

OPTIMIZING MEDICAL CARE TO FACILITATE AND SUSTAIN EMPLOYMENT AFTER SPINAL CORD INJURY

Florian P. Thomas, MD, MA, PhD; Lance L. Goetz, MD; Thomas Dixon, PhD; Chester Ho, MD; Sally Ann Holmes, MD; Paul Sandford, MD; Sheila Smith, OT; Lisa Ottomanelli, PhD

INTRODUCTION

Unemployment among persons with disabilities is a serious and prevalent problem. The Department of Labor's Bureau of Labor Statistics reported that, as of May 2014, the employment rate for people without disabilities was 71.4 percent, but only 25.3 percent for persons with any disability [1], an employment gap of 46.1 percent. According to a comprehensive review of the literature between 1978 and 2008, the average rate of employment during that period for people with spinal cord injury (SCI) was only 35 percent [2]. Such data may reflect that, in the past few decades, vocational rehabilitation has been viewed as a secondary goal after SCI. Increasingly, however, return to work (RTW) is being rediscovered as a vital element of successful rehabilitation based on evidence that it improves quality of life, psychological adjustment, and social functioning. This, in turn, improves health, which decreases healthcare utilization [3–4].

Ways of providing appropriate vocational and medical support for RTW have been developed for both traumatic brain injury (TBI) [5] and serious mental illness [6]. One method, evidence-based supported employment, which consists of intensive individualized service that integrates vocational rehabilitation into clinical care, can greatly improve the likelihood of RTW for people with serious mental illness [6–7]. Community reintegration of Veterans with complex mental and physical disabilities is a priority area for the Department of Veterans Affairs (VA). Initial findings of two sequen-

“Returning to work after spinal cord injury requires a proactive health strategy and continuous collaboration between patient and healthcare team.”

tial VA-funded, 5-year national, multisite, longitudinal studies of RTW for Veterans with SCI indicate that evidence-based practice supported employment is more effective than traditional vocational rehabilitation [8–9].

One of the most frequently reported reasons for not working after SCI is inability to perform the physical demands of the job (60%) [10]. Vocational accommodations, however, can be helpful for overcoming the physical demands of work. Another important obstacle to RTW is hospitalization [11]. Because a person with SCI must monitor many bodily functions that previously required little attention, the critical challenges that must be met after SCI in order to recover autonomy and RTW are a heightened self-awareness and a meticulous self-care routine. Without health education and motivation, however, the skills needed for such a radical change in daily life may never fully develop. RTW, however, can fuel that motivation.

Anticipation, prevention, and, when prevention fails, rapid medical intervention are required to maintain the health—and employment—of people with SCI who want to work. Herein, we discuss the vocational implications of impairments typical of SCI (Table) and strategies for managing these impairments so as to improve Veterans' outcomes in seeking and maintaining work after SCI.

OPTIMIZING CARE THROUGH COLLABORATION AND INCLUSION

For RTW to succeed over time despite the complexity of SCI, a proactive, preventive health strategy is needed that addresses medical challenges

Table.

Conditions typical with spinal cord injury (SCI) that affect return to work. (Underlined terms are described in further detail in [Appendix](#), available online only).

