

Work Disability Prevention and Management

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ACOEM Evidence-based Practice Work Disability and Prevention and Management Expert Panel

Objective: This abbreviated version of the American College of Occupational and Environmental Medicine's (ACOEM) Work Disability Prevention and Management Guideline reviews the available evidence and provides recommendations to clinicians regarding interventions to help patients remain at or return to work. **Methods:** Systematic literature reviews were conducted. Studies were graded and evidence tables were created, with involvement of a multidisciplinary expert panel that evaluated the evidence and finalized recommendations for all clinical questions. Extensive peer review was performed. Consensus recommendations were formulated when evidence was lacking. **Results:** Evidence-based recommendations have been developed to guide work disability prevention and management. **Conclusions:** Clinicians should utilize quality evidence in determining treatment methods to prevent and alleviate work disability for workers. This guideline offers an evidence-based framework for preventing and mitigating work disability for individual adults in the active workforce. It is designed for use by healthcare clinicians who desire to minimize the negative impact of health conditions on working people's lives and livelihoods.

OBJECTIVES

The goal of this guideline, one of the American College of Occupational and Environmental Medicine's (ACOEM) Evidence-based Practice Guidelines' "Foundation

Guidelines," is not a comprehensive discussion of the philosophy of disability prevention, or the importance of managing it, which can be obtained from other sources.¹ The overarching principle is essentially that productive activity is generally in the best interests of patients, whether that activity is work related or not. Clinicians play an important role in disability management. The intent of this article is to increase both clinicians' knowledge regarding some of the factors that affect impairment and disability and their understanding of the evidence that supports (or fails to support) interventions that can help their patients' ability to remain at or return to work.

Specific interventions for work disability prevention subject to literature searches to formulate this guideline included:

- The value of early intervention in workplace disability.
- The use of screening measures to identify risk factors for work disability/workplace leaves,
- Education for the patient/employee and/or management,
- Exercise, behavioral activation, occupational therapy, and physical therapy,
- Cognitive behavioral therapy, short-term psychotherapy, mindfulness, hypnosis, support system/peer support, or other psychological interventions, and
- Vocational rehabilitation (VR), work disability prevention programs, work disability management programs and return-to-work programs.

Comparative effectiveness is discussed where reliable information is available. An algorithm has been developed (see Fig. 1). This guideline does not specifically address: 1) comprehensive psychological and behavioral aspects of pain management and various types of pain programs (addressed in the ACOEM Chronic Pain Guideline);² 2) opioids (in the Opioids Guideline);³ or 3) detailed aspects of psychological treatment related to specific conditions (addressed in the ACOEM Workplace Mental Health Guidelines).⁴⁻⁶ The Evidence-based Practice Work Disability Prevention and Management Expert Panel

recognizes that there are differences in workers' compensation systems,⁷ as well as regional differences in treatment approaches.⁸⁻¹⁰

METHODS AND LIMITATIONS

The Evidence-based Practice Work Disability Prevention and Management Panel and the Research Team, which formulated this guideline, have complete editorial independence from the ACOEM and Reed Group, LLC, the publisher of the ACOEM's guidelines, neither of which have influenced this guideline. The medical and other relevant literature is routinely monitored and searched at least annually for evidence that would require a modification to this guidance. The guideline is planned to be comprehensively updated at least every 5 years, or more frequently should evidence require it.

A detailed methodology document used for guideline development, including evidence selection, scoring, incorporation of cost considerations,¹¹⁻¹⁴ and formulation of recommendations is available online.¹⁵ All evidence in the prior editions of this guideline garnered from seven databases (MEDLINE, EBM Online, Cochrane, TRIP, CINAHL, Embase, PEDro) was included in this guideline. Additionally, new comprehensive searches for evidence were performed with both PubMed and Google Scholar up through 2024 to help ensure complete capture of relevant literature. There was no limit on year of publication. Search terms are available online.² Guidance is developed with sufficient detail to facilitate assessment of compliance¹¹ and auditing/monitoring.¹² Alternative options to manage conditions are provided. In accordance with the Institute of Medicine's Trustworthy Guidelines, detailed records are kept, including responses to external peer reviewers.¹¹

In addition to these searches, we relied upon prior searches performed for the ACOEM guidelines.^{2-6,16-28} For work-focused cognitive behavioral therapy (CBT), we found and reviewed 50 articles in PubMed, 72 in Scopus, 29 in CINAHL, 18 in Cochrane Library, 62,300 in Google Scholar, and seven from other sources. We considered for inclusion three articles from PubMed, seven from Scopus, zero from CINAHL, four from Cochrane

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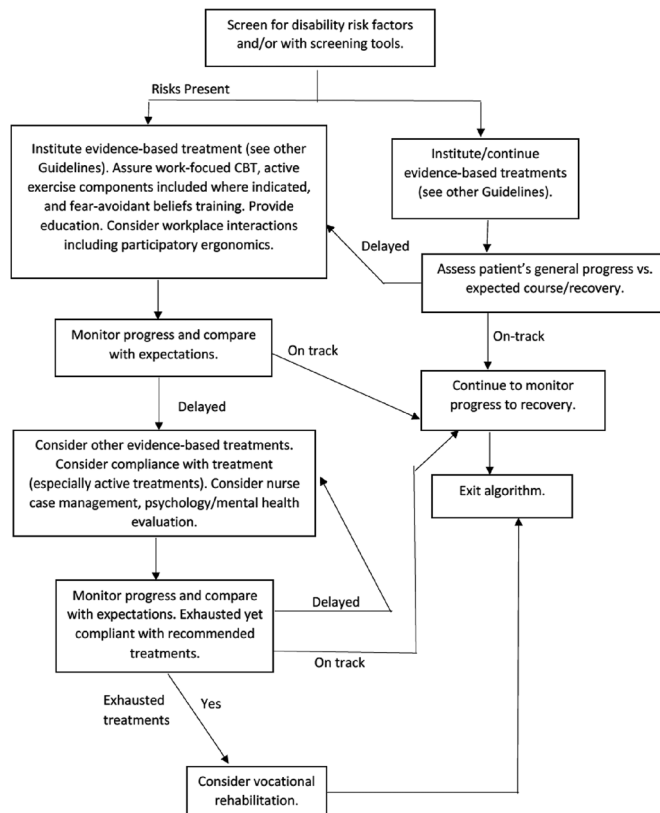


FIGURE 1. Disability prevention and management algorithm.

