivity and responsiveness to the individual and personal meaning of illness and injury to affected workers, and assist individuals in the emotional and mechanical aspects of negotiation of the workers' compensation system.
3. Bridge the sometimes conflicting perspectives of affected workers, physicians, employers, and other stakeholders.

4. Facilitate communication among stakeholders, and increase the consistency, continuity, efficiency, and effectiveness of health and administrative service provision.
5. Facilitate both structural (e.g., benefits administration) and process (e.g., interaction with physicians and the workers' compensation system) factors in the go to/stay at/return to work process.
6. Serve as monitor, coordinator, supporter, and advocate for workers, as well as consultant and resource to service providers and facilitator of cost containment.
7. Serve an overall coordinating and oversight function in facilitating the optimal medical and administrative management of the case and case resolution.

A case for the combination of predictive modeling to identify high risk cases and employment of aggressive case management earlier in the rehabilitation process rather than later has been made,(517) and the role of occupational health nurses in the case coordination process emphasized.(507) A community-based program has been described in which nurse case coordinators were employed by a rural medical center (not employers or insurers) to improve care access, facilitate communication among stakeholders, and expedite return to work.(518, 519) The program provided case management to more than 3,000 affected workers and both increased number of workers returning to work and decreased transitional duty days. An integrated case management (ICM) approach combining workplace ergonomic and problem-solving interventions by nurse case managers for workers with upper extremity disorders in a federal setting reported increased worker satisfaction in the ICM group translated into positive outcomes at 6 and 12 months, including decreased symptom severity and functional limitations, and shorter time to return to work.(520) A pilot study with contract case managers who removed more than 70 workers from long-term disability status generated a return on company investment of 3.52.(521) The aggressive use of case managers in the Shell Oil Disability Management Program, which emphasized work absence tracking, early institution of case management interventions, and transitional duty found a significant decrease in absenteeism among hourly wage employees, with an estimated 2.4 return-on-investment.(522)

Use of Return to Work Coordinator

Return-to-work coordinators are dedicated individuals focused on facilitation of the return to work process who work directly with affected workers, physicians, employers, and payers. Coordinators may have backgrounds in human resources; industrial hygiene; insurance case management; managed care; occupational or other nursing; occupational or physical therapy (including ergonomics); psychology; and vocational rehabilitation.(68) They may act as independent consultants or be engaged and compensated by clinics or hospitals, employers, insurers, or government agencies. Responsibilities include obtaining input, support, and understanding of expectations from workers, employers, and health care providers; designing and implementing individualized return to work plans (including identification of barriers and development of methods to address them); identification and facilitation of transitional work; and coordination of ongoing recovery and rehabilitation efforts, particularly through maintenance of communication.(456, 508)

A recent study identified 29 coordinator activities which they segregated into six preliminary competency domains: 1) ergonomic and workplace assessment; 2) clinical interviewing; 3) social problem solving; 4) workplace mediation; 5) knowledge of business and legal aspects; and 6) knowledge of medical conditions.(68) These authors observed that successful return to work coordination may depend more on competencies in ergonomic job accommodation, communication, and conflict resolution than on medical training. A study of coordinator competencies utilizing interviews and focus groups identified 18 competencies endorsed as "essential" for success as a return to work coordinator by more than 50% of respondents.(173) The consensus among participants was that the requirements "reflect a broad range of responsibilities, an emphasis on developing and maintaining interpersonal relationships and communication through a complex social process, and problem-solving in a positive and effective manner that involves all key stakeholders."(173) Coordinators have been identified as one of the crucial elements in a five-component model of return to work (the program was undergoing evaluation in Ontario at the time of this writing).(482) The importance of dedicated coordinators has been demonstrated in a number of successful return-to-work programs.(218, 221, 225, 233, 234, 411, 417, 523, 524)

Use of Interdisciplinary Team Approach

One of the outgrowths of the increase in acceptance of the biopsychosocial approach to musculoskeletal worker illness and injury has been the development of effective interdisciplinary approaches to the problem.(35) These approaches comprise an integrated team of health care providers, variously involving behavioral health professionals, medical physicians, nurses, occupational and physical therapists, and rehabilitation and vocational specialists working in a coordinated effort to minimize work disability and maximize affected worker function. Characteristics of the full interdisciplinary approach include:(525)

- Centralized management by a core multi-disciplinary team in collaboration with other stakeholders.

- Availability of multi-disciplinary resources as described above to allow assessment of multiple causes of work disability in individual cases and to provide the expertise needed to implement specific interventions (such as cognitive behavioral therapy and workplace based interventions).
- Coordination between the various partners and to allow for regular exchanges, thus fostering active and concerted commitment.

A 2005 study advised that the interdisciplinary management process needed to be actively planned, with sensitivity towards the complexity of the process.(66) The authors also commented on the opportunity for and importance of increase in team member's awareness of each others' perspective to minimize miscommunication and focus activity. Another study described perceptions of an interdisciplinary rehabilitation team comprising a general medical practitioner, an occupational therapist, a kinesiologist, a psychologist, an ergonomist and a team coordinator.(60) The team used an evidence-based program that subscribing to a specified inter-organizational management model to manage work related musculoskeletal injuries in Montreal. The authors elaborated numerous obstacles to team function involving affected workers, physicians, employers, and insurers, and described a number of strategies employed by the team to overcome barriers to collaboration.

Two studies found interdisciplinary rehabilitation to be more effective than conventional treatment in the short term (3 to 4 months) but without significant advantage at long-term (5 year) follow-up.(526, 527) Cochrane reviews have found that interdisciplinary rehabilitation was more effective than conventional approaches in both subacute (528) and chronic(529) low back pain. The effect on chronic pain was dependent on the intensity of treatment, with less intensive multi-disciplinary approaches no more effective than usual care(529); this effect was confirmed by a later study.(530) In a cohort of 134 adults with low back pain, a 2010 study reported a marked improvement in median duration to sustainable return to work (88 versus 208 days) in the integrated care group when compared to usual care, with significant sustained improvement to 12 month follow up; no difference was noted in pain improvement between groups.(531) A meta-analysis of five Scandinavian studies on low back demonstrated a modest but significant effect (relative risk 1.21) of multi-disciplinary interventions on return to work.(532) Another study found that male workers randomized to a "light" multi-disciplinary program experienced faster return to work than those in an extensive multi-disciplinary program or usual care; although the same effect was not noted for female workers, the authors concluded that the program was cost-effective based on savings over the 2-year course of the study.(533) Another study using a similar paradigm over a period of 14 months in 654 workers confirmed the cost-benefit aspects and suggested that a simple, standardized screening instrument (including psychological and physiotherapeutic elements) may be useful in allocating affected workers with musculoskeletal pain to the appropriate treatment level.(534)

References

1. Fulton-Kehoe D, Franklin G, Weaver M, Cheadle A. Years of productivity lost among injured workers in Washington state: modeling disability burden in workers' compensation. *Am J Ind Med.* 2000;37(6):656-62.
2. Lax MB, Klein R. More than meets the eye: social, economic, and emotional impacts of work-related injury and illness. *New Solut.* 2008;18(3):343-60.
3. Vasek W. Personal Communication -- 1996. Cited in Fulton-Kehoe, et al 2000, p 657.
4. Frank J, Sinclair S, Hogg-Johnson S, et al. Preventing disability from work-related low-back pain. New evidence gives new hope--if we can just get all the players onside. *Cmaj.* 1998;158(12):1625-31.
5. Frank JW, Brooker AS, DeMaio SE, et al. Disability resulting from occupational low back pain. Part II: What do we know about secondary prevention? A review of the scientific evidence on prevention after disability begins. *Spine (Phila Pa 1976).* 1996;21(24):2918-29.
6. Krause N, Ragland DR. Occupational disability due to low back pain: a new interdisciplinary classification based on a phase model of disability. *Spine (Phila Pa 1976).* 1994;19(9):1011-20.
7. Waddell G, Burton K, Aylward M. A biopsychosocial model of sickness and disability. *AMA Guides Newsletter.* 2008 (May-June):1-13.
8. Boyd KM. Disease, illness, sickness, health, healing and wholeness: exploring some elusive concepts. *Med Humanit.* 2000;26(1):9-17.
9. Rondinelli R, ed. *Guides to the Evaluation of Permanent Impairment, 6th Edition.* Chicago, IL: American Medical Association; 2008.
10. Ursin H. Sensitization, somatization, and subjective health complaints. *Int J Behav Med.* 1997;4(2):105-16.
11. Page LA, Wessely S. Medically unexplained symptoms: exacerbating factors in the doctor-patient encounter. *J R Soc Med.* 2003;96(5):223-7.
12. Talmage J. Personal Communication -- 2010.
13. Waddell G, Burton A. *Concepts of Rehabilitation for the Management of Common Health Problems.* London: The Stationery Office; 2004.
14. Parsons T. *The Social System.* Glencoe, IL: The Free Press; 1951.
15. Schultz IZ, Stowell AW, Feuerstein M, Gatchel RJ. Models of return to work for musculoskeletal disorders. *J Occup Rehabil.* 2007;17(2):327-52.
16. Barsky AJ, Borus JF. Somatization and medicalization in the era of managed care. *Jama.* 1995;274(24):1931-4.
17. Vranceanu AM, Barsky A, Ring D. Psychosocial aspects of disabling musculoskeletal pain. *J Bone Joint Surg Am.* 2009;91(8):2014-8.
18. American College of Occupational and Environmental Medicine. Preventing needless work disability by helping people stay employed. *J Occup Environ Med.* 2006;48(9):972-87.
19. Krause N, Dasinger LK, Deegan LJ, Rudolph L, Brand RJ. Psychosocial job factors and return-to-work after compensated low back injury: a disability phase-specific analysis. *Am J Ind Med.* 2001;40(4):374-92.
20. Krause N, Frank JW, Dasinger LK, Sullivan TJ, Sinclair SJ. Determinants of duration of disability and return-to-work after work-related injury and illness: challenges for future research. *Am J Ind Med.* 2001;40(4):464-84.
21. Baldwin ML, Johnson WG, Butler RJ. The error of using returns-to-work to measure the outcomes of health care. *Am J Ind Med.* 1996;29(6):632-41.
22. Linton SJ, Gross D, Schultz IZ, et al. Prognosis and the identification of workers risking disability: research issues and directions for future research. *J Occup Rehabil.* 2005;15(4):459-74.
23. Glass L, ed. *Occupational Medicine Practice Guidelines: Evaluation and Management of Common Health Problems and Functional Recovery in Workers, 2nd Edition.* Elk Grove Village, IL: American College of Occupational and Environmental Medicine; 2004.
24. Christian J. SAW/RTW/STW Decision-making: Process, Methods, and Tools. *American Occupational Health Conference.* Orlando, FL; 2010.
25. Christian J. Background and Orientation. *American Occupational Health Conference.* Orlando, FL; 2010.
26. Talmage J, Melhorn M. Chapter 2: How to think about work ability and work restrictions: risk, capacity, and tolerance. In: Talmage J, Melhorn M, eds. *A Physician's Guide to Return to Work.* Chicago, IL: AMA Press; 2005:7-17.
27. Crook J, Milner R, Schultz IZ, Stringer B. Determinants of occupational disability following a low back injury: a critical review of the literature. *J Occup Rehabil.* 2002;12(4):277-95.
28. Engel GL. How much longer must medicine's science be bound by a seventeenth century world view? *Psychother Psychosom.* 1992;57(1-2):3-16.
29. Beecher HK. Relationship of significance of wound to pain experienced. *J Am Med Assoc.* 1956;161(17):1609-13.
30. Engel G. "Psychogenic" pain and pain-prone patient. *Am J Med.* 1959;26(60):899-918.