Condition	Concern	Work-Related Issue
Medical		
<u>Autonomic Dysreflexia</u>	Sudden and insidious onset that can resemble anxiety. Treatment: Immediate correction of underlying cause, most often bladder related; if this fails, use nitroglycerin 2% paste.	Detection requires high level of suspicion. Educate employee, coworkers, and employer.
<u>Bladder, Neurogenic (Loss of Voluntary Control)</u>	Bladder emptying or storage; urinary catheterization helpful. Increased risk of UTI and skin trauma from catheters.	Without developing and following a bladder management plan, UTI may result in frequent sick leave. Caregiver assistance at work may be needed.
<u>Bowel, Neurogenic</u>	Bowel care routine of less than 2 h required to prevent hemorrhoids. Colostomy may be best solution for some and may lead to higher satisfaction with bowel management.	Work schedule must accommodate bowel care schedule. Caregiver assistance at work may be needed. Prolonged sitting contributes to hemorrhoids.
<u>Heterotopic Ossification</u>	Impairs range of motion. Increases risk of PrUs.	Specialized seating may be required.
<u>PrUs</u>	Most frequent medical complication after SCI; often recurrent. Prevention critical—protect skin from moisture, friction, and pressure. Recovery requires often lengthy conservative or surgical care.	Work may reduce risk of PrUs by improving health behavior. Prevent with frequent rest breaks, pressure relief, and sometimes standing wheel chair. Prolonged recovery and recurrence affect job retention.
Neuromusculoskeletal		
<u>Limb Impairment, Lower</u>	Even if walking is possible, impaired gait and balance may create risks. Fall assessment required.	Fall-proofing can increase personal safety and confidence. For jobs requiring lower-limb function, functional capacity evaluation may be useful.
<u>Limb Impairment, Upper</u>	Impairment occurs from weakness, flaccidity, spasticity, and contractures. Treatments include orthotics, reconstructive surgery, and functional electrical stimulation. Shoulder problems can result from overuse.	Ergonomic workplace design can increase accessibility and decrease risk of complications. Education helps prevent overuse.
<u>Fractures</u>	Even minor stress on bones below level of SCI can cause fractures. Leg fracture usually treated with leg elevation and extension and bivalved cast or padded brace.	Educate employee, coworkers, and employer about risks of fractures. Detection requires high level of suspicion.
<u>Osteoporosis</u>	No proven prevention or treatment. Further increases risk of fractures.	Educate employee, coworkers, and employer about risks of fractures.
<u>Spasticity</u>	Spasticity may support standing/pivoting; must be treated only when it impairs function or causes pain or other complications. Treatment and prevention include physical therapy and gentle stretching; equipment, including standing wheelchair; and medications.	Prefer medications less likely to affect cognition. Long periods of stillness can exacerbate spasticity; with prolonged inactivity, scheduled breaks for gentle stretching.
Neuropsychological		
<u>Depression</u>	Is underdiagnosed and under-reported. Psychotherapy combined with medication may be more effective than medication alone. Include vocational services in treatment strategy.	Associated with decreased workplace productivity and increased absence. Can be mistaken for lack of motivation. Work can mitigate depression.
<u>Dual Diagnosis TBI and SCI</u>	Dual diagnosis of TBI/SCI is associated with greater cognitive impairment and emotional distress and less functional gain than SCI alone. Include neuropsychological evaluation in vocational planning. Effects of TBI may manifest only when challenges occur, such as seeking employment.	As severity of TBI increases, likelihood of successful return to work decreases. Screen for co-occurring TBI/SCI in vocational candidates. Supported employment is proving effective.
<u>Pain</u>	Goal of treatment is maximum benefit with minimal adverse reactions. Improving activity and quality of life may be more realistic than eliminating pain.	Pain interferes with vocational goals. Medication can affect work productivity and safety.
PrU = pressure ulcer, TBI = traumatic brain injury, UTI = urinary tract infection.		

through continuous interdisciplinary collaboration between persons with SCI and their healthcare team. A care plan must be developed that is flexible and responsive to evolving needs while the person seeks, gains, and maintains employment (Figures 1 and 2). Vocational rehabilitation specialists can be critical in mediating among a person with SCI, healthcare providers, and potential or current employers. Persons with SCI, however, may need to be coached to be their own advocates and to draw not only on the expertise of healthcare teams and vocational counselors but also on the support of their social networks for assistance with related activities such as transportation and bowel and bladder care routines at work.

