

spinal cord injury

UPDATE

Department of Rehabilitation Medicine

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UW Medicine
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What will my life be like? Moving forward after SCI

Working with newly injured SCI inpatients at Harborview and UWMC, rehab staff often see them struggling to imagine what their lives will be like with a spinal cord injury. They dutifully learn all the new self-care skills required to stay healthy and function as independently as possible, but what about everything else? We frequently hear, “All my expectations and assumptions about what a normal life is—they don’t apply anymore.” It can be terrifying.

The truth is that people with SCI can go on to do the same things that make life fulfilling for everyone, including careers, friendships, marriage, children, and participating in activities they enjoy. But it’s hard to picture these things for yourself while lying in your bed in the rehab unit, no matter what rehab staff and people “on the outside” tell you.

Thus was born the idea for a series of short videos showing people with SCI living lives that include all the “normal” stuff: work, family and friends, sports, an active social life, owning a home, driving a car, etc.

With funding from the National Institute on Disability and Rehabilitation Research (NIDRR, grant #H133N000003) and the Craig H. Neilsen Foundation, as well as considerable volunteer time from several key players, the Northwest Regional SCI System (NWRSCIS) recently completed the “pilot” in the series.

It features Billy Price, whose life was upended 12 years ago when he sustained a C-6 complete SCI as a freshman in college. As he narrates

his journey with SCI—the traumatic early days, the challenges and achievements—we see on the video screen images of his present day life: driving to his full-time engineering job, doing laundry in his condo, laughing with friends at a football tailgate party, and whizzing down the ski slopes.

“It’s a message of hope,” says Jeanne Hoffman, UW rehab psychologist and NWRSCIS co-director. “Life isn’t over. You really do move on. While our peer mentor program (which pairs newly injured SCI patients with SCI ‘peers’ who are successfully living and working in the community) goes a long way toward showing inpatients that a satisfying life is still possible after SCI, we thought it also would be helpful for them to actually see what life with SCI could look like after moving on from rehab. This video can benefit anyone struggling to imagine what ‘normal’ can look like.”

Creating even a short seven-minute video took many hours of planning, shooting, editing and re-editing. “Because our budget was quite small, we had to rely on the good will of professionals who wanted to be a part of a worthwhile project and were willing to waive most of their fees,” says Chris Garbaccio, SCI peer mentor coordinator with the NWRSCIS, who helped produce the video. This included Kyle Carver, a Seattle-based director/cinematographer whose company, Free Road Films, makes documentaries, and editor Bruce McCoy of Big Time Film and Video. “We are immensely grateful for their generosity and enthusiasm.”

Billy Price, the “star” of the video, cheerfully volunteered his time and welcomed a camera into his work, home and social life. “I couldn’t say ‘no’ to such a worthwhile project,” Price says. “People helped me after my injury, and I welcome opportunities to try to help others going through this kind of ordeal.”

The NWRSCIS hopes to produce a video for several different injury levels. “We decided to start



A clip from the video showing Billy Price, who has C6 quadriplegia, commuting to work in his modified van.

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The road back to school after SCI

By Aditya Ganapathiraju

Editor's note: Aditya Ganapathiraju was an 18-year-old college student when a motorcycle accident caused C-5 quadriplegia. He was living in New York at the time and both his parents were deceased. Now age 25, he is a full-time student at the University of Washington.

My journey from hospital bed back to the classroom has been gradual, sometimes bumpy and often challenging, but ultimately it has been immensely rewarding and worthwhile.

The first three years after injury were a low point for me. After discharge from rehab I lived in a series of adult family homes in which I felt pretty isolated from the world. My circumstances at that time made returning to college impractical and frustrating—too far from campus; no transportation or driver; frequent health problems and hospitalizations—but I still kept the thought of school in the back of my mind and was hopeful that my life would start turning around once I returned. But in the meantime, I spent most of my days during those years in a television-induced stupor.