31. Gamsa A. The role of psychological factors in chronic pain. I. A half century of study. *Pain*. 1994;57(1):5-15.
32. Allan DB, Waddell G. An historical perspective on low back pain and disability. *Acta Orthop Scand Suppl*. 1989;2341-23.
33. Hadler NM. The disabling backache. An international perspective. *Spine (Phila Pa 1976)*. 1995;20(6):640-9.
34. Imrie R. Demystifying disability: a review of the International Classification of Functioning, Disability and Health. *Sociol Health Illn*. 2004;26(3):287-305.
35. Gatchel RJ, Turk DC. Criticisms of the biopsychosocial model in spine care: creating and then attacking a straw person. *Spine (Phila Pa 1976)*. 2008;33(25):2831-6.
36. Engel GL. The need for a new medical model: a challenge for biomedicine. *Science*. 1977;196(4286):129-36.
37. Hunt DG, Zuberbier OA, Kozlowski AJ, et al. Are components of a comprehensive medical assessment predictive of work disability after an episode of occupational low back trouble? *Spine (Phila Pa 1976)*. 2002;27(23):2715-9.
38. Jones M, Edwards I, Gifford L. Conceptual models for implementing biopsychosocial theory in clinical practice. *Man Ther*. 2002;7(1):2-9.
39. Schultz IZ, Crook JM, Berkowitz J, et al. Biopsychosocial multivariate predictive model of occupational low back disability. *Spine (Phila Pa 1976)*. 2002;27(23):2720-5.
40. Tate DG, Pledger C. An integrative conceptual framework of disability. New directions for research. *Am Psychol*. 2003;58(4):289-95.
41. Bendix AF, Bendix T, Lund C, Kirkbak S, Ostensfeld S. Comparison of three intensive programs for chronic low back pain patients: a prospective, randomized, observer-blinded study with one-year follow-up. *Scand J Rehabil Med*. 1997;29(2):81-9.
42. Bendix AF, Bendix T, Vaegter K, Busch E, Kirkbak S, Ostensfeld S. Intensive multidisciplinary treatment of back pain--2 controlled prospective studies. *Ugeskr Laeger*. 1994;156(16):2388-91, 94-5.
43. Corey DT, Koepfler LE, Etlin D, Day HI. A limited functional restoration program for injured workers: a randomized trial. *J Occup Rehabil*. 1996;6(4):239-49.
44. Hildebrandt J, Pflingsten M, Saur P, Jansen J. Prediction of success from a multidisciplinary treatment program for chronic low back pain. *Spine (Phila Pa 1976)*. 1997;22(9):990-1001.
45. Jousset N, Fanello S, Bontoux L, et al. Effects of functional restoration versus 3 hours per week physical therapy: a randomized controlled study. *Spine (Phila Pa 1976)*. 2004;29(5):487-93; discussion 94.
46. Patrick LE, Altmaier EM, Found EM. Long-term outcomes in multidisciplinary treatment of chronic low back pain: results of a 13-year follow-up. *Spine (Phila Pa 1976)*. 2004;29(8):850-5.
47. Shirado O, Ito T, Kikumoto T, Takeda N, Minami A, Strax TE. A novel back school using a multidisciplinary team approach featuring quantitative functional evaluation and therapeutic exercises for patients with chronic low back pain: the Japanese experience in the general setting. *Spine (Phila Pa 1976)*. 2005;30(10):1219-25.
48. Oleinick A, Gluck JV, Guire K. Factors affecting first return to work following a compensable occupational back injury. *Am J Ind Med*. 1996;30(5):540-55.
49. Dasinger LK, Krause N, Deegan LJ, Brand RJ, Rudolph L. Physical workplace factors and return to work after compensated low back injury: a disability phase-specific analysis. *J Occup Environ Med*. 2000;42(3):323-33.
50. Franche R, Krause N. Readiness for return to work following injury or illness. In: Schultz I, Gatchel R, eds. *Handbook of Complex Occupational Disability Claims*. New York: Springer Sciences + Business Media; 2005:67-92.
51. Dasinger LK, Krause N, Thompson PJ, Brand RJ, Rudolph L. Doctor proactive communication, return-to-work recommendation, and duration of disability after a workers' compensation low back injury. *J Occup Environ Med*. 2001;43(6):515-25.
52. McIntosh G, Frank J, Hogg-Johnson S, Bombardier C, Hall H. Prognostic factors for time receiving workers' compensation benefits in a cohort of patients with low back pain. *Spine (Phila Pa 1976)*. 2000;25(2):147-57.
53. Dionne CE, Dunn KM, Croft PR, et al. A consensus approach toward the standardization of back pain definitions for use in prevalence studies. *Spine (Phila Pa 1976)*. 2008;33(1):95-103.
54. Von Korff M, Miglioretti DL. A prognostic approach to defining chronic pain. *Pain*. 2005;117(3):304-13.
55. Larocca H. Editorial. *Spine (Phila Pa 1976)*. 1987;12(7, Suppl 1):S8.
56. Feuerstein M. Does the workers' compensation system think multidimensionally? *J Occup Rehabil*. 1996;6(1):1-3.
57. Bronfenbrenner U. *The Ecology of Human Development: Experiments by Nature and Design*. Cambridge, MA: Harvard University Press; 1979.
58. Friesen MN, Yassi A, Cooper J. Return-to-work: The importance of human interactions and organizational structures. *Work*. 2001;17(1):11-22.
59. Loisel P, Durand M, Berthelette D, et al. Disability prevention: new paradigm for the management of occupational back pain. *Dis Manage Health Outcomes*. 2001;9(7):351-60.
60. Loisel P, Durand MJ, Baril R, Gervais J, Falardeau M. Interorganizational collaboration in occupational rehabilitation: perceptions of an interdisciplinary rehabilitation team. *J Occup Rehabil*. 2005;15(4):581-90.

61. Loisel P, Buchbinder R, Hazard R, et al. Prevention of work disability due to musculoskeletal disorders: the challenge of implementing evidence. *J Occup Rehabil.* 2005;15(4):507-24.
62. MacEachen E, Kosny A, Ferrier S, Chambers L. The "toxic dose" of system problems: why some injured workers don't return to work as expected. *J Occup Rehabil.* 2010;20(3):349-66.
63. Heymans MW, de Vet HC, Knol DL, Bongers PM, Koes BW, van Mechelen W. Workers' beliefs and expectations affect return to work over 12 months. *J Occup Rehabil.* 2006;16(4):685-95.
64. Shaw WS, Pransky G, Patterson W, Linton SJ, Winters T. Patient clusters in acute, work-related back pain based on patterns of disability risk factors. *J Occup Environ Med.* 2007;49(2):185-93.
65. Franche RL, Krause N. Readiness for return to work following injury or illness: conceptualizing the interpersonal impact of health care, workplace, and insurance factors. *J Occup Rehabil.* 2002;12(4):233-56.
66. Franche RL, Baril R, Shaw W, Nicholas M, Loisel P. Workplace-based return-to-work interventions: optimizing the role of stakeholders in implementation and research. *J Occup Rehabil.* 2005;15(4):525-42.
67. Schultz I, Crook J, Fraser K, Joy P. Models of diagnosis and rehabilitation in musculoskeletal pain-related occupational disability. *J Occup Rehabil.* 2000;10(4):271-93.
68. Shaw W, Hong QN, Pransky G, Loisel P. A literature review describing the role of return-to-work coordinators in trial programs and interventions designed to prevent workplace disability. *J Occup Rehabil.* 2008;18(1):2-15.
69. Pransky G, Shaw W, Franche RL, Clarke A. Disability prevention and communication among workers, physicians, employers, and insurers--current models and opportunities for improvement. *Disabil Rehabil.* 2004;26(11):625-34.
70. Wynne-Jones G, Mallen CD, Main CJ, Dunn KM. Sickness certification and the GP: what really happens in practice? *Fam Pract.* 2010;27(3):344-50.
71. Batavia AI, Batavia M. Disability, chronic condition, and iatrogenic illness. *Arch Phys Med Rehabil.* 2004;85(1):168-71.
72. Hadler NM, Tait RC, Chibnall JT. Back pain in the workplace. *Jama.* 2007;297(14):1594-6.
73. Andersson GB. Epidemiological features of chronic low-back pain. *Lancet.* 1999;354(9178):581-5.
74. Conrad P, Mackie T, Mehrotra A. Estimating the costs of medicalization. *Soc Sci Med.* 2010;70(12):1943-7.
75. American College of Occupational and Environmental Medicine. Position Statement: The Personal Physician's Role in Helping Patients with Medical Conditions Stay at Work or Return to Work. Available at: <http://www.acoem.org/guidelines.aspx?id=5460>. 2008.
76. Fritz J, Cleland J, Brennan G. Does adherence to the guideline recommendation for active treatments improve the quality of care for patients with acute low back pain delivered by physical therapists? . *Med Care Res Rev.* 2007;45(10):973-80.
77. Jensen MP. A neuropsychological model of pain: research and clinical implications. *J Pain.* 2010;11(1):2-12.
78. Bartley M. Unemployment and ill health: understanding the relationship. *J Epidemiol Community Health.* 1994;48(4):333-7.
79. Crichton S, Stillman S, Hyslop D. *Returning to Work After Injury: Longitudinal Evidence on Employment and Earnings. Discussion Paper No. 1857.*: Bonn: Institute for the Study of Labor (IZA); 2005.
80. Gerdtham UG, Johannesson M. A note on the effect of unemployment on mortality. *J Health Econ.* 2003;22(3):505-18.
81. Mathers CD, Schofield DJ. The health consequences of unemployment: the evidence. *Med J Aust.* 1998;168(4):178-82.
82. Waddell G, Burton A. *Occupational Health Guidelines for the Management of Low Back Pain: Evidence Review and Recommendations.* London: Faculty of Occupational Medicine.; 2000.
83. Johnson D, Fry T. *Factors Affecting Return to Work After Injury: A Study for the Victorian WorkCover Authority.* Melbourne: Melbourne Institute of Applied Economic and Social Research; 2002.
84. Colledge AL. A model for the prevention of iatrogenic disease within the current workers compensation system. *J Occup Rehabil.* 1993;3(4):223-31.
85. Colledge AL, Johnson HI. S.P.I.C.E.--a model for reducing the incidence and costs of occupationally entitled claims. *Occup Med.* 2000;15(4):695-722, iii.
86. Harris J, Ossler C, Crane R, Swedlow A. *Utilization Review and the Use of Medical Treatment Guidelines in California Workers' Compensation: A Comparison of ACOEM & AAOS on Medical Testing and Service Utilization for Low Back Injury.* Oakland, CA: California Workers' Compensation Institute; 2005.
87. Shrey D. Worksite disability management and industrial rehabilitation: an overview. In: Shrey D, Lacerte M, eds. *Principles and Practice of Disability Management in Industry.* Winter Park, FL: GR Press; 1995:1-54.
88. Weiser S. Psychosocial aspects of occupational musculoskeletal disorders. In: Nordin M, Andersson G, Pope M, eds. *Musculoskeletal Disorders in the Workplace: Principles and Practice.* New York: CV Mosby; 1997.
89. Abenhaim L, Rossignol M, Valat JP, et al. The role of activity in the therapeutic management of back pain. Report of the International Paris Task Force on Back Pain. *Spine (Phila Pa 1976).* 2000;25(4 Suppl):1S-33S.
90. Genovese E, Harris J, Galper J. Exercise in the management of chronic low back pain. *APG Insights.* 2006;2(3):1-12.
91. Christian J. Most days "off work on comp" may be unnecessary. *OEM 1389 Report.* 1998;12(7):65-70.

92. Baril R, Clarke J, Friesen M, Stock S, Cole D. Management of return-to-work programs for workers with musculoskeletal disorders: a qualitative study in three Canadian provinces. *Soc Sci Med*. 2003;57(11):2101-14.
93. McGrail MP, Jr., Lohman W, Gorman R. Disability prevention principles in the primary care office. *Am Fam Physician*. 2001;63(4):679-84.
94. Krause N, Dasinger L, Neuhauser F. Modified work and return to work: A review of the literature. *J Occ Rehab*. 1998;8(2):113-39.
95. King PM, Tuckwell N, Barrett TE. A critical review of functional capacity evaluations. *Phys Ther*. 1998;78(8):852-66.
96. Frank JW, Kerr MS, Brooker AS, et al. Disability resulting from occupational low back pain. Part I: What do we know about primary prevention? A review of the scientific evidence on prevention before disability begins. *Spine (Phila Pa 1976)*. 1996;21(24):2908-17.
97. Boersma K, Linton S. Early assessment of psychological factors: the Orebro Screening Questionnaire for Pain. In: Linton S, ed. *New Avenues for the Prevention of Pain, Vol 1*. Amsterdam: Elsevier; 2002:205-13.
98. Hurley DA, Dusoir TE, McDonough SM, Moore AP, Baxter GD. How effective is the acute low back pain screening questionnaire for predicting 1-year follow-up in patients with low back pain? *Clin J Pain*. 2001;17(3):256-63.
99. McGlynn EA, Asch SM, Adams J, et al. The quality of health care delivered to adults in the United States. *N Engl J Med*. 2003;348(26):2635-45.
100. Sackett DL, Rosenberg WM, Gray JA, Haynes RB, Richardson WS. Evidence based medicine: what it is and what it isn't. *Br Med J*. 1996;312(7023):71-2.
101. Eddy DM. Evidence-based medicine: a unified approach. *Health Aff* 2005;24(1):9-17.
102. Shortell SM, Rundall TG, Hsu J. Improving patient care by linking evidence-based medicine and evidence-based management. *Jama*. 2007;298(6):673-6.
103. Timmermans S, Mauck A. The promises and pitfalls of evidence-based medicine. *Health Aff* 2005;24(1):18-28.
104. Gochnour G, Ratcliffe S, Stone MB. The UTAH VBAC Study. *Matern Child Health J*. 2005;9(2):181-8.
105. McGuirk B, Bogduk N. Evidence-based care for low back pain in workers eligible for compensation. *Occup Med (Lond)*. 2007;57(1):36-42.
106. Swedlow A, Ireland J. *Analysis of California Workers' Compensation Reforms. Part 1: Medical Utilization & Reimbursement Outcomes. CWCI Research Update*. Oakland, CA: California Workers' Compensation Institute (CWCI); 2007.
107. Swedlow A, Ireland J. *Analysis of California Workers' Compensation Reforms, Part 2: Temporary Disability Benefits. CWCI Research Update*. Oakland, CA: California Workers' Compensation Institute; 2007.
108. Swedlow A, Ireland J. *Analysis of California Workers' Compensation Reforms, Part 4: Post-Surgical Physical Medicine and Chiropractic Manipulation-Preliminary Results. CWCI Research Update*. Oakland, CA: California Workers' Compensation Institute; 2007.
109. Shaw WS, Zaia A, Pransky G, Winters T, Patterson WB. Perceptions of provider communication and patient satisfaction for treatment of acute low back pain. *J Occup Environ Med*. 2005;47(10):1036-43.
110. Carragee EJ, Alamin TF, Miller JL, Carragee JM. Discographic, MRI and psychosocial determinants of low back pain disability and remission: a prospective study in subjects with benign persistent back pain. *Spine J*. 2005;5(1):24-35.
111. Bernacki EJ, Tao XG, Yuspeh L. An investigation of the effects of a healthcare provider network on costs and lost time in workers' compensation. *J Occup Environ Med*. 2006;48(9):873-82.
112. Cheadle A, Wickizer TM, Franklin G, et al. Evaluation of the Washington State Workers' Compensation Managed Care Pilot Project II: medical and disability costs. *Med Care*. 1999;37(10):982-93.
113. Loisel P, Lemaire J, Poitras S, et al. Cost-benefit and cost-effectiveness analysis of a disability prevention model for back pain management: a six year follow up study. *Occup Environ Med*. 2002;59(12):807-15.
114. Swedlow A. *ICIS Says Report: Early Returns on Workers' Comp Medical Reforms. Part 5: Changes in Medical Utilization and Average Cost by Medical Service Type*. Oakland, CA: California Workers' Compensation Institute (CWCI); 2005.
115. Swedlow A, Gardner L. *Provider Experience and Volume-Based Outcomes in California Workers' Compensation - Does "Practice Make Perfect?"* Oakland, CA: California Workers' Compensation Institute (CWCI); 2003.
116. Wickizer T. *Center of Occupational Health and Education. Final report on outcomes from the initial cohort of injured workers, 2003-2005. Available at: www.lni.wa.gov/ClaimsIns/Files/Providers/ohs/CombinedReportApril2007.pdf*; University of Washington, School of Public Health and Community Medicine, Department of Environmental & Occupational Health Sciences, Occupational Epidemiology and Health Outcomes Program; 2007.
117. Burton WN, Pransky G, Conti DJ, Chen CY, Edington DW. The association of medical conditions and presenteeism. *J Occup Environ Med*. 2004;46(6 Suppl):S38-45.
118. Jensen M, Romano J, Turner J, Good A, Wald L. Patient beliefs predict patient functioning: further support for a cognitive-behavioral model of chronic pain. *Pain*. 1999;81:94-104.
119. Stroud MW, Thorn BE, Jensen MP, Boothby JL. The relation between pain beliefs, negative thoughts, and psychosocial functioning in chronic pain patients. *Pain*. 2000;84(2-3):347-52.