Employers, recognizing what people with disabilities can bring to the work team and the customer, are joining in the discussion of the implications of reasonable accommodations as required by the Americans

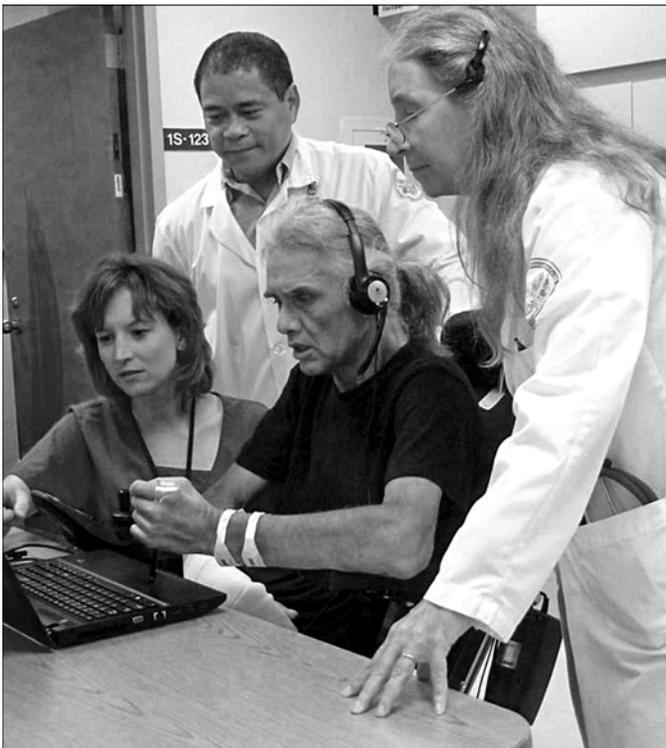


Figure 1.

Vocational plans that sustain long-term employment for persons with spinal cord injury must be developed as part of clinical care that integrates continuous interdisciplinary collaboration. Shown here are an occupational therapist, physician, and physician's assistant evaluating assistive technology to help a Veteran with impaired hand function operate a laptop computer.

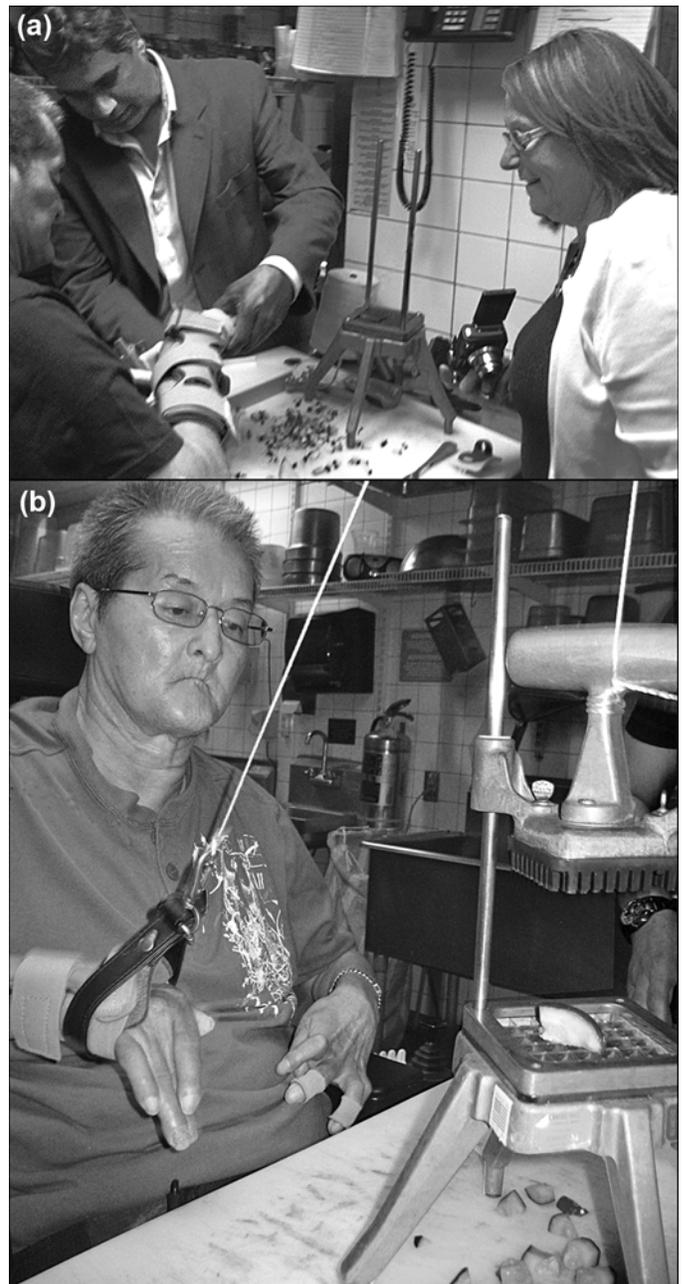


Figure 2.