Then in the spring of 2005 a great opportunity to improve my living situation came along and I seized it. The family of a young quadriplegic who lived near Seattle thought it would be mutually beneficial for me to come live with them. So I moved in, and shortly after applied to the University of Washington.

I went online and downloaded the college application forms, marked down due dates, and contacted my old community college and high school for transcripts. I couldn't write on my own back then so friends and caregivers helped fill out forms for me.

Lucky to have done my rehab at the UW Medical Center, I was able to work with the vocational counselor there, Curt Johnson. He set me up with the people at the Disability

Resources for Students (DRS) office, who assisted me with some of the needed accommodations like note takers and textbook scanning. I applied for financial aid from the Division of Vocational Rehab in order to qualify for funding for assistive technology (AT), such as a voice dictation program. I also filled out the Free Application for Federal Student Aid (FAFSA) online with help from my uncle, who was in Seattle temporarily for a sabbatical. I didn't get much FAFSA help at first so DVR stepped in to cover tuition and AT.

After the move out of the adult homes I found a full-time caregiver with the help of friends, paid for by the Department of Social and Health Services (DSHS) through the COPES program, which allows for independent hiring of caregivers. My caregiver Danielle, who later became a good friend, helped me get through the application process, all the while encouraging me to be more independent in my daily activities.

Despite the help I received, starting classes again was stressful. I worried about numerous little details, which of course didn't seem so little at the time. How was I going to take notes? How would I write in class? Take tests? Study? What about my personal care at school?

My health issues? This was my second chance at college and I wanted things to go well.

I decided to start back gradually and only took one class my first quarter. Always a fan of thinking about things (known as anxiety in some circles), I quickly rediscovered that school consisted of more than academics – it was a social setting that I had been completely detached from for three years. This, along with my new physical situation, brought up some unique challenges.

For example, for the first few quarters I was terrified of getting sick in class. This was no idle worry as I was experiencing significant nausea most of the day and was often unable to keep down my breakfast. I started hiding a garbage bag tucked in-between my leg and the armrest anticipating that very thing, which came in quite handy on those long bumpy rides to school.

Danielle, who drove me to campus, accompanied me to class in the beginning but wasn't always able to make it. Getting sick in class was bad enough, but what if it happened without my caregiver there to help me? This terrified me. What would I do? Just leave? What if I couldn't pull the door open? Where would I go? Or what if I had an even more unpleasant

surprise—quads and paras know what I'm referring to—what would I do then? How would I return to school with the embarrassment of it all?

All of these worries seem insignificant to me now, especially in light of some of the obstacles that people face elsewhere, but at the time these things were a big deal.

I quickly learned you just have to be creative, try different things and see what works for you. For example, if the disability office couldn't find me a note taker, I would ask another student who was waiting before class to



For Aditya Ganapathiraju, who has C5 quadriplegia, returning to college after his spinal cord injury has been challenging but worth it.

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Moving Forward After SCI

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with C-6 because it is such a common injury,” Garbaccio says. “If we can find the funding, we’d like to produce videos showing people with both higher and lower injuries so they relate more specifically to patients with different injury levels.”

At the UW and Harborview, the *Moving Forward* video will be shown to SCI patients undergoing rehab. In addition, faculty will use it as a training tool for graduate students and medical residents in the Department of Rehabilitation Medicine.

For more information, or to obtain a copy on DVD for your institution or group, contact Cynthia Salzman at 206-685-3999 or csalzman@u.washington.edu.

Watch this short documentary on our Web site:

http://sci.washington.edu/info/video-moving_on.asp

Kyle Carver (far right) runs the camera while Chris Garbaccio (seated right) interviews Billy Price (left) for a new documentary short, Moving Forward After Spinal Cord Injury. The setting is the UW Medical Center Surgery Pavilion.



The road back

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share notes with me. My professors and I worked out arrangements for me to take exams at home or the DRS office.