120. Turner JA, Jensen MP, Romano JM. Do beliefs, coping, and catastrophizing independently predict functioning in patients with chronic pain? *Pain*. 2000;85(1-2):115-25.
121. Anderson KO, Dowds BN, Pelletz RE, Edwards WT, Peeters-Asdourian C. Development and initial validation of a scale to measure self-efficacy beliefs in patients with chronic pain. *Pain*. 1995;63(1):77-84.
122. Tota-Faucette ME, Gil KM, Williams DA, Keefe FJ, Goli V. Predictors of response to pain management treatment. The role of family environment and changes in cognitive processes. *Clin J Pain*. 1993;9(2):115-23.
123. Mondloch MV, Cole DC, Frank JW. Does how you do depend on how you think you'll do? A systematic review of the evidence for a relation between patients' recovery expectations and health outcomes. *Cmaj*. 2001;165(2):174-9.
124. Cole DC, Mondloch MV, Hogg-Johnson S. Listening to injured workers: how recovery expectations predict outcomes--a prospective study. *Cmaj*. 2002;166(6):749-54.
125. Schultz IZ, Crook J, Meloche GR, et al. Psychosocial factors predictive of occupational low back disability: towards development of a return-to-work model. *Pain*. 2004;107(1-2):77-85.
126. Reiso H, Nygard JF, Jorgensen GS, Holanger R, Soldal D, Bruusgaard D. Back to work: predictors of return to work among patients with back disorders certified as sick: a two-year follow-up study. *Spine (Phila Pa 1976)*. 2003;28(13):1468-73; discussion 73-4.
127. Gross DP, Battie MC. Work-related recovery expectations and the prognosis of chronic low back pain within a workers' compensation setting. *J Occup Environ Med*. 2005;47(4):428-33.
128. Gross DP, Battie MC. Recovery expectations predict recovery in workers with back pain but not other musculoskeletal conditions. *J Spinal Disord Tech*. 2010;23(7):451-6.
129. Iles RA, Davidson M, Taylor NF. Psychosocial predictors of failure to return to work in non-chronic non-specific low back pain: a systematic review. *Occup Environ Med*. 2008;65(8):507-17.
130. Iles RA, Davidson M, Taylor NF, O'Halloran P. Systematic review of the ability of recovery expectations to predict outcomes in non-chronic non-specific low back pain. *J Occup Rehabil*. 2009;19(1):25-40.
131. Lackner J, Carosella A, Feuerstein M. Pain expectancies, pain, and functional self-efficacy expectancies as determinants of disability in patients with chronic low back disorders. *J Consult Clin Psychol*. 1996;64:212-20.
132. Lackner J, Carosella A. The relative influence of perceived pain control, anxiety, and functional self efficacy on spinal function among patients with chronic low back pain. *Spine (Phila Pa 1976)*. 1999;24:2254-60.
133. Gibson L, Strong J. Assessment of psychosocial factors in functional capacity evaluation of clients with chronic back pain. *Br J Occup Ther*. 1998;61:399-404.
134. Gatchel RJ, Gardea MA. Psychosocial issues: their importance in predicting disability, response to treatment, and search for compensation. *Neurol Clin*. 1999;17(1):149-66.
135. Gatchel RJ, Polatin PB, Mayer TG. The dominant role of psychosocial risk factors in the development of chronic low back pain disability. *Spine (Phila Pa 1976)*. 1995;20(24):2702-9.
136. Kendall N, Burton A, Main C, Watson P, on behalf of the Flags Think-Tank. *Tackling Musculoskeletal Problems: A Guide for the Clinic and Workplace: Identifying Obstacles Using the Psychosocial Flags Framework*. London: The Stationery Office; 2009.
137. Bhandari M, Tornetta P, 3rd. Evidence-based orthopaedics: a paradigm shift. *Clin Orthop Relat Res*. 2003(413):9-10.
138. Schunemann HJ, Bone L. Evidence-based orthopaedics: a primer. *Clin Orthop Relat Res*. 2003(413):117-32.
139. Linton SJ, Vlaeyen J, Ostelo R. The back pain beliefs of health care providers: are we fear-avoidant? *J Occup Rehabil*. 2002;12(4):223-32.
140. Vlaeyen JW, Linton SJ. Fear-avoidance and its consequences in chronic musculoskeletal pain: a state of the art. *Pain*. 2000;85(3):317-32.
141. Turk DC, Swanson KS, Tunks ER. Psychological approaches in the treatment of chronic pain patients--when pills, scalpels, and needles are not enough. *Can J Psychiatry*. 2008;53(4):213-23.
142. Robinson R, Gatchel R, Whitfill T. Tailoring psychosocial treatment for patients with occupational disability. In: Schultz I, Gatchel R, eds. *Handbook of Complex Occupational Disability Claims: Early Risk Identification, Intervention, and Prevention*. New York: Springer Science + Business Media; 2005.
143. Bruns D, Disorbio JM. Assessment of biopsychosocial risk factors for medical treatment: a collaborative approach. *J Clin Psychol Med Settings*. 2009;16(2):127-47.
144. Goetzel RZ, Long SR, Ozminkowski RJ, Hawkins K, Wang S, Lynch W. Health, absence, disability, and presenteeism cost estimates of certain physical and mental health conditions affecting U.S. employers. *J Occup Environ Med*. 2004;46(4):398-412.
145. Havelka M, Lucanin JD, Lucanin D. Biopsychosocial model--the integrated approach to health and disease. *Coll Antropol*. 2009;33(1):303-10.

146. Schultz I, Gatchel R. Research and practice directions in risk for disability prediction and early intervention. In: Schultz I, Gatchel R, eds. *Handbook of Complex Disability Cases: Early Risk Identification, Intervention, and Prevention*. New York: Springer Science+Business Media,; 2005:523-40.
147. Grove WM, Zald DH, Lebow BS, Snitz BE, Nelson C. Clinical versus mechanical prediction: a meta-analysis. *Psychol Assess*. 2000;12(1):19-30.
148. Harding TP. Psychiatric disability and clinical decision making: the impact of judgment error and bias. *Clin Psychol Rev*. 2004;24(6):707-29.
149. Pransky G, Snyder T, Himmelstein J. The organizational response: influence on cumulative trauma disorders in the workplace. In: Moon S, Sauter S, eds. *Psychosocial Aspects of Musculoskeletal Disorders in Office Work*. London: Taylor and Francis; 1996.
150. Huang YH, Pransky GS, Shaw WS, Benjamin KL, Savageau JA. Factors affecting the organizational responses of employers to workers with injuries. *Work*. 2006;26(1):75-84.
151. Sox HC, Jr., Margulies I, Sox CH. Psychologically mediated effects of diagnostic tests. *Ann Intern Med*. 1981;95(6):680-5.
152. Elam KC, Cherkin DC, Deyo RA. How emergency physicians approach low back pain: choosing costly options. *J Emerg Med*. 1995;13(2):143-50.
153. Mahmud MA, Webster BS, Courtney TK, Matz S, Tacci JA, Christiani DC. Clinical management and the duration of disability for work-related low back pain. *J Occup Environ Med*. 2000;42(12):1178-87.
154. Webster BS, Courtney TK, Huang YH, Matz S, Christiani DC. Survey of acute low back pain management by specialty group and practice experience. *J Occup Environ Med*. 2006;48(7):723-32.
155. LaDou J. The rise and fall of occupational medicine in the United States. *Am J Prev Med*. 2002;22(4):285-95.
156. Bruckman RZ, Harris JS. Occupational medicine practice guidelines. *Occup Med*. 1998;13(4):679-91.
157. Anema JR, Van Der Giezen AM, Buijs PC, Van Mechelen W. Ineffective disability management by doctors is an obstacle for return-to-work: a cohort study on low back pain patients sicklisted for 3-4 months. *Occup Environ Med*. 2002;59(11):729-33.
158. Anema JR, Jettinghoff K, Houtman I, Schoemaker CG, Buijs PC, van den Berg R. Medical care of employees long-term sick listed due to mental health problems: a cohort study to describe and compare the care of the occupational physician and the general practitioner. *J Occup Rehabil*. 2006;16(1):41-52.
159. Faber E, Bierma-Zeinstra SM, Burdorf A, et al. In a controlled trial training general practitioners and occupational physicians to collaborate did not influence sickleave of patients with low back pain. *J Clin Epidemiol*. 2005;58(1):75-82.
160. Lax MB. Occupational medicine: toward a worker/patient empowerment approach to occupational illness. *Int J Health Serv*. 2002;32(3):515-49.
161. Bigos SJ, Battie M. Overdiagnosis and over prescription of low back pain: acute care to prevent back disability. *Clin Orthop*. 1987;221:121-30.
162. Jarvik JG, Deyo RA. Diagnostic evaluation of low back pain with emphasis on imaging. *Ann Intern Med*. 2002;137(7):586-97.
163. Deyo RA, Diehl AK, Rosenthal M. Reducing roentgenography use. Can patient expectations be altered? *Arch Intern Med*. 1987;147(1):141-5.
164. Carragee E, Alamin T, Cheng I, Franklin T, van den Haak E, Hurwitz E. Are first-time episodes of serious LBP associated with new MRI findings? *Spine J*. 2006;6(6):624-35.
165. Chou R, Fu R, Carrino JA, Deyo RA. Imaging strategies for low-back pain: systematic review and meta-analysis. *Lancet*. 2009;373(9662):463-72.
166. Webster BS, Cifuentes M. Relationship of early magnetic resonance imaging for work-related acute low back pain with disability and medical utilization outcomes. *J Occup Environ Med*. 2010;52(9):900-7.
167. Deyo RA, Diehl AK. Patient satisfaction with medical care for low-back pain. *Spine (Phila Pa 1976)*. 1986;11(1):28-30.
168. Nachemson A. The lumbar spine: An orthopedic challenge. *Spine (Phila Pa 1976)*. 1976;159-71.
169. Hadler NM. MRI for regional back pain: need for less imaging, better understanding. *Jama*. 2003;289(21):2863-5.
170. Bigos S, Bowyer O, Braen G, et al. *Acute Low Back Problems in Adults. Clinical Practice Guideline No. 14. AHCPR Publication no. 95-0642*. Rockville, MD: Agency for Health Care Policy and Research, Public Health Service, U.S. Department of Health and Human Services; 1994.
171. Faas A, van Eijk JT, Chavannes AW, Gubbels JW. A randomized trial of exercise therapy in patients with acute low back pain. Efficacy on sickness absence. *Spine (Phila Pa 1976)*. 1995;20(8):941-7.
172. Gilbert JR, Taylor DW, Hildebrand A, Evans C. Clinical trial of common treatments for low back pain in family practice. *Br Med J*. 1985;291(6498):791-4.
173. Pransky G, Shaw WS, Loisel P, Hong QN, Desorcy B. Development and validation of competencies for return to work coordinators. *J Occup Rehabil*. 2010;20(1):41-8.