Through integration of medical care and vocational rehabilitation, accommodations and workplace supports were developed to help a person with cervical 6, American Spinal Injury Association C tetraplegia and limited use of his right hand and arm obtain work as a prep cook. (a) A rehabilitation engineer and physical therapist accompanied the patient to the restaurant kitchen where he was employed to help fit him with a cuff that enabled him to operate a specially designed chopper. In order for him to use his larger proximal arm muscles to operate the chopper, it was designed with a pulley. (b) One end of the pulley is attached to a blade that slides up and down the support structure; on the other end is the cuff. With the cuff and a splint on his right hand, the patient controls the blade. (Photograph used with permission of Barbara Taylor.)

with Disabilities Act [12]. For example, flexible scheduling is essential to accommodate healthcare needs, such as time off for both predictable and unpredictable medical appointments and for breaks to allow for bladder and bowel care. Technological advances also continually increase options. Therefore, all members of the team need to keep abreast of such developments. For example, an adapted home environment may foster an optimal balance between on-site work and telework without losing the benefit of social engagement of the traditional work environment.

MEDICAL CONDITIONS TYPICAL OF SPINAL CORD INJURY

Autonomic Dysreflexia

Autonomic dysreflexia (AD), an exaggerated reflex response to a visceral or somatic stimulus such as bladder or rectal distension, is a potentially life-threatening condition unique to SCI. AD can occur suddenly and complications can be fatal; therefore, prompt recognition is essential. However, AD can be overlooked even by healthcare providers if they are uneducated in SCI care. For instance, a person with SCI often has a lower than average blood pressure; thus, if blood pressure were elevated because of AD, it might go unrecognized as an AD symptom.

The most common cause of AD [13] is elevated bladder pressure caused by a full bladder or by catheter blockage due to debris, encrustations, calculi, or kinking. Bowel problems, such as stool impaction or irritated hemorrhoids, are another common cause. Therefore, ruling out bladder or bowel distension is the first step in seeking the cause of AD [14]. Since AD can occur during work, coworkers and the employer's medical providers need to be familiar with initial management, which can resolve most occurrences, and with when to seek emergency medical attention.

Neurogenic Bladder and Bowel

Neurogenic Bladder

Loss of voluntary bladder control is common in SCI, and urinary incontinence may be a factor in unemployment [15–16]. Because the usual alternative strategy for voiding is the use of urinary catheters, “social continence” primarily means staying dry by preventing problems with catheters. Further, urinary

tract infections, the most frequent cause of infection and illness in persons with SCI, may be overlooked even though early detection is critical to the prevention of complications. Once infection occurs, recovery may require long or frequent absences from work, which can substantially impact job retention [11].

Medication or procedures to facilitate catheter storage or emptying can be used to both decrease stasis of urine and prevent bladder leakage. Catheterization regimens should be evaluated and adjusted as needed for a vocational setting. Some employees may be reluctant to catheterize at work, in which case education may lead them to reconsider. Self-contained urinary drainage systems may promote independence.

Neurogenic Bowel

For people with SCI, bowel management may be a less apparent, though no less significant, challenge than mobility impairment [17]. In fact, bowel management may be the greatest challenge, especially with regard to RTW [18]. Poorly controlled neurogenic bowel has social implications that can seriously undermine vocational efforts [19]. Further, as a result of underreporting of this sensitive issue, it may represent an even greater challenge than current data suggest.

Planning an individualized bowel care routine is vital to successful RTW and warrants important and sometimes complex considerations for vocational planning, such as coordination of work and bowel management schedules. In addition to maintaining social continence (avoidance of bowel accidents), bowel management prevents common medical complications, including hemorrhoids, which occur frequently [20] and may limit the time a person can spend sitting—an essential element of many jobs. Colostomy, though often considered a last resort, can lead to higher satisfaction with bowel management, at least partly because it takes less time [21].