Library, one from Google Scholar, and seven from other sources. Of the 22 articles considered for inclusion, 10 randomized trials and 12 systematic reviews met the inclusion criteria.

For medical and psychological treatments, we found and reviewed 1435 articles in PubMed, 42 in Scopus, 70 in CINAHL, 19 in Cochrane Library, 7710 in Google Scholar, and zero from other sources. We considered for inclusion nine articles from PubMed, zero from Scopus, five from CINAHL, one from Cochrane Library, seven from Google Scholar, and zero from other sources. Of the 22 articles considered for inclusion, seven randomized trials and 10 epidemiological studies met the inclusion criteria.

For nurse case management, we found and reviewed 134 articles in PubMed, 537 in Scopus, two in CINAHL, 386 in Cochrane Library, 115,900 in Google Scholar, and zero from other sources. We considered for inclusion seven articles from PubMed, seven from Scopus, one from CINAHL, zero from Cochrane Library, one from Google Scholar, and zero from other sources. Of the 21 articles considered for inclusion, five randomized trials and three systematic reviews met the inclusion criteria.

For job and workplace modification, we found and reviewed 87 articles in PubMed, 168 in Scopus, 10 in CINAHL, 168 in Cochrane Library, 18,800 in Google Scholar, and three from other sources. We considered for inclusion

four articles from PubMed, three from Scopus, three from CINAHL, two from Cochrane Library, one from Google Scholar, and three from other sources. Of the 16 articles considered for inclusion, two randomized controlled trials and nine epidemiological studies met the inclusion criteria.

For VR, we found and reviewed 269 articles in PubMed, 398 in Scopus, 272 in CINAHL, 83 in Cochrane Library, 35,900 in Google Scholar, and zero from other sources. We considered for inclusion 14 articles from PubMed, two from Scopus, eight from CINAHL, two from Cochrane Library, one from Google Scholar, and zero from other sources. Of the 27 articles considered for inclusion, five randomized trials and seven systematic reviews met the inclusion criteria.

IMPACT OF WORK DISABILITY

Prevalence

Disability is formally defined as “activity limitations and/or participation restrictions in an individual with a health condition, disorder, or disease.”²⁹ More broad definitions are also common; the World Health Organization, for instance, includes personal and environmental factors, such as negative attitudes, inaccessible transportation/buildings, and limited social support.³⁰ Pragmatically speaking, disability can be considered the impact of an

impairment or impairments on activity and/or participation. The World Health Organization estimates that more than one billion people worldwide live with some form of disability.^{31,32} Disability affects approximately 22% of US adults in a given year;³³ this figure rises to 33% of those age 65 or older.³⁴ Increasing numbers of workers enter (and remain in) disability systems (eg, private disability insurance, workers’ compensation, and Social Security Disability). Chronic pain, and resultant disability, may have multiple negative effects on individuals and their significant others, including changes in employment and economic status; worse health; increased dependence upon medical systems and external care; loss of companionship, social activities, and relationships; social stigma; behavioral health consequences; and increased mortality.³⁵

Outcomes and Costs

Work disability can be operationally defined as 1) job loss or worklessness, 2) absence from work, and 3) reduced productivity at work. It differs from impairment in that whereas impairment is generally objectively observable and often quantifiable, and usually a medical issue, work disability is a biopsychosocial phenomenon (BPS) that is a potential outcome from the interactions among medical impairment, psychological features of the impacted individual, job- and employer-related constraints and demands, social and cultural conditions, workers’ compensation jurisdictional factors, the economic and legal environment, and other factors. The ramifications of work disability are enormous. These include lost productivity from workplace absence (absenteeism), decreased productivity from workers who are in the workplace but working at less than full capacity (presenteeism), and administrative and benefit expenses.³⁶ Measuring those costs is complex and depends on the quality of underlying data.³⁷ As an example, an ad hoc analysis of the European Labour Force Survey commissioned by DG Employment and Social Affairs in Brussels³⁸ found that musculoskeletal disorders (MSDs) accounted for 53% of all work-related diseases in the EU-15 and resulted in the most lost days and permanent incapacity to work. Overall, they accounted for 50% of all absences from work lasting for more than 3 days, 49% of all absences lasting 2 weeks or more, and about 60% of all reported cases of permanent incapacity. The analysis estimated that the total costs of work-related MSDs were approximately 2% of gross domestic product (GDP). MSDs are, according to this analysis, responsible for 40%–50% of the costs of all work-related health issues.

Mortality

Unemployment or “worklessness” is associated with a 63% increased risk of

mortality, and the risks for men are approximately 37% higher than for women.³⁹ Ladička and Ladička (2016) found an interactive relationship among gender/sex, race, and employment status on life expectancy.^{40,41} Disability is associated with an approximately 50% increased risk of mortality.⁴² A Netherlands-based study estimated that those with disability in activities of daily living and mobility had a 10-year shorter lifespan, only 6 years of which could be explained by differences in lifestyle, sociodemographic factors, and major chronic diseases.⁴³ Risk factors for mortality among those unemployed include cardiovascular disease, depression, substance abuse, and suicide.^{39,44,45} (Unemployment is also associated with other negative psychological, social, and economic effects on the affected person, his/her family, and the community.)

ETIOLOGY OF WORK DISABILITY

Causation of work disability is complex, with many interacting risk factors and contributing elements. Loisel & Cote (2013) described a model for understanding work disability that accounted for individual (personal), workplace, healthcare-related, and compensation-related characteristics.¹ Building on earlier work by Loisel et al (2005),⁴⁶ Caruso and Kertay (2019) defined several domains of influence contributing to delayed and failed recovery from illness and injury.⁴⁷ These included administrative procedures associated with managing workplace absence; medical practices that may contribute to shortened or lengthened disability durations; psychological features of the individual; family, community, and sociocultural issues; workplace circumstances; and systemic features such as the workers' compensation system, regulatory bodies, and the economic climate.