174. Pourat N, Kominski G, Roby D, Cameron M. Satisfaction with care and perceptions of quality among injured workers in California's Workers' Compensation system. *J Occup Environ Med*. 2007;49(11):1249-56.
175. Wickizer TM, Franklin G, Fulton-Kehoe D, Turner JA, Mootz R, Smith-Weller T. Patient satisfaction, treatment experience, and disability outcomes in a population-based cohort of injured workers in Washington State: implications for quality improvement. *Health Serv Res*. 2004;39(4 Pt 1):727-48.
176. Deyo RA. The role of the primary care physician in reducing work absenteeism and costs due to back pain. *Occup Med*. 1988;3(1):17-30.
177. Frank J. Paradoxical aspects of low back pain in workers' compensation systems. In: Hyatt D, Gunderson M, eds. *Workers' Compensation: Foundations for Reform*. Toronto: University of Toronto Press; 2000.
178. Hall H, McIntosh G, Melles T, Holowachuk B, Wai E. Effect of discharge recommendations on outcome. *Spine (Phila Pa 1976)*. 1994;19(18):2033-7.
179. Rose M, Reilly J, Pennie B, et al. Chronic low back pain: a consequence of misinformation? *Employee Counseling Today*. 1993;512-5.
180. Kosny A, Franche RL, Pole J, Krause N, Cote P, Mustard C. Early healthcare provider communication with patients and their workplace following a lost-time claim for an occupational musculoskeletal injury. *J Occup Rehabil*. 2006;16(1):27-39.
181. Rudolph L, Dervin K, Cheadle A, Maizlish N, Wickizer T. What do injured workers think about their medical care and outcomes after work injury? *J Occup Environ Med*. 2002;44(5):425-34.
182. Australian Acute Musculoskeletal Pain Guidelines Group. *Evidence-based Management of Acute Musculoskeletal Pain*. Brisbane: Australian Academic Press; 2003.
183. Bedell SE, Graboys TB, Bedell E, Lown B. Words that harm, words that heal. *Arch Intern Med*. 2004;164(13):1365-8.
184. Jensen MP, Turner JA, Romano JM, Karoly P. Coping with chronic pain: a critical review of the literature. *Pain*. 1991;47(3):249-83.
185. Zimmerman M, Warchausky S. Empowerment theory for rehabilitation research: conceptual methodological issues. *Rehabil Psychology*. 1998;433-16.
186. Kirsh B, McKee P. The needs and experiences of injured workers: a participatory research study. *Work*. 2003;21(3):221-31.
187. Salmon P, Peters S, Stanley I. Patients' perceptions of medical explanations for somatisation disorders: qualitative analysis. *Br Med J*. 1999;318(7180):372-6.
188. Varekamp I, Verbeek JH, van Dijk FJ. How can we help employees with chronic diseases to stay at work? A review of interventions aimed at job retention and based on an empowerment perspective. *Int Arch Occup Environ Health*. 2006;80(2):87-97.
189. Goodson W, Hunt T. Studies of wound healing in experimental diabetes mellitus. *J Surg Res*. 1997;22(221-7).
190. Greenhalgh DG. Wound healing and diabetes mellitus. *Clin Plast Surg*. 2003;30(1):37-45.
191. Hayden RJ, Louis DS, Doro C. Fibromyalgia and myofascial pain syndromes and the workers' compensation environment: an update. *Clin Occup Environ Med*. 2006;5(2):455-69, x-xi.
192. Edington D. *Zero Trends: Health as a Serious Economic Strategy*. Ann Arbor, MI: University of Michigan Press; 2009.
193. Koes BW, van Tulder MW, Ostelo R, Kim Burton A, Waddell G. Clinical guidelines for the management of low back pain in primary care: an international comparison. *Spine (Phila Pa 1976)*. 2001;26(22):2504-13; discussion 13-4.
194. Centers for Disease Control and Prevention. Alcohol and Other Drug Use Among Victims of Motor-Vehicle Crashes - West Virginia, 2004-2005. *MMWR*. 2006;55(48):1293-6.
195. Centers for Disease Control and Prevention. Adult Use of Prescription Opioid Pain Medications --- Utah, 2008. *MMWR*. 2010;59(6):153-7.
196. Hall A, Logan J, Toblin R, et al. Patterns of abuse among unintentional pharmaceutical overdose fatalities. *Jama*. 2008;300(22):2613-20.
197. Franklin GM, Mai J, Wickizer T, Turner JA, Fulton-Kehoe D, Grant L. Opioid dosing trends and mortality in Washington State workers' compensation, 1996-2002. *Am J Ind Med*. 2005;48(2):91-9.
198. Franklin GM, Rahman EA, Turner JA, Daniell WE, Fulton-Kehoe D. Opioid use for chronic low back pain: A prospective, population-based study among injured workers in Washington state, 2002-2005. *Clin J Pain*. 2009;25(9):743-51.
199. Juratli SM, Mirza SK, Fulton-Kehoe D, Wickizer TM, Franklin GM. Mortality after lumbar fusion surgery. *Spine (Phila Pa 1976)*. 2009;34(7):740-7.
200. Chu LF, Clark DJ, Angst MS. Opioid tolerance and hyperalgesia in chronic pain patients after one month of oral morphine therapy: a preliminary prospective study. *J Pain*. 2006;7(1):43-8.
201. Fishbain DA, Cole B, Lewis JE, Gao J, Rosomoff RS. Do opioids induce hyperalgesia in humans? An evidence-based structured review. *Pain Med*. 2009;10(5):829-39.
202. Turk DC, Okifuji A. What factors affect physicians' decisions to prescribe opioids for chronic noncancer pain patients? *Clin J Pain*. 1997;13(4):330-6.

203. Breckenridge J, Clark JD. Patient characteristics associated with opioid versus nonsteroidal anti-inflammatory drug management of chronic low back pain. *J Pain*. 2003;4(6):344-50.
204. Fanciullo GJ, Ball PA, Girault G, Rose RJ, Hanscom B, Weinstein JN. An observational study on the prevalence and pattern of opioid use in 25,479 patients with spine and radicular pain. *Spine (Phila Pa 1976)*. 2002;27(2):201-5.
205. Fillingim RB, Doleys DM, Edwards RR, Lowery D. Clinical characteristics of chronic back pain as a function of gender and oral opioid use. *Spine (Phila Pa 1976)*. 2003;28(2):143-50.
206. Block A, Mock L, Rashbaum R, Waldrip A, Ohnmeiss D. Results of random drug testing in chronic back pain patients managed with pain medication. Proceedings of the NASS 23rd annual meeting. *Spine J*. 2008;8(5):25S-6S.
207. Couto JE, Romney MC, Leider HL, Sharma S, Goldfarb NI. High rates of inappropriate drug use in the chronic pain population. *Popul Health Manag*. 2009;12(4):185-90.
208. Webster BS, Verma SK, Gatchel RJ. Relationship between early opioid prescribing for acute occupational low back pain and disability duration, medical costs, subsequent surgery and late opioid use. *Spine (Phila Pa 1976)*. 2007;32(19):2127-32.
209. Volinn E, Fargo JD, Fine PG. Opioid therapy for nonspecific low back pain and the outcome of chronic work loss. *Pain*. 2009;142(3):194-201.
210. Carragee EJ, Helms E, O'Sullivan GS. Are postoperative activity restrictions necessary after posterior lumbar discectomy? A prospective study of outcomes in 50 consecutive cases. *Spine (Phila Pa 1976)*. 1996;21(16):1893-7.
211. Carragee EJ, Han MY, Yang B, Kim DH, Kraemer H, Billys J. Activity restrictions after posterior lumbar discectomy. A prospective study of outcomes in 152 cases with no postoperative restrictions. *Spine (Phila Pa 1976)*. 1999;24(22):2346-51.
212. Mayhew HE, Nordlund DJ. Absenteeism certification: the physician's role. *J Fam Pract*. 1988;26(6):651-5.
213. Zinn W, Furutani N. Physician perspectives on the ethical aspects of disability determination. *J Gen Intern Med*. 1996;11(9):525-32.
214. LoCascio J. Chapter 9: Can this patient work? A disability perspective. In: Talmage J, Melhorn J, eds. *A Physician's Guide to Return to Work*. Chicago, IL: AMA Press; 2005:113-32.
215. Rainville J, Pransky G, Indahl A, Mayer EK. The physician as disability advisor for patients with musculoskeletal complaints. *Spine (Phila Pa 1976)*. 2005;30(22):2579-84.
216. Institute for Work and Health. Seven "principles" for successful return to work. Available at: <http://www.iwh.on.ca/seven-principles-for-rtw>. 2007.
217. Keogh JP, Gucer PW, Gordon JL, Nuwayhid I. Patterns and predictors of employer risk-reduction activities (ERRAs) in response to a work-related upper extremity cumulative trauma disorder (UECTD): reports from workers' compensation claimants. *Am J Ind Med*. 2000;38(5):489-97.
218. Amick BC, 3rd, Habeck RV, Hunt A, et al. Measuring the impact of organizational behaviors on work disability prevention and management. *J Occup Rehab*. 2000;10(1):21-38.
219. Cooper JE, Tate R, Yassi A. Work hardening in an early return to work program for nurses with back injury. *Work*. 1997;8:149-56.
220. Cooper JE, Tate RB, Yassi A. Components of initial and residual disability after back injury in nurses. *Spine (Phila Pa 1976)*. 1998;23(19):2118-22.
221. Habeck R, Scully S, VanTol B, Hunt H. Successful employer strategies for preventing and managing disability 21906. *Rehab Counsel Bull*. 1998;42:144-61.
222. Tate RB, Yassi A, Cooper J. Predictors of time loss after back injury in nurses. *Spine (Phila Pa 1976)*. 1999;24(18):1930-5; discussion 6.
223. Verbeek JH, van der Weide WE, van Dijk FJ. Early occupational health management of patients with back pain: a randomized controlled trial. *Spine (Phila Pa 1976)*. 2002;27(17):1844-51; discussion 51.
224. Yassi A. Utilizing data systems to develop and monitor occupational health programs in a large Canadian hospital. *Methods Inf Med*. 1998;37(2):125-9.
225. Yassi A, Tate R, Cooper JE, Snow C, Vallentyne S, Khokhar JB. Early intervention for back-injured nurses at a large Canadian tertiary care hospital: an evaluation of the effectiveness and cost benefits of a two-year pilot project. *Occup Med (Lond)*. 1995;45(4):209-14.
226. Yassi A, Khokhar J, Tate R, Cooper J, Snow C, Vallentyne S. The epidemiology of back injuries in nurses at a large Canadian tertiary care hospital: implications for prevention. *Occup Med (Lond)*. 1995;45(4):215-20.
227. Karjalainen K, Malmivaara A, Pohjolainen T, et al. Mini-intervention for subacute low back pain: a randomized controlled trial. *Spine (Phila Pa 1976)*. 2003;28(6):533-40; discussion 40-1.
228. Loisel P, Durand MJ, Diallo B, Vachon B, Charpentier N, Labelle J. From evidence to community practice in work rehabilitation: the Quebec experience. *Clin J Pain*. 2003;19(2):105-13.
229. Loisel P, Gosselin L, Durand P, Lemaire J, Poitras S, Abenheim L. Implementation of a participatory ergonomics program in the rehabilitation of workers suffering from subacute back pain. *Appl Ergon*. 2001;32(1):53-60.

230. Green-McKenzie J, Parkerson J, Bernacki E. Comparison of workers' compensation costs for two cohorts of injured workers before and after the introduction of managed care. *J Occup Environ Med.* 1998;40(6):568-72.
231. Bernacki EJ, Tsai SP. Managed care for workers' compensation: three years of experience in an "employee choice" state. *J Occup Environ Med.* 1996;38(11):1091-7.
232. Bernacki EJ, Guidera JA, Schaefer JA, Lavin RA, Tsai SP. An ergonomics program designed to reduce the incidence of upper extremity work related musculoskeletal disorders. *J Occup Environ Med.* 1999;41(12):1032-41.
233. Bernacki EJ, Guidera JA, Schaefer JA, Tsai S. A facilitated early return to work program at a large urban medical center. *J Occup Environ Med.* 2000;42(12):1172-7.
234. Bernacki EJ, Tsai SP. Ten years' experience using an integrated workers' compensation management system to control workers' compensation costs. *J Occup Environ Med.* 2003;45(5):508-16.
235. Caruso GM. A clinical perspective on workplace depression: current and future directions. *J Occup Environ Med.* 2008;50(4):501-13.
236. Nachemson A, Vingard E. Influences of individual factors and smoking on neck and low back pain. In: Nachemson A, Jonsson E, eds. *Neck and Back Pain: The Scientific Evidence of Causes, Diagnosis and Treatment.* Philadelphia, PA: Lippincott; 2000:79-96.
237. Turner JA, Franklin G, Turk DC. Predictors of chronic disability in injured workers: a systematic literature synthesis. *Am J Ind Med.* 2000;38(6):707-22.
238. Feuerstein M, Berkowitz SM, Peck CA, Jr. Musculoskeletal-related disability in US Army personnel: prevalence, gender, and military occupational specialties. *J Occup Environ Med.* 1997;39(1):68-78.
239. Leijon M, Hensing G, Alexanderson K. Sickness absence due to musculoskeletal diagnoses: association with occupational gender segregation. *Scand J Public Health.* 2004;32(2):94-101.
240. Kempen GI, Sanderman R, Scaf-Klomp W, Ormel J. Gender differences in recovery from injuries to the extremities in older persons. A prospective study. *Disabil Rehabil.* 2003;25(15):827-32.
241. Waugh EJ, Jaglal SB, Davis AM, Tomlinson G, Verrier MC. Factors associated with prognosis of lateral epicondylitis after 8 weeks of physical therapy. *Arch Phys Med Rehabil.* 2004;85(2):308-18.
242. Crook J, Moldofsky H. The probability of recovery and return to work from work disability as a function of time. *Qual Life Res.* 1994;3 Suppl 1S97-109.
243. Gjesdal S, Lie RT, Maeland JG. Variations in the risk of disability pension in Norway 1970-99. A gender-specific age-period-cohort analysis. *Scand J Public Health.* 2004;32(5):340-8.
244. Harrold LR, Savageau JA, Pransky G, Benjamin K. Understanding the role of sex differences in work injuries: implications for primary care practice. *Disabil Rehabil.* 2008;30(1):36-43.
245. Chibnall JT, Dabney A, Tait RC. Internist judgments of chronic low back pain. *Pain Med.* 2000;1(3):231-7.
246. Chibnall JT, Tait RC, Merys SC. Disability management of low back injuries by employer-retained physicians: ratings and costs. *Am J Ind Med.* 2000;38(5):529-38.
247. Green CR, Wheeler JR, Marchant B, LaPorte F, Guerrero E. Analysis of the physician variable in pain management. *Pain Med.* 2001;2(4):317-27.
248. Green CR, Anderson KO, Baker TA, et al. The unequal burden of pain: confronting racial and ethnic disparities in pain. *Pain Med.* 2003;4(3):277-94.
249. Tait RC, Chibnall JT. Work injury management of refractory low back pain: relations with ethnicity, legal representation and diagnosis. *Pain.* 2001;91(1-2):47-56.
250. Tait RC, Chibnall JT, Andresen EM, Hadler NM. Management of occupational back injuries: differences among African Americans and Caucasians. *Pain.* 2004;112(3):389-96.
251. Chibnall JT, Tait RC, Andresen EM, Hadler NM. Race and socioeconomic differences in post-settlement outcomes for African American and Caucasian Workers' Compensation claimants with low back injuries. *Pain.* 2005;114(3):462-72.
252. Lillie-Blanton M, Brodie M, Rowland D, Altman D, McIntosh M. Race, ethnicity, and the health care system: public perceptions and experiences. *Med Care Res Rev.* 2000;57 Suppl 1218-35.
253. Chibnall JT, Tait RC, Andresen EM, Hadler NM. Clinical and social predictors of application for social security disability insurance by workers' compensation claimants with low back pain. *J Occup Environ Med.* 2006;48(7):733-40.
254. Tait RC, Chibnall JT, Andresen EM, Hadler NM. Disability determination: validity with occupational low back pain. *J Pain.* 2006;7(12):951-7.
255. Deyo RA, Tsui-Wu YJ. Functional disability due to back pain. A population-based study indicating the importance of socioeconomic factors. *Arthritis Rheum.* 1987;30(11):1247-53.
256. Dionne C, Koepsell TD, Von Korff M, Deyo RA, Barlow WI, Checkoway H. Formal education and back-related disability. In search of an explanation. *Spine (Phila Pa 1976).* 1995;20(24):2721-30.
257. Bruusgaard D, Smeby L, Claussen B. Education and disability pension: A stronger association than previously found. *Scand J Public Health.* 2010.