With some nudging from Danielle, I eventually transitioned to attending classes alone. I also started buying food by myself, which at first involved the act of handing my wallet to the cashier and asking them to take out the cash. (Having grown up in New York, this felt very strange at first.) I started to plan and prepare for things ahead of time and learned to ask for assistance from strangers, such as, “would you grab my book out of my bag for me?”

For the second quarter I was worried about writing papers and how I would read and highlight or take notes. By using Dragon NaturallySpeaking (a voice dictation software program I’m using to type this essay right now) I was able to complete my papers without too much hassle. The DRS office helped me obtain most of my books in electronic format online, and I was able to use Dragon to jot down notes while reading.

By the third quarter, I was attending classes alone, typing up long papers, and focusing on much more important things, like finding a date.

After the first year, once I was comfortable being a student again, I took advantage of opportunities to get involved in campus activities like the Student Senate, the Student Disability Commission and the school newspaper.

You can’t plan for every contingency, as I would learn, so you just have to adapt and try to mitigate problems when they arise. Unforeseen events came up – wheelchair trouble, like getting your chair stuck in tilt, bad weather stranding you at home, ER visits with a couple of pesky kidney stones, and more – but miraculously the world didn’t end, life rolled on, and things worked out, as they often do.

Things got better with time and I started enjoying my classes and time with peers. Many of my health problems subsided after I learned to deal with the stresses and anxieties that my new condition was producing—the likely culprit of the health issues in the first place.

Eventually I started riding the bus, which made a dramatic difference in my independence as I no longer had to depend on others to drive me around. Gradually I made more friends, met interesting people from different places, and finally discovered there is a world out there waiting for me.

Some have considered my story extraordinary but I would disagree. It’s important to remember that the adversity I faced was tiny compared to what many people around the world with (and without) disabilities have faced long before I was around. I have been and continue to be very privileged, riding on the coattails of the activists who actually fought for change—those who helped push for the Americans with Disabilities Act for example—and who paved the way for me and others.

There were times, many times in fact, that I felt things weren’t going to work out. And many may feel as hopeless about their situation now as I did back then. I just hung in there seizing opportunities as they arose. And the opportunities did arise, not from thin air but often from thoughtful and caring individuals – many times strangers – who gave a little piece of themselves so that I and others could grow. I think there is a lesson in this.

Whether it’s getting back to school, work, volunteering, or just getting out of bed, the opportunities are there for us. There’s never been a better time than now.

forum report

The SCI Forum is an evening presentation and discussion series on topics of interest to persons with spinal cord injury and their family members, friends, caregivers and health care providers, held monthly at the University of Washington Medical Center. To learn about upcoming SCI Forums, read reports of past forums, or view forum videos, consult our Web site at <http://sci.washington.edu/info/forums>. Contact Cynthia Salzman (email: csalzman@u.washington.edu; phone: 206-685-3999) if you wish to be added to the SCI Forum mailing list.

Autonomic Dysreflexia

By Janna Friedly, MD, Rehabilitation Medicine, Harborview Medical Center, University of Washington, presented on October 9, 2007 at the University of Washington Medical Center, Seattle, Washington. Watch the video online at http://sci.washington.edu/info/forums/reports/autonomic_dysreflexia.asp.

Autonomic dysreflexia (AD) is a medical problem unique to people with spinal cord injuries (SCI). Although uncommon, it is a serious concern because it can be life threatening and needs immediate attention. If you know what you are looking for, however, it is relatively easy to recognize and treat. But since many health care providers may not be familiar with AD, it is important to understand it yourself and carry a medic alert card.

What is autonomic dysreflexia (AD)?

AD is an abnormal response to a problem in your body—pain, pressure, full bladder or bowel—somewhere below the level of your injury. Because of the SCI, your body doesn't respond properly to signals that something is wrong. Instead, your body may develop a sudden rise in blood pressure, and this can lead to stroke, seizures or death.

How does AD happen?