Disability can be temporary or chronic/permanent. Specific causal aspects of work disability are as follows:

- Examples of common causes of temporary disability include migraine headaches,⁴⁸ many surgeries, and pregnancy (although arguably not meeting some common definitions of disability).
- There are many causes of chronic work disability, especially including single and multiple MSDs. Risk for chronic/permanent disability is at least partially a function of time away from work. Only 50%, 20%, and 10% of workers still out of work at 12, 24, and 36 weeks after illness or injury, respectively, ever return to gainful employment.^{49,50}
 - Risk factors in the United States include increasing age, female gender/sex, occupation (also, military service), Black/African-American and Hispanic/Latino race and ethnicity, lower socioeconomic status, and select state resi-

dence (eg, AL, AR, LA, ME, MS, NM, OK, OR, TN, WV)³⁴ (see Table 1). It should be noted that some of these factors are also linked with the probability of performing jobs with higher job physical demands that are also linked with higher risk of disability. Lifestyle-related health influences include cigarette smoking, diabetes, dyslipidemia, hypertension, obesity, and other chronic health conditions.⁵¹ Arthritis, diabetes, and mental health disorders are major sources of *general* disability in the US general population,³³ whereas the most common causes of *work* disability are back and neck pain, arthritis, multiple MSDs causing chronic pain, depression and other mental health disorders, nervous system disorders, and other musculoskeletal/connective tissues problems.⁵² Other risk factors for never returning to work include involvement in litigation (eg, workers' compensation), inadequate skills for competitive employment, and living in an economically poor area.^{49,50,53}

COVID-19

COVID-19 may cause numerous significant adverse effects, including pneumonia, respiratory failure, myocardial infarction, dysrhythmias, stroke, thromboemboli, and deaths (see COVID-19 Guideline).^{27,69–77} Disability attributed to COVID-19 has been reported as at least partially correlated with measures of case severity. However, among those treated as outpatients, persistent symptoms lasting more than 6 months have reportedly included fatigue, dyspnea, joint pain, chest pain, cough, anosmia, and cognitive and executive function impairments.^{78–81}

The overall trajectory of recovery from COVID-19 remains unclear. Prior experience with diseases that have similar manifestations, such as acute respiratory distress syndrome (ARDS), suggest that there is significant risk of delayed return to work and long-term disability, as approximately 50% of individuals surviving ARDS have not returned to work after 1 year (see COVID-19 Guideline).^{27,75,82}

Cardiac, respiratory, and neurological impairment measures are often needed to particularly evaluate those with symptoms in those organ system(s). Rehabilitative strategies targeting impairments are indicated. These rehabilitation programs are typically multimodal when there are multiple impairments. Some preliminary randomized clinical trials suggest CBT is indicated for those with ongoing COVID-19 symptoms, particularly accompanied by anxiety, depression, insomnia, and/or posttraumatic stress disorder (PTSD).^{83–85} While not yet demonstrated for COVID-19,

employer support for recovery is believed to be critical by analogy with other conditions.

GENERAL APPROACH TO WORK DISABILITY PREVENTION

Initial Considerations

The first step in preventing work disability is to understand the job(s) and job task(s), as this is essential for tailoring recommendations and improving stay at work and earlier return to work. A preliminary assessment should be undertaken in the clinical evaluation; a definitive assessment typically requires workplace analyses and objective exposure data. This especially includes job factors that are either generic risks for disability and/or are specific risk factors for a given injured worker. Factors to understand include job physical factors (eg, force, repetition, posture, vibration), chemical exposures (eg, for occupational asthma), and work organizational factors. Beyond a generic approach of the presence of a risk factor, it is best to understand whether the exposure(s) exceed recommended limits (eg, ACGIH TLV for Hand Activity Level; Revised NIOSH Lifting Equation; permissible exposure limits for chemical[s]), which typically requires involvement of ergonomists and industrial hygienists for exposure quantification and guidance regarding potential prevention.

The classical levels of prevention in occupational medicine, focused on deterrence of permanent impairment, are *primary* (eg, avoidance of workplace illness or injury before it arises), *secondary* (eg, prevention of permanent impairment and disability in workers with illness or injury through early detection of impairment potential and treatment), and *tertiary* (eg, management of impairment and disability to reduce residual dysfunction and functional deficit).⁸⁶ Quaternary prevention, or avoiding the iatrogenic effects of evaluation and treatment, has emerged as an important additional concern in work disability,⁸⁷ as there are many potential tests and interventions where the harms outweigh the potential benefits (eg, spine fusion for nonspecific low back pain; benzodiazepines for anxiety disorders; opioids for chronic pain).

Preventing work disability is generally a more complex BPS construct than preventing injury (eg, through safety measures) or appropriately managing specific workplace illnesses and injuries (as discussed in specific ACOEM treatment guidelines). As noted under the Etiology of Work Disability section above, work disability may be influenced by medical process and practice; personal characteristics (physical and psychophysiological); sociocultural and economic conditions; administrative factors (insurance and legislation); and workplace conditions, policies, and culture. All these

TABLE 1. Risk and Associated Factors for Disability*

Demographic Factors	Psychosocial Factors	Medical Disorders/Conditions
Increasing age*	Depression*	Obesity*
Female sex*	Other mental health disorders*	Hypertension*
Litigation*	Litigation*	Back pain*
Single (nonmarried)*	Smoking*	Neck pain*
Lower socioeconomic status*	Workplace bullying*	Nervous system disorders
Living in a poor region*	Job strain*	Severe asthma*
Black/African-American; Hispanic/Latino*	Time pressure	Ongoing exposures among those with occupational asthma*
South central US region	High annual sickness absence*	Chronic medical disorders; poor physical health*
Lower education level*	Long overtime hours*	Arthritides*
	Sleep disturbance*	Poor cardiorespiratory fitness*
	Low social support*	Dyslipidemia
	Low job control*	Diabetes mellitus*
	Relational problems at work*	Physical inactivity*
	Computer work*	
	High job physical demands*	

*Supportive evidence includes at least one prospective study.^{33,34,48-68}

factors interact in complicated ways, and effective intervention may be both less obvious and markedly more difficult than for more straightforward clinical challenges. In some cases, progress is being made, such as in managing the effects of individual psychological factors,^{88,89} where CBT has been shown to be a central component in the successful and durable management of chronic spine pain, anxiety, depression, and PTSD.^{2,4-6,24,90} However, other elements, such as sociocultural influences and the prevailing legislative climate, are currently beyond the scope of clinical practices, although they should generally be documented when identified (eg, no time to engage in therapeutic exercise and/or attendance of physical therapy [PT] because of childcare). This guideline focuses on evidence for preventive interventions that are currently reasonably attainable for most practitioners.