258. Waddell G, Waddell H. A review of social influences on neck and back pain and disability. In: Nachemson A, Jonsson E, eds. *Neck and Back Pain: The Scientific Evidence of Causes, Diagnosis and Treatment*. Philadelphia, PA: Lippincott; 2000:13-55.
259. Zborowski M. Cultural components in responses to pain. *J Soc Issues*. 1952;8:16-30.
260. Elton D, Stanley G. Cultural expectations and psychological factors in prolonged disability. *Adv Behav Med*. 1982;233-42.
261. Turner C, McClure R, Pirozzo S. Injury and risk-taking behavior—a systematic review. *Accid Anal Prev*. 2004;36(1):93-101.
262. Lanier DC, Stockton P. Clinical predictors of outcome of acute episodes of low back pain. *J Fam Pract*. 1988;27(5):483-9.
263. Turk D. The role of demographic and psychosocial factors in transition from acute to chronic pain. In: Jensen T, Turner J, Wiesenfeld-Hallin Z, eds. *Proceedings of the 8th World Congress on Pain, Volume 8*. Seattle, WA: IASP Press; 1997:185-213.
264. Greenwood JG, Wolf HJ, Pearson RJ, Woon CL, Posey P, Main CF. Early intervention in low back disability among coal miners in West Virginia: negative findings. *J Occup Med*. 1990;32(10):1047-52.
265. Sandstrom J, Andersson GB, Wallerstedt S. The role of alcohol abuse in working disability in patients with low back pain. *Scand J Rehabil Med*. 1984;16(4):147-9.
266. Vallfors B. Acute, subacute and chronic low back pain: clinical symptoms, absenteeism and working environment. *Scand J Rehabil Med Suppl*. 1985;111-98.
267. Frymoyer JW, Cats-Baril W. Predictors of low back pain disability. *Clin Orthop Relat Res*. 1987(221):89-98.
268. Atkinson JH, Slater MA, Patterson TL, Grant I, Garfin SR. Prevalence, onset, and risk of psychiatric disorders in men with chronic low back pain: a controlled study. *Pain*. 1991;45(2):111-21.
269. Polatin PB, Kinney RK, Gatchel RJ, Lillo E, Mayer TG. Psychiatric illness and chronic low-back pain. The mind and the spine—which goes first? *Spine (Phila Pa 1976)*. 1993;18(1):66-71.
270. van den Berg T, Schuring M, Avendano M, Mackenbach J, Burdorf A. The impact of ill health on exit from paid employment in Europe among older workers. *Occup Environ Med*. 2010;67(12):845-52.
271. Nasell H, Adami J, Samnegard E, Tonnesen H, Ponzer S. Effect of smoking cessation intervention on results of acute fracture surgery: a randomized controlled trial. *J Bone Joint Surg Am*. 2010;92(6):1335-42.
272. Moller AM, Villebro N, Pedersen T, Tonnesen H. Effect of preoperative smoking intervention on postoperative complications: a randomised clinical trial. *Lancet*. 2002;359(9301):114-7.
273. Lindstrom D, Sadr Azodi O, Wladis A, et al. Effects of a perioperative smoking cessation intervention on postoperative complications: a randomized trial. *Ann Surg*. 2008;248(5):739-45.
274. Porter SE, Hanley EN, Jr. The musculoskeletal effects of smoking. *J Am Acad Orthop Surg*. 2001;9(1):9-17.
275. Wilk J, West JC, Rae DS, Regier DA. Relationship of comorbid substance and alcohol use disorders to disability among patients in routine psychiatric practice. *Am J Addict*. 2006;15(2):180-5.
276. Tarsh MJ, Royston C. A follow-up study of accident neurosis. *Br J Psychiatry*. 1985;146:18-25.
277. Strunin L, Boden LI. The workers' compensation system: worker friend or foe? *Am J Ind Med*. 2004;45(4):338-45.
278. Feldman J, Phillips L, Aronoff G. A cognitive systems approach to treating chronic pain patients and their families. In: Aronoff G, ed. *Evaluation and Treatment of Chronic Pain, 3rd Edition*. Baltimore, MD: Williams & Wilkins; 1998:313-22.
279. Feldman JB. The prevention of occupational low back pain disability: evidence-based reviews point in a new direction. *J Surg Orthop Adv*. 2004;13(1):1-14.
280. Bradley L, McDonald-Haile J, Jaworski T. Assessment of psychological status using interviews and self-report instruments. In: Turk D, Melzack R, eds. *Handbook of Pain Assessment*. New York: Guilford Press; 1992:193-213.
281. Romano JM, Turner JA, Jensen MP, et al. Chronic pain patient-spouse behavioral interactions predict patient disability. *Pain*. 1995;63(3):353-60.
282. Bruns D, Mueller K, Warren PA. A review of evidence-based biopsychosocial laws governing the treatment of pain and injury. *Psychol Inj Law*. 2010;3:169-81.
283. Gatchel RJ, Peng YB, Peters ML, Fuchs PN, Turk DC. The biopsychosocial approach to chronic pain: scientific advances and future directions. *Psychol Bull*. 2007;133(4):581-624.
284. Warren P. Behavioral health concerns as a causation issue in workers' compensation and disability claims. *IAIABC J*. 2009;46(2):17-56.
285. Warren P, ed. *Behavioral Health Disability: Innovations In Prevention and Management*. New York: Springer Publishing; 2010.
286. Hoffman BM, Papas RK, Chatkoff DK, Kerns RD. Meta-analysis of psychological interventions for chronic low back pain. *Health Psychol*. 2007;26(1):1-9.
287. Dersh J, Polatin P, Leeman G, Gatchel R. Secondary gains and losses in the medicolegal setting. In: Gatchel R, Schultz J, eds. *Handbook of Complex Occupational Disability Claims: Early Risk Identification, Intervention, and Prevention*. New York: Springer Science + Business Media; 2005:421-41.

288. Evans DL, Charney DS, Lewis L, et al. Mood disorders in the medically ill: scientific review and recommendations. *Biol Psychiatry*. 2005;58(3):175-89.
289. Gros DF, Antony MM, McCabe RE, Swinson RP. Frequency and severity of the symptoms of irritable bowel syndrome across the anxiety disorders and depression. *J Anxiety Disord*. 2009;23(2):290-6.
290. Kessler RC, Frank RG. The impact of psychiatric disorders on work loss days. *Psychol Med*. 1997;27(4):861-73.
291. Lerner D, Allaire SH, Reisine ST. Work disability resulting from chronic health conditions. *J Occup Environ Med*. 2005;47(3):253-64.
292. Lerner D, Henke RM. What does research tell us about depression, job performance, and work productivity? *J Occup Environ Med*. 2008;50(4):401-10.
293. Merikangas KR, Ames M, Cui L, et al. The impact of comorbidity of mental and physical conditions on role disability in the US adult household population. *Arch Gen Psychiatry*. 2007;64(10):1180-8.
294. Scott KM, Von Korff M, Alonso J, et al. Mental-physical co-morbidity and its relationship with disability: results from the World Mental Health Surveys. *Psychol Med*. 2009;39(1):33-43.
295. Linton S. Psychological risk factors for neck and back pain. In: Nachevson AL, Jonsson E, eds. *Neck and Back Pain: The Scientific Evidence of Causes, Diagnosis, and Treatment*. Philadelphia, PA: Williams & Wilkins; 2000.
296. Barsky AJ. Forgetting, fabricating, and telescoping: the instability of the medical history. *Arch Intern Med*. 2002;162(9):981-4.
297. Warren P. *The Management of Workplace Mental Health Issues and Appropriate Disability Prevention Strategies*. Encinitas, CA: Work Loss Data Institute 2005.
298. American Psychiatric Foundation, Partnership for Workplace Mental Health. *Assessing and Treating Psychiatric Occupational Disability, Executive Report*. Washington, DC: American Psychiatric Foundation; 2005.
299. Sharma A, Madaan V, Petty F. Exercise and well-being: a review of mental and physical health benefits associated with physical activity. *Prim Care Companion J Clin Psychiatry*. 2006;8(2):106.
300. Callaghan P. Exercise: a neglected intervention in mental health care? *J Psychiatr Ment Health Nurs*. 2004;11(4):476-83.
301. Dunn AL, Trivedi MH, Kampert JB, Clark CG, Chambliss HO. Exercise treatment for depression: efficacy and dose response. *Am J Prev Med*. 2005;28(1):1-8.
302. Fox KR. The influence of physical activity on mental well-being. *Public Health Nutr*. 1999;2(3A):411-8.
303. Galper DI, Trivedi MH, Barlow CE, Dunn AL, Kampert JB. Inverse association between physical inactivity and mental health in men and women. *Med Sci Sports Exerc*. 2006;38(1):173-8.
304. Guskowska M. [Effects of exercise on anxiety, depression and mood]. *Psychiatr Pol*. 2004;38(4):611-20.
305. Hamer M, Stamatakis E, Steptoe A. Dose-response relationship between physical activity and mental health: the Scottish Health Survey. *Br J Sports Med*. 2009;43(14):1111-4.
306. Peluso MA, Guerra de Andrade LH. Physical activity and mental health: the association between exercise and mood. *Clinics (Sao Paulo)*. 2005;60(1):61-70.
307. Kessler RC, Ormel J, Demler O, Stang PE. Comorbid mental disorders account for the role impairment of commonly occurring chronic physical disorders: results from the National Comorbidity Survey. *J Occup Environ Med*. 2003;45(12):1257-66.
308. McCracken L, Gatchel R. The magnification of psychopathology sequelae associated with multiple chronic medical conditions. *J Appl Biobehav Res*. 2000;5(1):92-9.
309. American Psychiatric Association. *Diagnostic and Statistical Manual of Mental Disorders (DSM-IV-TR)*. Arlington, VA: American Psychiatric Association; 2000.
310. Buist-Bouwman MA, de Graaf R, Vollebergh WA, Ormel J. Comorbidity of physical and mental disorders and the effect on work-loss days. *Acta Psychiatr Scand*. 2005;111(6):436-43.
311. de Waal M, Arnold I, Spinhoven P, Eekhof J, Assendelft W, van Hemert A. The role of comorbidity in the detection of psychiatric disorders with checklists for mental and physical symptoms in primary care. *Soc Psychiatry Psychiatr Epidemiol*. 2009;44(1):78-85.
312. Kessler RC, McGonagle KA, Zhao S, et al. Lifetime and 12-month prevalence of DSM-III-R psychiatric disorders in the United States. Results from the National Comorbidity Survey. *Arch Gen Psychiatry*. 1994;51(1):8-19.
313. Kessler RC, Berglund P, Demler O, Jin R, Merikangas KR, Walters EE. Lifetime prevalence and age-of-onset distributions of DSM-IV disorders in the National Comorbidity Survey Replication. *Arch Gen Psychiatry*. 2005;62(6):593-602.
314. Kessler RC, Akiskal HS, Ames M, et al. Prevalence and effects of mood disorders on work performance in a nationally representative sample of U.S. workers. *Am J Psychiatry*. 2006;163(9):1561-8.
315. Banks SM, Kerns RD. Explaining the high rates of depression in chronic pain: a diathesis-stress framework. *Psychol Bull*. 1996;119:95-110.