AD is usually triggered by something that would cause pain or discomfort in a person without SCI, such as a full bladder, tight clothing or an ingrown toenail. In non-injured individuals, the body reacts to pain by narrowing the blood vessels, and this causes blood pressure to increase. Receptors near your brain and heart receive messages from non-spinal cord pathways (nerves in the sympathetic nervous system) that your blood pressure is getting too high, and your brain responds by sending signals down the spinal cord to slow down the heart beat and relax the blood vessels. As the blood vessels open up and widen, blood pressure goes back down. Meanwhile, pain signals coming through the spinal cord have told the brain there is something wrong, so the individual feels the discomfort and knows to do something about it.

In SCI, when something causes pain or discomfort below the level of the injury,

the body still responds by narrowing blood vessels and blood pressure starts to rise. And the brain still gets the message about the problem and sends signals down the spinal cord to slow the heart-beat and open up the blood vessels. This slows your heartbeat and makes you flushed, red or blotchy above the injury, but the signals can't get past the injury level, so the blood vessels continue to narrow below the injury and the blood pressure keeps rising. Meanwhile, you don't know you have a problem because the pain message didn't get to your brain.

Who is at risk for AD?

- SCI at or above the level of T6
- Persons with complete injuries are more likely to experience AD

Some people in this risk group get AD frequently, others get it once in a while, and some don't get it at all. We don't know why some people get it more than others or why some get mild symptoms while others get very severe symptoms.

Common causes of AD

1. Bladder—the most common culprit!
 - a. Overfull or distended (stretched) bladder.
 - b. Kinked Foley catheter.
 - c. Overfilled leg bag.
 - d. Urinary tract infection.
 - e. Any obstruction that keeps urine from getting out of the bladder, like a stone.
2. Bowel
 - a. Over-distension (stretching of rectum or anus) during bowel program.
 - b. Constipation or impacted stool.
 - c. Hemorrhoids.
 - d. Anal fissures or skin breakdown.
3. Skin irritation
 - a. Prolonged pressure or pressure sore.
 - b. Ingrown toenail.
 - c. Sunburn.
 - d. Tight clothing.

4. Sexual activity: Over-stimulation during sex—things that would be painful if you had full sensation.

5. Gynecologic issues in women
 - b. Menstrual cramps.
 - c. Labor and delivery.

Common warning signs

Warning signs vary from person to person: Some people have all of the signs, some only one or two; signs may be obvious or subtle. Each person who is at risk of AD needs to get to know their own bodies and know how AD affects them.

- The most important sign is a sudden, major increase in blood pressure of about 20 to 40 mm Hg (millimeters of mercury) higher than your normal blood pressure.

Know your normal blood pressure!

Since people with SCI usually have a low resting blood pressure (80 or 90 systolic for a cervical injury), a rise to 130 or 140 systolic—normal in someone without SCI—could be dangerously high for a person above T6.

- Pounding headache.
- Sweating above the level of the SCI.
- Flushed or red skin (especially in face and neck).
- Goose bumps.
- Tightness in the chest, blurry vision, anxiety or jitters—often reported as feeling like a panic attack.
- Stuffy nose.

While all these signs and symptoms are uncomfortable and can be very annoying or upsetting, the increased blood pressure is what makes this a medical emergency.

How to lower your blood pressure

1. Identify and fix the problem. If that doesn't lower your blood pressure, go to step 2.

2. Use blood pressure medication prescribed by your doctor, usually nitro-

glycerin paste. The paste is applied to the surface of your skin, where it gets readily absorbed into your blood stream and brings down your blood pressure very quickly. As soon as you figure out what's causing the problem and the AD goes away, you can just wipe it right off.

About nitroglycerin paste:

- Caregivers should apply nitroglycerin paste with gloves, if possible, otherwise wash hands quickly after applying.
- Follow directions provided by your health care provider for the amount to apply (usually about ½ inch of paste to start) and where to apply it (typically trunk or shoulders, but wherever it is easiest).
- Do not use nitroglycerin paste if you have taken Viagra within 24 hours, since blood pressure may plummet dangerously. If you go to an emergency room for AD, tell them if you have taken Viagra.