Work disability prevention measures may encompass the discrete levels described above and may extend beyond the typical clinical role to include several aspects of administrative and clinical practice.⁴⁷ The overarching role of the treating clinician is simple and twofold: first, to provide appropriate evidence-based treatment (including referral to other properly trained health professionals), and second, to do no harm, avoiding all sources of iatrogenicity. Several recent publications have provided detailed, practical overviews of disability prevention,⁹¹⁻⁹³ and use of the SPICE (simplicity, proximity, immediacy, centrality, and expectancy) and BICEPS (brevity, immediacy, contact, expectancy, proximity, and simplicity) models as a framework for management is usually appropriate.^{94,95} The following general precepts may contribute to positive outcomes:

- **Avoiding Illness or Injury:** Primary prevention involves evading or circumventing impairing and potentially disabling

illness and injury, particularly using specific preventive measures as discussed in the ACOEM guidelines.

- **Identifying At-risk Individuals:** The healthcare clinician should identify ill or injured individuals who are at risk for eventual work disability as early as possible and should intervene where appropriate. (See Early Intervention section below.)
- **Establishing the Appropriate Diagnosis:** Clinicians need to establish an underlying diagnosis, especially for musculoskeletal conditions (which may have evidence-based and well-established management or few effective therapeutic options [eg, for disc herniation]) and mental health conditions (which may merit focused treatment such as CBT, exercise, and select medications [eg, for a major depressive disorder]). The diagnosis must be accurate and follow established principles of good medicine, correlating history, physical examination findings, and appropriately interpreted testing and imaging. Screening alone does not establish a diagnosis. Psychometric and psychological screening instruments such as the Beck Anxiety and Depression Inventories, Generalized Anxiety Disorder, Patient Health Questionnaire, and the Mini-Mental State Exam or Montreal Cognitive Assessment are useful initial assessment tools for symptoms of anxiety, depressed mood, and cognitive dysfunction, but should only be used to recognize potential problems and identify individuals who may need more detailed assessment by a qualified clinician. Screening for substance use disorders is often also indicated as the use may be surreptitious yet contribute to disability. Adverse impacts of injuries that inhibit and/or contribute to delayed recovery, especially including sleep disturbance, should be addressed.^{56,96-101}

- **Stratifying Risk:** The clinician should attempt to stratify risk and offer stepped care for illness and injury where appropriate.^{102,103}
- **Understanding the Affected Worker:** The clinician should strive to comprehend the impact of the condition(s) on the individual and tailor management to their specific circumstances. This requires a BPS approach often using a multimodal approach,¹⁰⁴ incorporating appreciation of the biological (eg, tissue injury and effects of treatment), psychological (behavioral health elements, including addressing fear avoidant beliefs), and sociocultural (environmental) influences on the person.^{46,105,106} This process should also seek to identify barriers to stay-at-work and return-to-work, including issues in the workplace (performance concerns, difficulties with supervisor or coworkers), personal issues (family burdens or conflicts), psychiatric diagnoses (including Axis II), and involvement with litigation. These issues should be identified and addressed at the earliest opportunity, rather than waiting until there are signs of delayed recovery. The treating practitioner may also need to modify or augment standard treatment to address particular factors that may contribute to eventual work disability in that worker. In addition, the clinician needs to appreciate that work disability is likely to be a dynamic condition that changes over time, with a corresponding need to adjust intervention, including the early and ongoing identification, adequacy, and addressing of coping strategies.¹⁰⁷
- **Promoting Stay-at-Work and Return-To-Work (SAW/RTW):** It is essential to normalize the affected worker's activity and participation levels, including maintaining them in the workplace in some capacity (stay-at-work and return-to-work),

whenever possible and practical during recovery. Clinicians have important roles in minimizing unnecessary lost time, which should begin at the first appointment.¹⁰⁸ Functional assessment and outcomes should be primary foci (see Table 2).^{109,110} This can be greatly facilitated by use of the CLRRRT (capacity, limitation, risk, restriction, and tolerance) paradigm.¹¹¹ In this approach, *capacity* and *limitation* refer to what an individual is physically or mentally able and unable to do; *risk* and *restriction* refer to potential or actual hazards to the affected person and others posed by their condition, and necessary activity restrictions to alleviate or minimize that hazard; and *tolerance* refers to the person's willingness to engage in a given activity at a given time. (Capacity, limitation, risk, and restriction can reasonably be determined by healthcare professionals, but tolerance is not a medical construct and cannot be.) Collaborations among workplace medical professionals, safety professionals, production supervisors, therapists, ergonomists, industrial hygienists, and human resources personnel are often helpful with SAW/RTW. Participatory ergonomics programs focused on patients with MSDs, especially regarding the spine, pain may help SAW/RTW status (see Low Back Disorders Guideline).²⁴ Ongoing monitoring for the development of other disorders, especially mental health, is indicated to minimize added disability.¹¹²

- **Avoiding Administrative and Medical Iatrogenicity:** Avoiding iatrogenic effects, including advocagenicity, medicalization and iatrogenicity (eg, inappropriate imaging such as for nonspecific spine pain; nonevidence based treatments that

TABLE 2. Examples of Objective Function-Based Goals and Secondary Goals to Track During Treatment*

Primary functional goals
1. Return to work from nonworking status
2. Return to full duty work from modified working status
3. Advancement of activity, especially observed in therapy
a. Increased weight lifted
b. Increased numbers of repetitions
c. Increased distance walked
Secondary functional goals
1. Resumptions of activities of daily living (eg, clothing, bathing, showering)
2. Resumption of household chores
3. Resumption of sports
4. Validated functional instruments.†

*Adapted from the ACOEM, Initial Approaches to Treatment Guideline.