316. Turk DC. A diathesis-stress model of chronic pain and disability following traumatic injury. *Pain Res Manag.* 2002;7(1):9-19.
317. Dersh J, Gatchel RJ, Polatin P, Mayer T. Prevalence of psychiatric disorders in patients with chronic work-related musculoskeletal pain disability. *J Occup Environ Med.* 2002;44(5):459-68.
318. Melhorn J, Ackerman W, eds. *Guides to the Evaluation of Disease and Injury Causation.* Chicago, IL: AMA Press; 2007.
319. Kahn JP. Diagnosis and referral of workplace depression. *J Occup Environ Med.* 2008;50(4):396-400.
320. Rush AJ, Warden D, Wisniewski SR, et al. STAR*D: revising conventional wisdom. *CNS Drugs.* 2009;23(8):627-47.
321. Miller W, Rollnick S. *Motivational Interviewing: Preparing People for Change, 2nd Edition.* New York: Guilford Press; 2002.
322. Greenberg G, Ganshorn K, Danilkewich A. Solution-focused therapy. Counseling model for busy family physicians. *Can Fam Physician.* 2001;47:2289-95.
323. Derebery J, Tullis WH. Prevention of delayed recovery and disability of work-related upper extremity disorders. *Clin Occup Environ Med.* 2006;5(2):235-47, vi.
324. Kannenberg K, Amini D, Hartmann K. *Position Paper: Occupational Therapy Services in the Promotion of Psychological and Social Aspects of Mental Health:* American Occupational Therapy Association, Commission on Practice; 2010.
325. Langlieb A, Stoline A, Sharfstein S. Chapter 2: Mental health care providers and delivery systems. In: Kahn J, Langlieb A, eds. *Mental Health and Productivity in the Workplace.* San Francisco, CA: Jossey-Bass (John Wiley & Sons); 2003:28-47.
326. Kahn J. Chapter 1: Workplace mental health quality. In: Khan J, Langlieb A, eds. *Mental Health and Productivity in the Workplace.* San Francisco: Jossey-Bass (John Wiley & Sons); 2003:3-27.
327. American Educational Research Association, American Psychological Association, National Council on Measurement in Education. *Standards for Educational and Psychological Testing.* Washington, DC; 2004.
328. Hollon SD, Ponniah K. A review of empirically supported psychological therapies for mood disorders in adults. *Depress Anxiety.* 2010;27(10):891-932.
329. Lake AE, 3rd. Behavioral and nonpharmacologic treatments of headache. *Med Clin North Am.* 2001;85(4):1055-75.
330. Linton SJ, Andersson T. Can chronic disability be prevented? A randomized trial of a cognitive-behavior intervention and two forms of information for patients with spinal pain. *Spine (Phila Pa 1976).* 2000;25(21):2825-31; discussion 4.
331. Keefe FJ, Caldwell DS. Cognitive behavioral control of arthritis pain. *Med Clin North Am.* 1997;81(1):277-90.
332. Williams DA. Psychological and behavioural therapies in fibromyalgia and related syndromes. *Best Pract Res Clin Rheumatol.* 2003;17(4):649-65.
333. van Tulder MW, Koes B, Malmivaara A. Outcome of non-invasive treatment modalities on back pain: an evidence-based review. *Eur Spine J.* 2006;15 Suppl 1S64-81.
334. Feuerstein M, Burrell LM, Miller VI, Lincoln A, Huang GD, Berger R. Clinical management of carpal tunnel syndrome: a 12-year review of outcomes. *Am J Ind Med.* 1999;35(3):232-45.
335. Sanders S. Operant therapy with pain patients: Evidence for its effectiveness. In: Lebovits A, ed. *Seminars in Pain Medicine.* Philadelphia, PA: W. B. Saunders; 2003:90-8.
336. Linton SJ, Nordin E. A 5-year follow-up evaluation of the health and economic consequences of an early cognitive behavioral intervention for back pain: a randomized, controlled trial. *Spine (Phila Pa 1976).* 2006;31(8):853-8.
337. Blonk RW, Brenninkmeijer V, Lagerveld SE, Houtman IL. Return to work: a comparison of two cognitive behavioral interventions in cases of work-related psychological complaints among the self-employed. *Work & Stress.* 2006;20(2):129-44.
338. Beutel ME, Rasting M, Stuhr U, Ruger B, Leuzinger-Bohleber M. Assessing the impact of psychoanalysis and long-term psychoanalytic therapies on health care utilization and costs. *Psychother Res.* 2004;14(2):146-60.
339. de Maat S, Philipszoon F, Schoevers R, Dekker J, De Jonghe F. Costs and benefits of long-term psychoanalytic therapy: changes in health care use and work impairment. *Harv Rev Psychiatry.* 2007;15(6):289-300.
340. Berghout CC, Zevalkink J, Hakkaart-Van Roijen L. The effects of long-term psychoanalytic treatment on healthcare utilization and work impairment and their associated costs. *J Psychiatr Pract.* 2010;16(4):209-16.
341. Kahn J. Personal Communication - 2010
342. Marlowe JF. Depression's surprising toll on worker productivity. *Empl Benefits J.* 2002;27(1):16-21.
343. Langlieb AM, Kahn JP. How much does quality mental health care profit employers? *J Occup Environ Med.* 2005;47(11):1099-109.
344. Halliday J. *Psychosocial Medicine.* London: William Heinemann Medical Books; 1948.
345. Main CJ, Foster N, Buchbinder R. How important are back pain beliefs and expectations for satisfactory recovery from back pain? *Best Pract Res Clin Rheumatol.* 2010;24(2):205-17.
346. Pfau-Effinger B. Culture and welfare state policies: reflections on a complex interaction. *J Soc Pol.* 2005;34(1):3-20.
347. Wynne-Jones G, Mallen CD, Welsh V, Dunn KM. Rates of sickness certification in European primary care: A systematic review. *Eur J Gen Pract.* 2009:1-10.
348. Waddell G, Burton A. *Is Work Good for Your Health and Well-Being?* . London: The Stationery Office; 2006.

349. Illich I. *Limits to Medicine*. London: Marion Boyars; 1976.
350. Aylward M, Locascio JJ. Problems in the assessment of psychosomatic conditions in Social Security benefits and related commercial schemes. *J Psychosom Res*. 1995;39(6):755-65.
351. Worrall J. Compensation costs, injury rates and the labor market. In: Worrall J, ed. *Safety and the Work Force*. Ithaca, NY: ILR Press, Cornell University; 1983:1-17.
352. Aylward M. Chapter 22: Origins, practice and limitations of disability assessment medicine. In: Halligan P, Bass C, Oakley D, eds. *Malingering and Illness Deception*. Oxford, England: Oxford University Press; 2003:287-300.
353. Aronoff GM. The disability epidemic. *Clin J Pain*. 1989;5(3):203-4.
354. Aronoff GM. Chronic pain and the disability epidemic. *Clin J Pain*. 1991;7(4):330-8.
355. Berthoud R. *Disability Benefits: A Review of the Issues and Options for Reform*. Layerthorpe, York: Joseph Rowntree Foundation; 1998.
356. Butler R, Durbin D, Helvacian N. Increasing claims for soft tissue injuries in workers compensation: cost shifting and moral hazard. *J Risk Uncertainty*. 1996;13(1):73-87.
357. Carman KL, Maurer M, Yegian JM, et al. Evidence that consumers are skeptical about evidence-based health care. *Health Aff* 2010;29(7):1400-6.
358. Buchbinder R, Jolley D, Wyatt M. 2001 Volvo Award Winner in Clinical Studies: Effects of a media campaign on back pain beliefs and its potential influence on management of low back pain in general practice. *Spine (Phila Pa 1976)*. 2001;26(23):2535-42.
359. Sullivan MJ, Feuerstein M, Gatchel R, Linton SJ, Pransky G. Integrating psychosocial and behavioral interventions to achieve optimal rehabilitation outcomes. *J Occup Rehabil*. 2005;15(4):475-89.
360. Buchbinder R, Jolley D. Effects of a media campaign on back beliefs is sustained 3 years after its cessation. *Spine (Phila Pa 1976)*. 2005;30(11):1323-30.
361. Waddell G, O'Connor M, Boorman S, Torsney B. Working Backs Scotland: a public and professional health education campaign for back pain. *Spine (Phila Pa 1976)*. 2007;32(19):2139-43.
362. Werner EL, Ihlebaek C, Laerum E, Wormgoor ME, Indahl A. Low back pain media campaign: no effect on sickness behaviour. *Patient Educ Couns*. 2008;71(2):198-203.
363. Shorter E. Sucker-punched again! Physicians meet the disease-of-the-month syndrome. *J Psychosom Res*. 1995;39(2):115-8.
364. Sharpe M, Hawton K, Seagroatt V, Pasvol G. Follow up of patients presenting with fatigue to an infectious diseases clinic. *Br Med J*. 1992;305(6846):147-52.
365. Bentall RP, Powell P, Nye FJ, Edwards RH. Predictors of response to treatment for chronic fatigue syndrome. *Br J Psychiatry*. 2002;181:248-52.
366. D'Andrea DC, Meyer JD. Workers' compensation reform. *Clin Occup Environ Med*. 2004;4(2):vi, 259-71.
367. Butler RJ. Economic incentives in disability insurance and behavioral responses. *J Occup Rehabil*. 2000;10(1):7-19.
368. Hashimoto D. Defining the role of managed care in workers' compensation. *Occup Med*. 1996;11(1):101-12.
369. LaDou J. Occupational medicine: the case for reform. *Am J Prev Med*. 2005;28(4):396-402.
370. Restrepo T, Shuford H, Beaven N. *Measuring the Factors Driving Medical Severity: Price, Utilization, Mix*. Boca Raton: National Council on Compensation Insurance; 2007.
371. Bernacki EJ, Yuspeh L, Tao X. Determinants of escalating costs in low risk workers' compensation claims. *J Occup Environ Med*. 2007;49(7):780-90.
372. Sengupta I, Reno V, Burton J. Workers' Compensation: Benefits, Coverage, and Costs, 2005. Available at: <http://www.nasi.org/research/2007/report-workers-compensation-benefits-coverage-costs-2005>. *National Academy of Social Insurance*. 2007.
373. Johnson WG, Burton JF, Jr., Thornquist L, Zaidman B. Why does workers' compensation pay more for health care? *Benefits Q*. 1993;9(4):22-31.
374. Baker LC, Krueger AB. Medical costs in workers' compensation insurance. *J Health Econ*. 1995;14(5):531-49.
375. Leigh JP, Ward MM. Medical costs in workers' compensation insurance: comment. *J Health Econ*. 1997;16(5):619-22; discussion 23-4.
376. Johnson WG, Baldwin ML, Burton JF, Jr. Why is the treatment of work-related injuries so costly? New evidence from California. *Inquiry*. 1996;33(1):53-65.
377. Brinker MR, O'Connor DP, Woods GW, Pierce P, Peck B. The effect of payer type on orthopaedic practice expenses. *J Bone Joint Surg Am*. 2002;84-A(10):1816-22.
378. Shuford H, Restrepo T, Beaven N, Leigh JP. Trends in components of medical spending within workers compensation: results from 37 states combined. *J Occup Environ Med*. 2009;51(2):232-8.
379. Sharma R, Haas M, Stano M, Spegman A, Gehring R. Determinants of costs and pain improvement for medical and chiropractic care of low back pain. *J Manipulative Physiol Ther*. 2009;32(4):252-61.

380. Bernacki EJ, Tao X, Yuspeh L. The impact of cost intensive physicians on workers' compensation. *J Occup Environ Med*. 2010;52(1):22-8.
381. Swedlow A, Ireland J. *Analysis of California Workers' Compensation Reforms, Part 3: Medical Provider Networks and Medical Benefit Delivery*. CWCI Research Update. Oakland, CA: California Workers' Compensation Institute (CWCI); 2008.
382. Binder LM, Rohling ML. Money matters: a meta-analytic review of the effects of financial incentives on recovery after closed-head injury. *Am J Psychiatry*. 1996;153(1):7-10.
383. Talo S, Hendler N, Brodie J. Effects of active and completed litigation on treatment results: workers' compensation patients compared with other litigation patients. *J Occup Med*. 1989;31(3):265-9.
384. Misamore GW, Ziegler DW, Rushton JL, 2nd. Repair of the rotator cuff. A comparison of results in two populations of patients. *J Bone Joint Surg Am*. 1995;77(9):1335-9.
385. Rohling ML, Binder LM, Langhinrichsen-Rohling J. Money matters: A meta-analytic review of the association between financial compensation and the experience and treatment of chronic pain. *Health Psychol*. 1995;14(6):537-47.
386. Rainville J, Sobel JB, Hartigan C, Wright A. The effect of compensation involvement on the reporting of pain and disability by patients referred for rehabilitation of chronic low back pain. *Spine (Phila Pa 1976)*. 1997;22(17):2016-24.
387. Atlas SJ, Chang Y, Kammann E, Keller RB, Deyo RA, Singer DE. Long-term disability and return to work among patients who have a herniated lumbar disc: the effect of disability compensation. *J Bone Joint Surg Am*. 2000;82(1):4-15.
388. Atlas SJ, Chang Y, Keller RB, Singer DE, Wu YA, Deyo RA. The impact of disability compensation on long-term treatment outcomes of patients with sciatica due to a lumbar disc herniation. *Spine (Phila Pa 1976)*. 2006;31(26):3061-9.
389. Drew D, Drebing CE, Van Ormer A, et al. Effects of disability compensation on participation in and outcomes of vocational rehabilitation. *Psychiatr Serv*. 2001;52(11):1479-84.
390. Greenough CG, Fraser RD. Assessment of outcome in patients with low-back pain. *Spine (Phila Pa 1976)*. 1992;17(1):36-41.
391. Ware JE, Jr., Sherbourne CD. The MOS 36-item short-form health survey (SF-36). I. Conceptual framework and item selection. *Med Care*. 1992;30(6):473-83.
392. Harris I, Mulford J, Solomon M, van Gelder J, Young J. Association between compensation status and outcome after surgery: a meta-analysis. *Jama*. 2005;293(13):1644-52.
393. Henn RF, 3rd, Kang L, Tashjian RZ, Green A. Patients with workers' compensation claims have worse outcomes after rotator cuff repair. *J Bone Joint Surg Am*. 2008;90(10):2105-13.
394. Sperka P, Cherry N, Burnham R, Beach J. Impact of compensation on work outcome of carpal tunnel syndrome. *Occup Med (Lond)*. 2008;58(7):490-5.
395. DeBerard MS, LaCaille RA, Spielmans G, Colledge A, Parlin MA. Outcomes and presurgery correlates of lumbar discectomy in Utah Workers' Compensation patients. *Spine J*. 2009;9(3):193-203.
396. Cheadle A, Franklin G, Wolfhagen C, et al. Factors influencing the duration of work-related disability: a population-based study of Washington State workers' compensation. *Am J Public Health*. 1994;84(2):190-6.
397. Dichraff RM. When the injured worker retains an attorney: the relationship between attorney involvement and case outcome. *AAOHN J*. 1993;41(10):491-8.
398. Katz JN, Keller RB, Fossel AH, et al. Predictors of return to work following carpal tunnel release. *Am J Ind Med*. 1997;31(1):85-91.
399. Katz JN, Amick BC, 3rd, Keller R, et al. Determinants of work absence following surgery for carpal tunnel syndrome. *Am J Ind Med*. 2005;47(2):120-30.
400. Nguyen TH, Randolph DC, Talmage J, Succop P, Travis R. Long-term Outcomes of Lumbar Fusion Among Workers' Compensation Subjects: An Historical Cohort Study. *Spine (Phila Pa 1976)*. 2010.
401. Olney JR, Quenzer DE, Makowsky M. Contested claims in carpal tunnel surgery: outcome study of worker's compensation factors. *Iowa Orthop J*. 1999;19:111-21.
402. Osti OL, Gun RT, Abraham G, Pratt NL, Eckerwall G, Nakamura H. Potential risk factors for prolonged recovery following whiplash injury. *Eur Spine J*. 2005;14(1):90-4.
403. Pransky GS, Verma SK, Okurowski L, Webster B. Length of disability prognosis in acute occupational low back pain: development and testing of a practical approach. *Spine (Phila Pa 1976)*. 2006;31(6):690-7.
404. Turner JA, Hollingworth W, Comstock BA, Deyo RA. Spinal cord stimulation for failed back surgery syndrome: outcomes in a workers' compensation setting. *Pain*. 2010;148(1):14-25.
405. Lynch N, Clay R, Hegmann K, Greaves W, Gold J. Advocagenic illness: proposed term, case reports, and estimates of prevalence. *J Occup Environ Med*. 1998;40(11):1027.
406. Bernacki EJ, Tao XG. The relationship between attorney involvement, claim duration, and workers' compensation costs. *J Occup Environ Med*. 2008;50(9):1013-8.
407. Suter PB. Employment and litigation: improved by work, assisted by verdict. *Pain*. 2002;100(3):249-57.