What to do if you have AD

1. Sit straight up to lower your blood pressure, or elevate your head in bed and lower your legs.

2. Quickly remove or loosen anything tight or causing pressure, such as:

- Abdominal binder
- Catheter tape, leg bag straps
- Elastic hose or bandages
- Clothes
- Shoes or braces

3. Check your blood pressure every five minutes. Use blood pressure medication prescribed by your doctor, usually nitroglycerin paste (see above). As soon as you correct the problem and the AD goes away, you can wipe it right off.

4. Check your bladder.

- Indwelling or Foley catheter:
 - Check catheter for kinks.
 - Empty the drainage bag.
 - Consider irrigating bladder with saline (only if you have experience with this; use 30 cc at most) to dislodge anything that might be blocking the inside of the Foley.
- Intermittent catheterization
 - Catheterize your bladder—use lidocaine gel (an anesthetic, or numbing, gel).
 - If catheter doesn't pass through and you still have symptoms, call 911.

5. If you suspect your bowels as a cause, do a bowel program if you can, but

make sure to use lidocaine gel for the digital stimulation.

6. If symptoms get worse or persist after following the above suggestions and the — STOP and go to the emergency room!

7. If the symptoms do go away, write down what symptoms you had and what you did to fix the problem. Let your healthcare provider know about the episode of AD, since there may be some other things that they can recommend to prevent it from happening again.

8. If symptoms come back again, repeat the steps and call your healthcare provider or go to the emergency room.

AD tool kit

Anyone who is at risk for AD or has had AD in the past should keep a tool kit on them at all times.

1. AD instruction card to explain AD to healthcare providers, who may not know what it is or what to do about it, so they will treat it quickly and correctly (ask your rehabilitation provider for a card, or contact the PVA for the consumer guide that includes a card; see *Resources*).

2. Medical card with identification, list of medical problems and medications, and your normal blood pressure.

3. Blood pressure cuff.

4. Catheter and insertion supplies.

5. Irrigation syringe and sterile water or saline solution.

6. Lidocaine gel.

7. Gloves.

8. Prescription medications for AD, such as nitroglycerin paste, from your healthcare provider. Replace your nitroglycerin paste prescription every six months.

Preventing AD

As with most things in SCI, prevention is really key. Since we know what some of the triggers are for AD, it makes it easier to know what to do to prevent it.

Bladder

Foley catheter:

- Keep tube free of kinks.
- Empty collection bag frequently.
- Check inside of the tube frequently for any kind of grit or deposit that may indicate that you have an infec-

tion or a stone or that your Foley catheter needs to be changed or irrigated.

Intermittent catheterization:

- Avoid an overfull bladder!

Bowel

- Maintain a regular bowel program.
- Avoid constipation.
- Eat fiber (fruits and vegetables)
- Drink enough water.
- Get treatment for hemorrhoids.

Skin

- Do pressure reliefs frequently.
- Check skin vigilantly every day for pressure sores or skin problems.
- Avoid tight or restrictive clothing.
- Check clothing for sharp or hard objects that can rub or cause pressure (such as buttons on rear pants pockets).
- Avoid sunburns and extremes of temperature (hot or cold).

Key points

- **AD is potentially life-threatening and needs immediate attention!**
- Be prepared. Learn to recognize how your body feels when you have AD and what the triggers usually are.
- Stay calm, sit straight up, and fix the problem.
- If it doesn't go away, get help immediately!

Resources

Autonomic Dysreflexia: What You Should Know, a consumer guide published by the Consortium for Spinal Cord Medicine and the Paralyzed Veterans of America (PVA). Download the guide for free from the PVA Web site at <http://www.pva.org/> site, or call the PVA Publications Distribution Center toll-free at 888-860-7244 to receive a free copy in the mail (\$3 shipping charge). A wallet-size information card is included in the printed guide.