†Generally, functional instruments are subjective and lack objective measures.

increase risk of disability, anxiolytics and hypnotics, lumbar fusion for degenerative disease), excessive focus on symptom relief versus functional restoration,¹⁰⁹ and disregard for the critical nature of time in recovery from work-related illness and injury.^{113–117} Any intervention should be appropriately delivered (eg, educating the patient on the purpose and limits of the treatment [eg, CBT, epidural steroid injection, occupational therapy/PT]).

Early Intervention

Having identified the target of an intervention designed to return the patient to work, does earlier intervention result in superior outcomes? It seems intuitive that the sooner a proven intervention is utilized for treatment of a patient, the less disability would ensue. Though this is a commonly held belief, a systematic review for this guideline failed to find any high- or moderate-quality trials testing the theory that earlier intervention is effective at minimizing and/or avoiding long- or intermediate-term disability. In more narrow questions of specific interventions, for example, early PT for low back pain or discectomy for radiculopathy, support for early intervention to prevent disability was also weak and/or poor.

However, although only low-quality evidence is available at present, the extant information generally supported the concept that the sooner effective treatments are administered, the sooner the patient should recover.^{118–125} Clinicians may need to address disability prevention early in the course of a work-related illness or injury. For example, even when a clear diagnosis is not established, the following may help mitigate extended workplace absence: exploring perceived barriers to recovery and RTW, educating the worker on realistic care and RTW expectations, proposing alternative duty, communicating with other stakeholders, engaging case management, and assessing barriers to SAW/RTW. There is also some evidence for the potential value of early behavioral health assessment when signs of delayed recovery are identified.^{126–129} When a treatable behavioral health condition is identified, the timely application of suitable interventions is likely to improve the condition, which may in turn facilitate return-to-work recover.^{118–125} See the Workplace Mental Health Guidelines,^{4–6} as well as the evidence presented below regarding behavioral interventions specifically targeted to returning patients to work.

The Critical Need for Further Study

Review of the literature on both general and specific aspects of disability prevention and management has shown there is a fairly dramatic lack of quality evidence. Thus,

there is a pressing need for qualitative and quantitative research on many aspects of work disability, including epidemiology, direct and indirect costs, causation (particularly psychosocial influences), screening tools that are validated as showing that interventions result in reduced disability, interventions, and outcomes.

Treatments

The focus of disability prevention and management is to establish diagnosis and begin definitive treatment for a given condition as soon as possible in the course of the illness. Detailed diagnostic and treatment algorithms have been developed for numerous specific disorders.^{2–6,16–28} These are expert assessments utilizing integrated and sequential approaches inclusive of relative values, and the authors recommend that they be consulted to ensure that a patient has undergone appropriate diagnosis and treatment for underlying conditions before proceeding to the following interventions focused on disability prevention. Telehealth options are also available and recommended (see Initial Approaches to Treatment Guideline).¹³⁰

Disability Screening

Disability screening has been advocated as predictive of the development of disability with the potential to intervene and reduce morbidity.^{131,132} There are many different tools available, including Orebro, STarT, Roland Morris Disability, Shaw, Walter Reed Functional Impairment Scale, Maslach Burnout Inventory, and Abilita Rehabilitation Index (see examples in Table 3).^{131,133–153} However, while there are a few exceptions,^{142–144} the literature on validation of these measures is almost entirely without a demonstrated predictive nature; rather, it is overwhelmingly associative regarding, for example, the current measure of pain, function, and/or disability.¹³² Importantly, the literature is further limited with respect to showing that early identification of those purportedly at increased risk of disability can undergo successful interventions with resultant reduced disability.¹³¹ However, there are a few studies suggesting the potential benefits of early screening and intervention.^{147,153} However, attempts to reproduce results using the StarT method failed to validate,^{148,149} raising cautions about any one approach until results are independently replicated.

A moderate-quality RCT in England found psychologically augmented physiotherapy, including greater education regarding active exercise and addressing fear avoidant beliefs, in high-risk patients to be modestly superior to usual care at four and 12 months,¹⁵⁰ although a similar study in the US did not find comparable benefits.¹⁴⁸ Another moderate-quality RCT found 10 individualized PT

TABLE 3. Examples of Disability Screening Tools

Screening Tool	Author and Study	Questionnaire/Tool	Comments
Orebro	Ford 2016 (STOPS Trial, RCT) Hahne 2017 (post-hoc Ford 2016) Schmidt 2016, RCT	Musculoskeletal pain questionnaire for current episode of low back pain and/or referred leg pain for 6 weeks to 6 months. Musculoskeletal pain questionnaire. German short-form for low back pain.	Data suggest better efficacy in intervention group (individualized physiotherapy) Some efficacy for factorial and construct validity
STarT Back	Cherkin 2018, RCT (MATCH Trial) Delitto 2021, RCT (TARGET Trial) Katzan 2019 Khan 2019	Questionnaire for nonspecific back pain Questionnaire for nonspecific back pain Questionnaire for nonspecific back pain Questionnaire for nonspecific back pain	Lack of efficacy Lack of efficacy Nonlinear correlation between disability and STarT Lack of efficacy for medium and high risk for back disability patients.
Orebro versus STarT for chronic	Beneciuk 2014 Lheureux 2019	Questionnaire for nonspecific back pain Both questionnaires	Some efficacy Orebro better than STarT for pain and work and STarT better for function. However, Orebro is designed as prognostic and STarT is designed as a treatment guide.
Roland Morris Disability	Hill 2011, RCT	Questionnaire for Back pain with or without radiculopathy.	Data suggest modest efficacy in the intervention group.
Shaw	Shaw 2005	Nonspecific 16 item patient questionnaire and 10 item clinician questionnaire to screen for occupational low back pain	Modest predictive ability (sensitivity 74.3%, specificity 70.1%)
Walter Reed Functional Impairment Scale	Herrell 2014	Questionnaire for military personnel exposed to traumatic events	Some efficacy for psychological constructs such as negative occupational and social performance
Maslach Burnout Inventory	Ahola 2009	Questionnaire	Occupational burnout highly correlated to disability pension.
Abilita Rehabilitation Index	Garton 2016	Questionnaire pain and work disability as a consequence of musculoskeletal injury or illness.	Some efficacy