408. Brigham C, Barth R. A scientifically credible approach to impairment ratings: Florida's history and the world's future. *Florida Workers' Compensation Institute Newsletter*. 2010(Aug):14-6.
409. Bernacki EJ, Tao XG, Yuspeh L. A preliminary investigation of the effects of a provider network on costs and lost-time in workers' compensation. *J Occup Environ Med*. 2005;47(1):3-10.
410. Habeck R. Managing disability in industry. *Disability Management Interventions for the Industrially Injured Worker*. London, Ontario: London Disability Management Research Group; 1993:13-8.
411. Habeck R, Hunt H, Vantol B. Workplace factors associated with preventing and managing work disability. *Rehab Counsel Bull*. 1998;4298-143.
412. Pransky G, Shaw W, McLellan R. Employer attitudes, training, and return-to-work outcomes: a pilot study. *Assist Technol*. 2001;13(2):131-8.
413. Shaw WS, Robertson MM, Pransky G, McLellan RK. Employee perspectives on the role of supervisors to prevent workplace disability after injuries. *J Occup Rehabil*. 2003;13(3):129-42.
414. Elfering A, Semmer NK, Schade V, Grund S, Boos N. Supportive colleague, unsupportive supervisor: the role of provider-specific constellations of social support at work in the development of low back pain. *J Occup Health Psychol*. 2002;7(2):130-40.
415. MacEachen E, Kosny A, Ferrier S. Unexpected barriers in return to work: lessons learned from injured worker peer support groups. *Work*. 2007;29(2):155-64.
416. MacEachen E, Clarke J, Franche RL, Irvin E. Systematic review of the qualitative literature on return to work after injury. *Scand J Work Environ Health*. 2006;32(4):257-69.
417. Arnetz BB, Sjogren B, Rydehn B, Meisel R. Early workplace intervention for employees with musculoskeletal-related absenteeism: a prospective controlled intervention study. *J Occup Environ Med*. 2003;45(5):499-506.
418. Tompa E, de Oliveira C, Dolinschi R, Irvin E. A systematic review of disability management interventions with economic evaluations. *J Occup Rehabil*. 2008;18(1):16-26.
419. Tompa E, Dolinschi R, de Oliveira C, Irvin E. A systematic review of occupational health and safety interventions with economic analyses. *J Occup Environ Med*. 2009;51(9):1004-23.
420. Franche RL, Cullen K, Clarke J, Irvin E, Sinclair S, Frank J. Workplace-based return-to-work interventions: a systematic review of the quantitative literature. *J Occup Rehabil*. 2005;15(4):607-31.
421. Katz JN, Keller RB, Simmons BP, et al. Maine Carpal Tunnel Study: outcomes of operative and nonoperative therapy for carpal tunnel syndrome in a community-based cohort. *J Hand Surg Am*. 1998;23(4):697-710.
422. Keller RB, Largay AM, Soule DN, Katz JN. Maine Carpal Tunnel Study: small area variations. *J Hand Surg Am*. 1998;23(4):692-6.
423. Lucie S. Can pre-placement health assessments predict subsequent sickness absence? *Occup Med (Lond)*. 2008;58355-60.
424. Harbin G, Olson J. Post-offer, pre-placement testing in industry. *Am J Ind Med*. 2005;47(4):296-307.
425. Anderson C, Briggs J. A study of the effectiveness of ergonomically-based functional screening tests and their relationship to reducing worker compensation injuries. *Work*. 2008;31(1):27-37.
426. Rosenbloom K, Shankar A. A study of the effects of isokinetic pre-employment physical capability screening in the reduction of musculoskeletal disorders in a labor intensive work environment. *Work*. 2006;26215-28.
427. Gates L. The role of the supervisor in successful adjustment to work with a disabling condition: issues for disability policy and practice. *J Occup Rehabil*. 1993;3(4):179-90.
428. Shrey DE. Disability management in industry: the new paradigm in injured worker rehabilitation. *Disabil Rehabil*. 1996;18(8):408-14.
429. Painting S, Favarin I, Swales J. The management of acute industrial low back pain. *Physiother*. 1998;84110-7.
430. Sinclair SJ, Hogg-Johnson SH, Mondloch MV, Shields SA. The effectiveness of an early active intervention program for workers with soft-tissue injuries. The Early Claimant Cohort Study. *Spine (Phila Pa 1976)*. 1997;22(24):2919-31.
431. Holmgren K, Dahlin Ivanoff S. Supervisors' views on employer responsibility in the return to work process. A focus group study. *J Occup Rehabil*. 2007;17(1):93-106.
432. Lysaght RM, Larmour-Trode S. An exploration of social support as a factor in the return-to-work process. *Work*. 2008;30(3):255-66.
433. Morken T, Moen B, Riise T, et al. Effects of a training program to improve musculoskeletal health among industrial workers - effects of supervisors' role in the intervention. *INT J Ind Ergon*. 2002;30115-27.
434. Fitzler SL, Berger RA. Attitudinal change: the Chelsea back program. *Occup Health Saf*. 1982;51(2):24-6.
435. Fitzler SL, Berger RA. Chelsea Back Program: one year later. *Occup Health Saf*. 1983;52(7):52-4.
436. Linton S. The manager's role in employees' return to work following back injury. *Work Stress*. 1991;5189-95.
437. McLellan RK, Pransky G, Shaw WS. Disability management training for supervisors: a pilot intervention program. *J Occup Rehabil*. 2001;11(1):33-41.

438. Shaw WS, Robertson MM, McLellan RK, Verma S, Pransky G. A controlled case study of supervisor training to optimize response to injury in the food processing industry. *Work*. 2006;26(2):107-14.
439. Shaw WS, Robertson MM, Pransky G, McLellan RK. Training to optimize the response of supervisors to work injuries--needs assessment, design, and evaluation. *AAOHN J*. 2006;54(5):226-35.
440. CIGNA Intracorp. *The Disability Experience: What Helps and Hinders Return to Work*. Philadelphia: Cigna Group Insurance; 2001.
441. Butler RJ, Johnson WG, Cote P. It pays to be nice: employer-worker relationships and the management of back pain claims. *J Occup Environ Med*. 2007;49(2):214-25.
442. Amick BC, 3rd, Robertson MM, DeRango K, et al. Effect of office ergonomics intervention on reducing musculoskeletal symptoms. *Spine (Phila Pa 1976)*. 2003;28(24):2706-11.
443. Hunt H, Habeck R. *The Michigan Disability Prevention Study*. Kalamazoo, MI: WE Upjohn Institute for Employment Research; 1993.
444. Loisel P, Abenhaim L, Durand P, et al. A population-based, randomized clinical trial on back pain management. *Spine (Phila Pa 1976)*. 1997;22(24):2911-8.
445. Loisel P, Durand P, Abenhaim L, et al. Management of occupational back pain: the Sherbrooke model. Results of a pilot and feasibility study. *Occup Environ Med*. 1994;51(9):597-602.
446. Brooker AS, Cole DC, Hogg-Johnson S, Smith J, Frank JW. Modified work: prevalence and characteristics in a sample of workers with soft-tissue injuries. *J Occup Environ Med*. 2001;43(3):276-84.
447. Hogg-Johnson S, Cole DC. Early prognostic factors for duration on temporary total benefits in the first year among workers with compensated occupational soft tissue injuries. *Occup Environ Med*. 2003;60(4):244-53.
448. Carroll C, Rick J, Pilgrim H, Cameron J, Hillage J. Workplace involvement improves return to work rates among employees with back pain on long-term sick leave: a systematic review of the effectiveness and cost-effectiveness of interventions. *Disabil Rehabil*. 2010;32(8):607-21.
449. Steenstra IA, Anema JR, van Tulder MW, Bongers PM, de Vet HC, van Mechelen W. Economic evaluation of a multi-stage return to work program for workers on sick-leave due to low back pain. *J Occup Rehabil*. 2006;16(4):557-78.
450. Durand MJ, Loisel P. Therapeutic return to work: rehabilitation in the workplace. *Work*. 2001;17(1):57-63.
451. Woods V. Work-related musculoskeletal health and social support. *Occup Med (Lond)*. 2005;55(3):177-89.
452. Oxenstierna G, Ferrie J, Hyde M, Westerlund H, Theorell T. Dual source support and control at work in relation to poor health. *Scand J Public Health*. 2005;33(6):455-63.
453. Tjuliu A, Edvardsson Stiwne E, Ekberg K. Experience of the implementation of a multi-stakeholder return-to-work programme. *J Occup Rehabil*. 2009;19(4):409-18.
454. Werner EL, Laerum E, Wormgoor ME, Lindh E, Indahl A. Peer support in an occupational setting preventing LBP-related sick leave. *Occup Med (Lond)*. 2007;57(8):590-5.
455. Clarke J, Cole D, Ferrier S. *Return to Work after a Soft Tissue Injury: A Qualitative Exploration. Working Paper No. 127*. Toronto: Institute for Work & Health; 2002.
456. Institute for Work and Health. Conference Proceeding: Healthy Workplace Think Tank. Toronto; 2004.
457. Davis PM, Badii M, Yassi A. Preventing disability from occupational musculoskeletal injuries in an urban, acute and tertiary care hospital: results from a prevention and early active return-to-work safely program. *J Occup Environ Med*. 2004;46(12):1253-62.
458. Baril R, Berthelette D. Components and organizational determinants of workplace interventions designed to facilitate early return to work. *Studies and Research Projects: Report R-263*. Montreal: IRSST; 2000:i-53.
459. Shaw WS, Feuerstein M, Lincoln AE, Miller VI, Wood PM. Ergonomic and psychosocial factors affect daily function in workers' compensation claimants with persistent upper extremity disorders. *J Occup Environ Med*. 2002;44(7):606-15.
460. Daltroy LH, Iversen MD, Larson MG, et al. A controlled trial of an educational program to prevent low back injuries. *N Engl J Med*. 1997;337(5):322-8.
461. DeRango K, Amick B, Robertson M, Rooney T, Moore A, Bazzani L. *The Productivity Consequences of Two Ergonomic Interventions. Working Paper #222*. Toronto: Institute for Work & Health; 2003.
462. Lahiri S, Gold J, Levenstein C. Estimation of net-costs for prevention of occupational low back pain: three case studies from the US. *Am J Ind Med*. 2005;48(6):530-41.
463. Lahiri S, Gold J, Levenstein C. Net-cost model for workplace interventions. *J Safety Res*. 2005;36(3):241-55.
464. Lanoie P, Tavenas S. Costs and benefits of preventing workplace accidents: the case of participatory ergonomics. *Safety Sci*. 1996;24:181-96.
465. Karjalainen K, Malmivaara A, Mutanen P, Roine R, Hurri H, Pohjolainen T. Mini-intervention for subacute low back pain: two-year follow-up and modifiers of effectiveness. *Spine (Phila Pa 1976)*. 2004;29(10):1069-76.
466. Abrahamsson L. Production economics analysis of investment initiated to improve working environment. *Appl Ergon*. 2000;31(1):1-7.