Considerations for Both Bladder and Bowel Management

Plans for bowel and bladder management should assess factors such as frequency of bladder and bowel emptying and where and what facilities are available. The time required for care regimens and medication administration should be considered during the scheduling of work hours and break times. Contingency plans are also needed in case unexpected bowel or bladder problems occur at the workplace. A related

concern is that bathroom facilities should allow for privacy to attend to bodily functions and should be accessible and appropriately located relative to parking and to the building entrance. If assistance is needed for bowel or bladder care, options include having caregivers come to the workplace or using devices such as an electric leg bag emptier or self-contained urinary drainage systems.

Pressure Ulcers

Pressure ulcers (PrUs), which result from extreme or prolonged pressure on bony prominences, can be a serious, life-long problem after SCI due to sensorimotor-autonomic deficits. Prevention of PrUs involves multiple strategies. Skin health can be maintained by preventing friction and eliminating moisture in the areas at risk. Behavioral strategies include shifting weight frequently, optimizing seating and bladder and bowel management, and treating spasticity.

While techniques to prevent PrUs must be incorporated into work routines, employment may actually reduce the risk of PrUs by improving the employee's adherence to care routines to avoid missing work and by leading to a more active, healthier lifestyle [22–23]. This is a significant benefit because skin problems such as PrUs were the second most common cause for rehospitalization and were associated with the second leading cause of death among those followed in SCI Model Systems programs [24].

Heterotopic Ossification

Heterotopic ossification (HO) is abnormal bone formation typically found around joints below the level of the SCI. HO occurs in approximately 20 percent of people with SCI and typically affects the hips, followed by the knees and elbows. The problem usually starts within 2 mo of injury; therefore, treatment is typically underway by the time a RTW is considered. From a vocational perspective, the main concern with HO is loss of range of motion in the hips, which can change the way a person sits in a wheelchair and, thus, can require specialized seating. Impaired hip flexion may prevent upright sitting or the ability to lean forward and may restrict mobility such as needed for wheelchair propulsion or reaching for objects. HO may also cause unequal pressure on certain bones during sitting and increase the risk of PrUs in those areas. The multidisciplinary rehabilitation team can identify equipment adjustments to accommodate loss of motion.

NEUROMUSCULOSKELETAL CONDITIONS TYPICAL OF SPINAL CORD INJURY

Osteoporosis and Fractures

SCI with neurologic weakness results in osteoporosis below the level of the SCI. Loss of bone mass begins at the time of injury and results from immobilization, lack of weight bearing, and loss of neurologic function. Thus, persons with SCI are at risk of fractures below the level of the injury. From a vocational rehabilitation perspective, there may be greater risk at work, where seemingly minor stress on bones, such as from leg stretching or twisting, can cause a fracture. Lack of normal sensation in the legs warrants a high level of suspicion. If a fracture does occur, a regular cast may cause skin breakdown; so instead, a padded brace or a bivalved cast may be used with careful padding of bony prominences and monitoring of skin and circulation.

Spasticity

Involuntary muscle contraction, or spasticity, below the level of the SCI affects approximately 80 percent of people. As with HO, spasticity typically develops before discharge from inpatient rehabilitation and, thus, is already being treated by the time a person with SCI begins searching for employment. Spasticity sometimes supports mobility for those with SCI. Therefore, it only needs to be treated when it interferes with function or is painful. If work requires extended periods of low activity, however, such as sitting in a meeting or working at a computer, spasticity may increase. In that case, physical activity and range-of-motion exercises that gently stretch the muscles can decrease the spasticity.

Equipment modifications may support RTW by decreasing spasticity; for example, the tilt, recline, and elevated leg-rest options of power wheelchairs facilitate repositioning. Standing wheelchairs promote stretching, which occurs when changing from sitting to standing, and the standing itself may reduce spasticity. Also, standing wheelchairs are conducive to more natural social interactions than are traditional wheelchairs. While weight bearing can reduce spasticity, it also risks shear, friction, and focal pressure.