appointments superior to two appointments consisting of generalized guideline advice among those with higher back pain levels and poorer coping;¹⁴⁷ another trial found no difference, although use of opioids and imaging were 22%–26% despite advice against use.¹⁴⁹ A moderate-sized study of 518 acute low back pain patients at occupational clinics found that factors of job tenure, physical job demands, availability of modified duty, earlier reporting to the employer, pain ratings, and mood ratings predicted functional improvement and return to work.¹⁵¹ One small study of 159 subacute low back pain patients found modest correlations between medical history, physical examination, and range of motion; however, the variables did not correlate with return-to-work status.¹⁵⁴ Burnout has been shown to predict disability pensions in a small study.¹⁵²

There are no quality studies of the utility of disability screening measures in a broad array of patients to facilitate intervention that reduces disability. However, disability screening is **Recommended, Insufficient Evidence (I) with Moderate Confidence** in the absence of quality evidence to reassess and attempt to redirect care to provide for better clinical outcomes. Indications include individuals whose clinical course diverges from what is expected, those with a confirmed diagnosis but failure to improve as expected, and/or those with medically unexplained illness or work absence.

Education

There are few quality articles that have evaluated the efficacy of education, and those are typically for specific disorders.^{2–6,16–28} However, most of these trials used the education arm as the control group. This limits the ability to draw an evidence-based conclusion. Regardless, education provides the patient with information to understand aspects of care, such as the need to comply and/or work through pain to realize potential benefits. Thus, education is **Recommended, Insufficient Evidence (I) with High Confidence**.

Exercise

Exercise is considered among the most important therapeutic interventions for the treatment and prevention of MSDs, hypertension, diabetes mellitus, lipid disorders, cardiovascular disease, some cancers, and mental health disorders.^{155–202} Exercise may reduce eventual work disability in nonspecific low back pain^{190,202} and neck and upper extremity disorders.²⁰³ The ACOEM guidelines evaluate exercises in broad groupings of 1) aerobic exercise, 2) stretching and 3) strengthening. Additional reviews include aquatic therapy, yoga, tai chi, and Pilates.^{2–6,16–28} There are hundreds of RCTs that primarily used various exercise regimens for treatment of disorders, the vast majority of which have shown

evidence of efficacy and are reviewed in the various disorder-specific guidelines.^{2–6,16–28}

An exercise prescription is **Recommended, Insufficient Evidence (I) with High Confidence** for primary, secondary, and tertiary prevention of work disability. Indications include all patients with common impairments (eg, musculoskeletal, mental health, cardiopulmonary disorders) that have been shown to benefit from an exercise prescription. Formal programs with the institution of supervised, progressive exercise regimens are generally indicated for moderate to severely affected patients. Supervised exercise programs by a physical or occupational therapist are often helpful for those vocalizing fear-avoidant beliefs, many postoperative or posttraumatic injuries, complex and/or complicated individuals with many comorbidities, those not progressing as expected, and/or those having difficulties advancing an exercise regimen. Simultaneous coordination with CBT is often helpful. Exercise programs also appear to have primary preventive benefits. See individual disorder-specific guidelines for specific details.^{2–6,16–28}

If a supervised program is felt to be needed, see specific disorder-related guidance in other ACOEM guidelines, as there is increasing evidence of specific exercise regimens having efficacy for specific disorders. In general, recommended frequency is one to three sessions a week for up to 4 weeks, and perhaps

longer as long as progressive, objective functional improvement and symptom reduction are occurring. If the program is self-directed, daily exercise is recommended. An exercise prescription should address specific treatment goals and be time limited with transition to an independent exercise program as part of a healthy lifestyle (no longer considered treatment). The purpose of supervised exercise therapy is reduction in the degree of impairment, symptom reduction, functional improvement, and educating the patient so that they can independently manage the program. Evaluation for an exercise prescription related to work disability prevention involves consideration of four components: 1) stage of (theoretical) tissue healing (acute, subacute, chronic), 2) severity of symptoms (mild, moderate, severe), 3) degree and type of deconditioning (flexibility, strength, aerobic, muscular endurance), and 4) psychosocial factors (eg, medication dependence, fear-avoidance, secondary gain, mood disorders).

For purposes of work disability prevention, progressive aerobic and strengthening exercises are generally the preferred emphases. Stretching exercise is mainly indicated for acute pain and/or improving range of motion, especially when the range of motion is abnormally reduced and nonfixed. There is some evidence that extensor deconditioning may be a risk for acute LBP and thus a specific target for prevention.²⁰² When a specific diagnosis is made, there are evidence-based exercise modalities that are beneficial (eg, eccentric stabilization exercises for tendinopathies). Tailoring an exercise program to work demands may be helpful.

To achieve an aerobic program for most patients, a graded walking program is generally desired, often using distance or time as minimum benchmarks—eg, start with 10 to 15 minutes twice a day for 1 week, increase in 10- to 15-minute increments per week until ≥30-minute walking a day is achieved. A reasonable eventual target for patients is walking at least four times a week at 60% of predicted maximum heart rate (220-age = predicted maximum heart rate).²⁰⁴

Cognitive Behavioral Therapy

CBT is a short-term, goal-oriented psychotherapy treatment that takes a practical approach to problem solving. CBT attempts to change the patient's attitudes and behavior by focusing on their thoughts.²⁰⁵ It may include a variety of component therapies, including cognitive therapy, relaxation therapy, and various types of exposure therapy.