467. Banco L, Lapidus G, Monopoli J, Zavoiski R. The Safe Teen Work Project: a study to reduce cutting injuries among young and inexperienced workers. *Am J Ind Med.* 1997;31(5):619-22.
468. Chhokar R, Engst C, Miller A, Robinson D, Tate RB, Yassi A. The three-year economic benefits of a ceiling lift intervention aimed to reduce healthcare worker injuries. *Appl Ergon.* 2005;36(2):223-9.
469. Collins JW, Wolf L, Bell J, Evanoff B. An evaluation of a "best practices" musculoskeletal injury prevention program in nursing homes. *Inj Prev.* 2004;10(4):206-11.
470. Evanoff BA, Bohr PC, Wolf LD. Effects of a participatory ergonomics team among hospital orderlies. *Am J Ind Med.* 1999;35(4):358-65.
471. Gundewall B, Liljeqvist M, Hansson T. Primary prevention of back symptoms and absence from work. A prospective randomized study among hospital employees. *Spine (Phila Pa 1976).* 1993;18(5):587-94.
472. Halpern C, Dawson K. Design and implementation of a participatory ergonomics program for machine sewing tasks. *Int J Ind Ergon.* 1997;20:429-40.
473. Hochanadel CD, Conrad DE. Evolution of an on-site industrial physical therapy program. *J Occup Med.* 1993;35(10):1011-6.
474. Hocking B. Evaluation of a manual handling project. Australia & New Zealand. *J Occup Health Saf.* 1991;7:295-301.
475. Linton SJ, Bradley LA. An 18-month follow-up of a secondary prevention program for back pain: help and hindrance factors related to outcome maintenance. *Clin J Pain.* 1992;8(3):227-36.
476. Maniscalco P, Lane R, Welke M, Mitchell JH, Husting L. Decreased rate of back injuries through a wellness program for offshore petroleum employees. *J Occup Environ Med.* 1999;41(9):813-20.
477. Rempel DM, Krause N, Goldberg R, Benner D, Hudes M, Goldner GU. A randomized controlled trial evaluating the effects of two workstation interventions on upper body pain and incident musculoskeletal disorders among computer operators. *Occup Environ Med.* 2006;63(5):300-6.
478. Tuchin P, Pollard H. The cost-effectiveness of spinal care education as a preventive strategy for spinal injury. *J Occup Health Safety Aust N Z.* 1998;14:43-51.
479. Versloot JM, Rozeman A, van Son AM, van Akkerveeken PF. The cost-effectiveness of a back school program in industry. A longitudinal controlled field study. *Spine (Phila Pa 1976).* 1992;17(1):22-7.
480. Leyshon RT, Shaw LE. Using the ICF as a conceptual framework to guide ergonomic intervention in occupational rehabilitation. *Work.* 2008;31(1):47-61.
481. World Health Organization. *International Classification of Functioning, Disability, and Health.* Available at: <http://www.who.int/classifications/icf/en/>; 2001.
482. Ammendolia C, Cassidy D, Steensta I, et al. Designing a workplace return-to-work program for occupational low back pain: an intervention mapping approach. *BMC Musculoskelet Disord.* 2009;10:65.
483. Anema JR, Steenstra IA, Bongers PM, et al. Multidisciplinary rehabilitation for subacute low back pain: graded activity or workplace intervention or both? A randomized controlled trial. *Spine (Phila Pa 1976).* 2007;32(3):291-8; discussion 9-300.
484. Rivillis I, Van Eerd D, Cullen K, et al. Effectiveness of participatory ergonomic interventions on health outcomes: a systematic review. *Appl Ergon.* 2008;39(3):342-58.
485. Degenais S. A systematic review of low back pain cost of illness studies in the United States and internationally. *Spine J.* 2008;88-20.
486. Hashemi L, Webster BS, Clancy EA, Volinn E. Length of disability and cost of workers' compensation low back pain claims. *J Occup Environ Med.* 1997;39(10):937-45.
487. Waddell G. 1987 Volvo award in clinical sciences. A new clinical model for the treatment of low-back pain. *Spine (Phila Pa 1976).* 1987;12(7):632-44.
488. Nachemson AL, Andersson GB. Classification of low-back pain. *Scand J Work Environ Health.* 1982;8(2):134-6.
489. Carey TS, Garrett JM, Jackman A, Hadler N. Recurrence and care seeking after acute back pain: results of a long-term follow-up study. North Carolina Back Pain Project. *Med Care.* 1999;37(2):157-64.
490. Cassidy JD, Cote P, Carroll LJ, Kristman V. Incidence and course of low back pain episodes in the general population. *Spine (Phila Pa 1976).* 2005;30(24):2817-23.
491. Croft PR, Macfarlane GJ, Papageorgiou AC, Thomas E, Silman AJ. Outcome of low back pain in general practice: a prospective study. *Br Med J.* 1998;316(7141):1356-9.
492. Pengel LH, Herbert RD, Maher CG, Refshauge KM. Acute low back pain: systematic review of its prognosis. *Br Med J.* 2003;327(7410):323.
493. Chou R, Shekelle P. Will this patient develop persistent disabling low back pain? *Jama.* 2010;303(13):1295-302.
494. Hayden JA, Chou R, Hogg-Johnson S, Bombardier C. Systematic reviews of low back pain prognosis had variable methods and results: guidance for future prognosis reviews. *J Clin Epidemiol.* 2009;62(8):781-96 e1.
495. Accident Compensation Corporation, New Zealand Guidelines Group. *New Zealand Acute Low Back Pain Guide.* Available at: www.nzqa.org.nz/guidelines/0072/acc1038_col.pdf. Wellington, NZ: Accident Compensation Corporation; 2004.

496. Durand MJ, Loisel P, Hong QN, Charpentier N. Helping clinicians in work disability prevention: the work disability diagnosis interview. *J Occup Rehabil*. 2002;12(3):191-204.
497. Hilfiker R, Bachmann LM, Heitz CA, Lorenz T, Joronen H, Klipstein A. Value of predictive instruments to determine persisting restriction of function in patients with subacute non-specific low back pain. Systematic review. *Eur Spine J*. 2007;16(11):1755-75.
498. Pincus T, Burton AK, Vogel S, Field AP. A systematic review of psychological factors as predictors of chronicity/disability in prospective cohorts of low back pain. *Spine (Phila Pa 1976)*. 2002;27(5):E109-20.
499. Steenstra IA, Verbeek JH, Heymans MW, Bongers PM. Prognostic factors for duration of sick leave in patients sick listed with acute low back pain: a systematic review of the literature. *Occup Environ Med*. 2005;62(12):851-60.
500. Waddell G, Burton A, Main C. *Screening to Identify People at Risk of Long Term Incapacity for Work*. London: Royal Society of Medicine Press; 2003.
501. MacKenzie EJ, Morris JA, Jr., Jurkovich GJ, et al. Return to work following injury: the role of economic, social, and job-related factors. *Am J Public Health*. 1998;88(11):1630-7.
502. Hogg-Johnson S, Frank J, Rael E. *Prognostic risk factor models for low back pain: Why they have failed and a new hypothesis. Working Paper #19*. Toronto, Canada: Institute for Work and Health; 1994.
503. van der Weide WE, Verbeek JH, Salle HJ, van Dijk FJ. Prognostic factors for chronic disability from acute low-back pain in occupational health care. *Scand J Work Environ Health*. 1999;25(1):50-6.
504. Linton SJ, Hallden K. Can we screen for problematic back pain? A screening questionnaire for predicting outcome in acute and subacute back pain. *Clin J Pain*. 1998;14(3):209-15.
505. Fulton-Kehoe D, Stover BD, Turner JA, et al. Development of a brief questionnaire to predict long-term disability. *J Occup Environ Med*. 2008;50(9):1042-52.
506. Shaw WS, Pransky G, Winters T. The Back Disability Risk Questionnaire for work-related, acute back pain: prediction of unresolved problems at 3-month follow-up. *J Occup Environ Med*. 2009;51(2):185-94.
507. Wallace MA. Occupational health nurses--the solution to absence management? *Aaohn J*. 2009;57(3):122-7.
508. Durand MJ, Vezina N, Loisel P, Baril R, Richard MC, Diallo B. Workplace interventions for workers with musculoskeletal disabilities: a descriptive review of content. *J Occup Rehabil*. 2007;17(1):123-36.
509. Brines J, Salazar MK, Graham KY, Pergola T, Connon C. Injured workers' perceptions of case management services. A descriptive study. *Aaohn J*. 1999;47(8):355-64.
510. Brines J, Salazar MK, Graham KY, Pergola T. Return to work experience of injured workers in a case management program. *Aaohn J*. 1999;47(8):365-72.
511. Pergola T, Salazar MK, Graham KY, Brines J. Case management services for injured workers. Providers' perspectives. *Aaohn J*. 1999;47(9):397-404.
512. Salazar MK. The occupational health nurse as case manager. *Aaohn J*. 1999;47(8):347.
513. Salazar MK. The occupational health nurse as case manager--Part 2. *Aaohn J*. 1999;47(9):396.
514. Salazar MK, Graham KY. Evaluation of a case management program. Summary and integration of findings. *Aaohn J*. 1999;47(9):416-23.
515. Salazar MK, Graham KY, Lantz B. Evaluating case management services for injured workers. Use of a quality assessment model. *Aaohn J*. 1999;47(8):348-54.
516. Tsai JH, Salazar MK, Graham KY, Brines J. Case management for injured workers. A descriptive study using a record review. *Aaohn J*. 1999;47(9):405-15.
517. Amato D. Time for new shoes. *Claims (Covering the Business of Loss)*. 2006;54(12).
518. Lipscomb HJ, Moon SD, Li L, Pompeii L, Kennedy MQ. Evaluation of the North Country on the Job Network: a model of facilitated care for injured workers in rural upstate New York. *J Occup Environ Med*. 2002;44(3):246-57.
519. Kennedy MQ, Badger E, Pompeii L, Lipscomb HJ. The North Country on the Job Network: a unique role for occupational health nurses in a community coalition. *Aaohn J*. 2003;51(5):204-9.
520. Feuerstein M, Huang GD, Ortiz JM, Shaw WS, Miller VI, Wood PM. Integrated case management for work-related upper-extremity disorders: impact of patient satisfaction on health and work status. *J Occup Environ Med*. 2003;45(8):803-12.
521. Mallon TM, Cloeren M, Firestone LM, Burch HC. Contract case managers prove cost effective in federal workers' compensation programs. *Mil Med*. 2008;173(3):253-8.
522. Wendt JK, Tsai SP, Bhojani FA, Cameron DL. The Shell Disability Management Program: a five-year evaluation of the impact on absenteeism and return-on-investment. *J Occup Environ Med*. 2010;52(5):544-50.
523. Larsson A, Gard G. How can the rehabilitation planning process at the workplace be improved? A qualitative study from employers' perspective. *J Occup Rehabil*. 2003;13(3):169-81.
524. Scheel IB, Hagen KB, Herrin J, Carling C, Oxman AD. Blind faith? The effects of promoting active sick leave for back pain patients: a cluster-randomized controlled trial. *Spine (Phila Pa 1976)*. 2002;27(23):2734-40.

525. Briand C, Durand MJ, St-Arnaud L, Corbiere M. How well do return-to-work interventions for musculoskeletal conditions address multicausality of work disability? *J Occup Rehabil*. 2008;18207-17.
526. Bendix AF, Bendix T, Ostefeld S, Bush E, Andersen. Active treatment programs for patients with chronic low back pain: a prospective, randomized, observer-blinded study. *Eur Spine J*. 1995;4(3):148-52.
527. Bendix AF, Bendix T, Vaegter K, Lund C, Frolund L, Holm L. Multidisciplinary intensive treatment for chronic low back pain: a randomized, prospective study. *Cleve Clin J Med*. 1996;63(1):62-9.
528. Karjalainen K, Malmivaara A, van Tulder M, et al. Multidisciplinary biopsychosocial rehabilitation for subacute low back pain in working-age adults: a systematic review within the framework of the Cochrane Collaboration Back Review Group. *Spine (Phila Pa 1976)*. 2001;26(3):262-9.
529. Guzman J, Esmail R, Karjalainen K, Malmivaara A, Irvin E, Bombardier C. Multidisciplinary bio-psycho-social rehabilitation for chronic low back pain. *Cochrane Database Syst Rev*. 2002(1):CD000963.
530. Tveito TH, Hysing M, Eriksen HR. Low back pain interventions at the workplace: a systematic literature review. *Occup Med (Lond)*. 2004;54(1):3-13.
531. Lambeek LC, van Mechelen W, Knol DL, Loisel P, Anema JR. Randomised controlled trial of integrated care to reduce disability from chronic low back pain in working and private life. *Br Med J*. 2010;340c1035.
532. Norlund A, Ropponen A, Alexanderson K. Multidisciplinary interventions: review of studies of return to work after rehabilitation for low back pain. *J Rehabil Med*. 2009;41(3):115-21.
533. Skouen JS, Grasdal AL, Haldorsen EM, Ursin H. Relative cost-effectiveness of extensive and light multidisciplinary treatment programs versus treatment as usual for patients with chronic low back pain on long-term sick leave: randomized controlled study. *Spine (Phila Pa 1976)*. 2002;27(9):901-9; discussion 9-10.
534. Haldorsen EM, Grasdal AL, Skouen JS, Risa AE, Kronholm K, Ursin H. Is there a right treatment for a particular patient group? Comparison of ordinary treatment, light multidisciplinary treatment, and extensive multidisciplinary treatment for long-term sick-listed employees with musculoskeletal pain. *Pain*. 2002;95(1-2):49-63.