Upper-Limb Impairment

In addition to splints for the hand [25], simple ergonomic redesign of the work station and modification of

tools can increase workplace accessibility [26] and prevent cumulative trauma and pain [27]. Sometimes, entire tasks may need to be altered. Orthotics such as cuffs or splints can enable common functions that may be otherwise impossible (**Figure 2**) [28]. Also, reconstructive upper-limb (UL) surgery [29], such as tendon transfer, can restore UL function and enable critical functions such as writing and performing personal hygiene.

Another option is functional electrical stimulation (FES) [30]. Electrodes implanted in arm muscles help restore voluntary muscle contraction and, thereby, facilitate reaching and grasping. A noninvasive and simpler FES option is a neuroprosthesis that stabilizes the wrist and electrically stimulates the finger flexors and extensors to allow grasp and release. Some with severe UL dysfunction may need an environmental control unit for such activities as turning lights on and off and using a telephone [31].

On the other end of the spectrum, because of dependence on the UL for mobility with both tetraplegia and paraplegia, the elbow, wrist, and shoulder girdle may be damaged by repetitive weight bearing and wheelchair propulsion. Carpal tunnel syndrome occurs in 40 to 66 percent of the SCI population. Education about proper body mechanics for wheelchair use and transfers is essential for preventing such musculoskeletal complications, which may limit RTW.

Lower-Limb Impairment

People with incomplete SCI, who retain limb function and often walk independently or with the use of assistive devices, may also have unique vocational needs and concerns. For example, ability may be lacking or limited for jobs that require standing balance, prolonged standing, bending, walking long distances, or climbing stairs or ladders. These issues may be unrelated to normal leg strength and result, instead, from problems such as proprioceptive deficits, which cause imbalance. Also, imbalance or gait impairment increases the risk of falling. Therefore, occupations requiring physical activities call for a functional capacity evaluation. Further, fall risk should be assessed for home as well as for work. Fall prevention education and training may increase personal safety and confidence and thus contribute to greater independence.

NEUROPSYCHOLOGICAL CONDITIONS TYPICAL OF SPINAL CORD INJURY

Depression

Approximately 30 percent of people with SCI experience at least one depressive episode during their lifetime [32]. In the general population, depression decreases the chances of employment and is associated with decreased workplace productivity, increased absences, and increased healthcare costs [33–34]. This is likely to be true for people with SCI as well. Employment, however, appears to improve mood in people with SCI: those who were employed reported less severe depressive symptoms than those who were unemployed [35]. Similarly, employed Veterans are significantly less likely than unemployed Veterans to have major depression [36]. Therefore, vocational services can be integral to an overall strategy for recovery.

Clinical practice guidelines include detailed recommendations on medication choices and management for depression [36]. Despite the high prevalence of depression following SCI, optimal diagnosis and treatment may be lacking [37]. Providers may not recognize symptoms, and patients may underreport depression because of decreased insight, perceived stigma, or lack of timely access to care. It is critical to avoid mistaking depression for lack of motivation. As a person with SCI recovers from depression and at the same time navigates general and vocational rehabilitation, the chances for successful adjustment and reintegration are increased when the interdisciplinary healthcare team provides compensatory substantive assistance.

Dual Diagnosis of Traumatic Brain Injury and Spinal Cord Injury

People with SCI frequently have co-occurring TBI that may require intervention during vocational rehabilitation. Even if the TBI appears mild, dual diagnosis of SCI/TBI is associated with higher levels of cognitive impairment and emotional distress and fewer functional gains during rehabilitation than is SCI or TBI alone [38–39]. TBI may not be well documented in the context of severe, life-threatening trauma yet may become apparent when challenging activities such as seeking employment are attempted [40–41].