As cognitions often occur in a rapid and automatic manner, the individual may not be explicitly aware of cognitions or the distorted perceptions created by these thoughts. CBT is the process of examining these cognitions and replacing those that are distorted or

dysfunctional, such as catastrophizing^{206–210} or kinesiphobia,^{211–213} with cognitions that are accurate and more functional.^{214,215} This is thought to be important as, for instance, catastrophization is associated with poorer ability to have perceived the BPS message at 6 weeks after the start of treatment.²¹⁶

Types of cognitive and behavior therapies may be considered to include cognitive processing therapy, cognitive therapy, dialectical behavior therapy, rational emotive behavior therapy, self-instructional training, stress inoculation training, and acceptance and commitment therapy.

More recently, empirical research has examined the impact of CBT for workplace interventions. This type of CBT is called work-focused CBT (w-CBT or CBT-w).²¹⁷ There are common barriers that individuals may perceive that impede the individual's return to work. These barriers can be divided into distinct categories: *individual issues* (eg, personality or coping issues, individual perception of the workplace, a severe disorder with comorbid health conditions); *work* (eg, workplace conflict, lack of supervisor/co-worker support, and lack of guidance or training at work); and *healthcare* (eg, insufficient mental healthcare, insufficient care from the physician, and provision of nonevidence-based care). With w-CBT, the individual's problematic thoughts and feelings are identified. The individual is taught cognitive restructuring regarding identified, perceived negative workplace situations, such as workplace conflict, as well as the individual's perceptions of inability to continue to work. Cognitive restructuring is helpful in assisting an individual's stay at work or return to work.

Besides CBT, there is some evidence that psychiatric consultation for sick-listed employees in the Netherlands was associated with faster return-to-work.²¹⁸ There is inconsistent evidence that supervisor training influences employee well-being.²¹⁹

The Panel acknowledges that there may be confusion regarding recommendations for CBT. In the ACOEM workplace mental health guidelines,^{4–6} the recommendations for CBT are stronger, consistent with the evidence for each discrete disorder. As a treatment modality in general, CBT has been demonstrated to be efficacious with B-level evidence for certain discrete disorders. Here, however, the question is narrower, and specifically focused on prevention of, and/or reduced duration of, work disability. The literature is less strong for both work-focused CBT and CBT generally. As a result, CBT is recommended both here and in the workplace mental health guidelines, but with differing levels of evidence.

There are many types of CBT and many moderate-quality studies suggesting efficacy of CBT for many disorders, particu-

larly including pain conditions and mental health disorders. There are only a few RCTs of a work-focused CBT program and impacts on outcomes measures; the largest study demonstrating benefits⁸⁹ and a telehealth intervention for depression also suggesting efficacy.^{220,221} Uses in inpatient settings show conflicting results.^{222–225} One type of program that includes features of CBT is the Progressive Goal Attainment Program.^{226–230} However, quality evidence for any specific CBT type is variable, ranging from good to insufficient. CBT components with quality evidence allowing evidence-based guidance include computer-assisted cognitive therapy, interpersonal therapy, and acceptance and commitment therapy.

CBT, especially including a work focus, is **Recommended, Evidence (C) with Moderate Confidence** for the prevention of work disability, improving symptoms, increasing return-to-work, reducing presenteeism and absenteeism, and promoting stay-at-work. Indications include having an impairing disorder sufficient to require treatment. Work-focused CBT is generally preferable for return-to-work and stay-at-work purposes. CBT may be first-line treatment and may be used with an exercise and or progressive increase in activity prescription.

Medical and Psychological Treatments for Symptom Reduction

In contrast with work-focused CBT, the evidence for other psychotherapies is considerably less for purposes of disability prevention. While many individuals are referred for nonwork-focused psychotherapies, the referral may not be beneficial and may needlessly prolong the case by being nonbeneficial. It is noteworthy that this differs from some recommendations in the workplace mental health guidelines (PTSD, depressive disorders, and anxiety disorders).^{4–6} Whereas there is good-quality evidence to support CBT and some other psychotherapies for the treatment of mental health disorders, the evidence to support the use of psychotherapies that are not work-focused, including CBT, as a means to prevent or mitigate work disability, is insufficient. Thus, there is **No Recommendation, Insufficient Evidence (I), Low Confidence** regarding psychotherapies that do not specifically address work disability.

Medications

There are medications with specific indications for each disorder that may assist in secondary and tertiary work disability prevention, including minimizing the degree of work disability.^{2–6,16–28} However, some medications appear to increase risk of disability. These prominently include opioids and

benzodiazepines. Please see specific guidance, as there are many other options for treatment that typically focus on CBT, exercise, and other options.^{2-6,16-28}

Other Modalities: Electrical Therapies, Devices, Heat Therapies, Cryotherapies, Massage, Manipulation, Acupuncture, Relaxation, Meditation

All of these treatments are classified as passive treatments (eg, in contrast with aerobic and strengthening exercises or CBT). Some of these treatments have quality evidence of efficacy for the treatment of specific disorders,^{2-6,16-28} most typically in the subacute or secondary work disability prevention phase, which is after a disorder has occurred, and thus may contribute to work disability prevention. However, as these are passive modalities, they are generally thought to have relatively little value in tertiary prevention of work disability. Instead, they may inadvertently increase work disability by externalization, reliance on others for treatment, avoidance of performing an active rehabilitative program, and lack of development of an active rehabilitative strategy and mindset. If an individual has not had one of these treatments and also has quality evidence of efficacy for his/her specific disorder, a short course to ascertain potential benefits may be indicated, including for secondary or tertiary prevention. Attention to objective evidence of significant function and symptom improvements is important.

Injection Therapies

Some injections have quality evidence of efficacy for the treatment of specific disorders (eg, glucocorticoid injections for carpal tunnel syndrome, trigger digit, and radiculopathy from a herniated disc); that evidence of efficacy is typically during the secondary work disability prevention phase and/or subacute period. In such cases, injections may either be curative or help to reduce pain and inflammation to facilitate participation in active rehabilitative programs focused on functional restoration. Occasionally, they may be merely used to delay surgery (eg, glucocorticosteroid injection for knee osteoarthritis). However, injections are generally thought to have relatively little value in tertiary prevention of work disability. They may inadvertently increase work disability by externalization, reliance on others for treatment, avoidance of performing an active rehabilitative program, and lack of development of an active rehabilitative strategy and mindset.^{2-6,16-28} If an individual has not had an injection therapy that also has quality evidence of efficacy for his/her specific disorder,

an injection to ascertain potential benefits may be indicated including for secondary or tertiary prevention. In such cases, attention to objective functional improvement is particularly important.

Surgical Treatments

Surgeries may be restoratively curative for some disorders (eg, hip arthroplasty for severe osteoarthritis, discectomy for severe radiculopathy), and see disorder-specific guidelines.^{2-6,16-28} However, some surgical procedures and implanted devices have been shown to have relatively little value and may inadvertently increase work disability by externalization, reliance on others for treatment, avoidance of performing an active rehabilitative program, and lack of development of an active rehabilitative strategy and mindset. If an individual has not had a surgical treatment that also has quality evidence of efficacy for his/her specific disorder,^{2-6,16-28} there should be consideration for whether that patient may benefit from the surgery. Well-informed, shared decision making may be an approach to utilize, especially to help establish understandings of risks, benefits, and surgical goals.

Work Conditioning, Work Hardening, Early Intervention Programs, Interdisciplinary Work Rehabilitation Programs, Back Schools, Chronic Pain Management Programs, Multidisciplinary Rehabilitation Pain Programs, Interdisciplinary Pain Rehabilitation Programs, Functional Restoration Programs, and Participatory Ergonomic Programs

These programs are reviewed in the Chronic Pain Guideline.² The quality of these programs ranges widely, as does the efficacy between and among these programs. In general, programs that emphasize active treatments (eg, progressive exercises and CBT) are more successful. Long-term objective patient outcomes (eg, rate of return to work) are a good measure of the overall success of a given program.

Nurse Case Management

Nurse case management (NCM) is typically used to assist workers in returning to modified and full duty work through provision of coordinating complex care, facilitating modified duty work and transitioning back to work, typically after prolonged lost time. Few trials have assessed NCM. One trial of integrated case management found evidence

of improved clinical outcomes and reduced lost time.²³¹ There is clinical experience that NCM is helpful, it has negligible adverse effects aside from potential medicalization and externalization, and it is thus, **selectively Recommended, Insufficient Evidence (I) with Moderate Confidence** especially when there is potential to shorten work disability and facilitate earlier return to work. Indications are those who are either off work or on modified duty status without trending toward returning to the usual job in expected timeframe. With selective moderate to severe conditions, early NCM may be indicated before work disability durations are exceeded (eg, a patient had prior work disability status, prior prolonged work disability duration(s), absence of modified/light duty, vocalized fear avoidant beliefs with stated intention to remain off work for a prolonged time). NCM is also helpful where there are repeated barriers that need assistance in surmounting (eg, recurring difficulties scheduling medical appointments, complex consultation visits, communication barriers/breakdowns, language barriers).

Job-Workplace Interventions

Workplace interventions have been used to attempt to facilitate better return-to-work and stay-at-work.^{104,232-261} The literature regarding job modifications is highly heterogeneous, and there are few randomized trials. This limits the ability to develop a letter grade (A/B/C) recommendation, as well as to develop detailed guidance on specific interventions. See also "Participatory Ergonomics Programs" in the Chronic Pain Guideline.² There are multiple moderate quality RCTs that include some element of job modification and are generally supportive. Job modifications have generally negligible adverse effects aside from potential medicalization and externalization, although associated costs can be low to very high, and they are **selectively Recommended, Insufficient Evidence (I) with Moderate Confidence** especially when there are cost-effective means to facilitate return-to-work/stay-at-work. The indications are for workers off work or at high risk of going off working status. The intervention(s) may include measurements of job tasks, identification of potential job accommodations, identification of alternate jobs, and participatory ergonomics programs. Potential benefits include improved return-to-work and/or stay-at-work.

Vocational Rehabilitation

VR has been used for work disability prevention.²⁶²⁻²⁶⁵ Early return-to-work programs are separately reviewed in the Chronic Pain Guideline.² There are few quality articles that address the efficacy of VR services, as the available literature addresses work rehabilitation and/or interdisciplinary care

particularly for nonwork-related disorders. There is some evidence of efficacy for transitioning programs among those leaving the military.²⁶⁶ VR has been suggested to delay job loss among workers with rheumatic diseases²⁶⁷ and has been reportedly effective among those with myocardial infarction.²⁶⁸ One RCT showed nonsignificant findings of less disability at 1 year after traumatic brain injury among those in a cognitive and VR group,^{269,270} while another RCT of patients with traumatic brain injury was negative and reported that work self-efficacy was the most important factor determining return-to-work status at 1 year.²⁷¹ Some evidence suggests that function-based rehabilitation is superior to pain-centered rehabilitation over a 1-year period.²⁷² A nonsignificant trend favoring intensive case management over standard case management has been reported.²⁷³ One trial suggested a lack of efficacy of a VR-plus-mental-healthcare program for those with anxiety disorders,^{274,275} while a similar trial found efficacy for treatment of either anxiety or depression over 12 months,²⁷⁴ which disappeared at 24 months.²⁷⁵ VR programs have some evidence suggesting potential efficacy, have minimal adverse effects, and are high cost with no plausible alternative. Thus, VR is highly selectively **Recommended, Insufficient Evidence (I), Moderate confidence** for treatment and prevention of work disability. The indications for VR are for chronic and stable conditions among workers, and there importantly needs to be strong patient dedication to return-to-work. Highly selective use may be considered for those with subacute rehabilitation where recovery is unlikely to result in return to the prior job and there is no comparable job available that the patient is able to perform. Benefits include improved return-to-work and stay-at-work, while the harms are negligible.

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