In a “dose-response” relationship between the severity of TBI and employment [42], as the severity

of TBI increases, the likelihood of successful RTW decreases. Persons with moderate to severe trauma have an unemployment rate around 75 percent, probably because of problems with cognition, loss of insight into impairments, and challenges with interpersonal skills, which are all more frequent as severity of TBI increases [43–44]. Recent observations on polytrauma suggest that having more than one disability creates a “burden of adversity” that results in greater depletion of personal resources than a single disability [45]. No studies to date have documented employment rate with dual diagnoses of SCI and TBI.

We recommend screening for TBI in vocational candidates with SCI. Neuropsychological evaluation is useful for vocational treatment planning for people with substantial TBI or subjective cognitive complaints. Supported employment is effective in helping some with TBI [46] but is underutilized.

Pain

Pain interferes with social and vocational integration [47–49] and increases healthcare utilization. This multifaceted problem affects more than 65 percent of people with SCI. Chronic pain, chronic pain syndrome, and breakthrough pain can interfere with long-term vocational goals because of multiple associated issues, such as alcohol abuse. Treatment of chronic pain appears to be more successful in the framework of a comprehensive biopsychosocial model. Providers should help people with SCI appreciate that improving activity, mood, and quality of life may be more attainable than eliminating pain.

If breakthrough pain occurs at work, it must be determined whether it results from the medication or the work conditions. The latter may be modifiable through pacing and workplace adaptation. While a vocational specialist may assist in mediating pain-related issues on the job, people with SCI may require coaching in how to best convey their needs to their employer in order to minimize discomfort at work. Pharmacologic pain management involves adjusting choices and doses of medications to individual needs to provide maximum benefit with minimal effect on work productivity and safety. Since many employees are subject to drug testing, the option of disclosure must be weighed against the right to privacy.

CONCLUSIONS

This editorial serves as a call for the development of clinical practice guidelines for vocational rehabilitation for persons with serious physical disabilities. In the past, RTW after SCI was not the rule because the challenges were considered insurmountable and its benefits were underestimated. With a cultural shift toward community reintegration and more favorable views of the value of a diverse workforce, persons with SCI are now encouraged and equipped to seek employment.

With the increased options for resolving obstacles to RTW and the evidence that vocational rehabilitation interventions such as evidence-based practice supported employment can be effective, there are now data to serve as a foundation for clinical practice guidelines, in particular, integrating vocational rehabilitation into medical care. Regardless of the specific medical challenges or the type of employment, a partnership between the healthcare team and the person with SCI who wants to work may help patients become knowledgeable about and perceptive of their needs and may constitute the most likely path to optimal care as well as successful employment.

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Florian P. Thomas, MD, MA, PhD;^{1*} Lance L. Goetz, MD;² Thomas Dixon, PhD;³ Chester Ho, MD;⁴ Sally Ann Holmes, MD;⁵ Paul Sandford, MD;⁶ Sheila Smith, OT;⁷ Lisa Ottomanelli, PhD⁸

¹Department of Neurology and Psychiatry, St. Louis University, St. Louis, MO; ²Spinal Cord Injury Center, Hunter Holmes McGuire Department of Veterans Affairs (VA) Medical Center, Richmond, VA; and Department of Physical Medicine and Rehabilitation, Virginia Commonwealth University, Richmond, VA; ³Psychology Service, Louis Stokes Cleveland VA Medical Center,

Cleveland, OH; ⁴Division of Physical Medicine and Rehabilitation, Department of Clinical Neurosciences, University of Calgary, Calgary, Alberta, Canada; ⁵Spinal Cord Injury Center, VA Medical Center, Houston, TX; and Department of Physical Medicine and Rehabilitation, Baylor College of Medicine, Houston, TX; ⁶Clement J. Zablocki VA Medical Center, Milwaukee, WI; and Department of Physical Medicine and Rehabilitation, Medical College of Wisconsin, Milwaukee, WI; ⁷Spinal Cord Injury Center, Louis Stokes VA Medical Center, Cleveland, OH; ⁸Center of Innovation on Disability and Rehabilitation Research, James A. Haley Veterans' Affairs Hospital, Tampa, FL; and Department of Rehabilitation and Mental Health Counseling, University of South Florida, Tampa, FL

* Email: thomasfp@slu.edu

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