References:

1. *Autonomic Dysreflexia: What You Should Know*, consumer guide, Consortium for Spinal Cord Medicine, Paralyzed Veterans of America, Washington DC, 1997.
2. Cameron AA, Smith GM, Randall DC, et al. Genetic manipulation of intraspinal plasticity after spinal cord injury alters the severity of autonomic dysreflexia. *J Neurosci*. 2006 Mar 15;26(11):2923-32.

literature review

The articles previewed below were selected from a recent screening of the National Library of Medicine database for articles on spinal cord injury. In the judgment of the editors, they include potentially useful information on the diagnosis or management of spinal cord injury. You may obtain copies of the complete articles through your local medical library or from UW Health Sciences Library Document Delivery Service (call 206-543-3436 for fee schedule).

OUTCOMES

■ Early complications of high-dose methylprednisolone in acute spinal cord injury patients.

This retrospective review of all patients admitted to the investigators' ICU between January 1994 and December 2005 due to acute SCI compared those who received methylprednisolone (MP group, 59 patients) and those who did not (no-MP group, 23 patients). There were no differences between groups in ICU mortality or neurological function at ICU discharge. The MP group had more respiratory tract infections and total infections and a higher incidence of hyperglycemia than the no-MP group during the ICU stay. This study found that the use of MP in patients with acute SCI is not associated with improved outcome or neurological function at ICU discharge but is associated with an increased risk of infectious and metabolic complications during ICU stay. *Suberviola B, González-Castro A, Llorca J, et al. Injury. 2008 Jul;39(7):748-52. Epub 2008 Jun 9.*

■ Is age a key determinant of mortality and neurological outcome after acute traumatic spinal cord injury?

The authors examined a large, prospectively accrued clinical database (485 individuals) in addition to analysis of postmortem spinal cord tissue (12 individuals) to compare axonal survival and white matter degeneration in younger versus elderly individuals with SCI. Elderly individuals (age 65 and older) had significantly greater mortality rates than younger individuals 30 days, 6 months and at 1 year after SCI (46.88% versus 4.86%, respectively). However, age did not have a significant effect on motor and sensory recovery. Neuroanatomical analysis of postmortem spinal cord tissue revealed no significant age-related differences in extent of myelin degeneration or number of intact axons within sensory, motor and autonomic spinal cord tracts. Treatment protocols for SCI need to identify preventable predictors of mortality in the elderly post-SCI, recognizing that the potential for neurological recovery among elderly survivors of SCI is similar to that of younger individuals. *Furlan JC, Bracken MB, Fehlings MG. Neurobiol Aging. 2008 Jun 10. [Epub ahead of print]*

PRESSURE ULCERS

■ Pressure ulcer prevention and management in spinal cord-injured adults: analysis of educational needs.

People with SCI have a high risk for pressure ulcers (PrUs) that increases with age and time since injury. The authors interviewed 16 adults with SCI concerning perception of PrU risk, education, environmental considerations, and access to care. Eight SCI professionals were also interviewed. Number of years since injury of participants ranged from less than one year to 33 years (median 18 years); 10 of the 16 participants had experienced having a PrU. Perception of risk varied: those with previous PrUs or who had a long rehab hospital stay were more likely to consider themselves at risk, whereas those who had never had a PrU perceived their risks as decreasing over time. Education needs identified include: Awareness of lifelong risk for developing PrUs, including the ability to assess own risk factors and how risk changes over time; ability to take charge of own skin care regimen and to partner with health care providers; perform prevention strategies consistently that fit level of functioning and activity and update practices as risk changes; ability to coordinate social supports. The need for effective education among adults with SCI in the prevention and early detection of PrUs is critical.

Schubart JR, Hilgart M, Lyder C. Adv Skin Wound Care. 2008 Jul;21(7):322-9.

■ Remote monitoring of sitting behaviors for community-dwelling manual wheelchair users with spinal cord injury.

Twenty individuals with SCI (C4 – L2) who used manual wheelchairs for their primary mobility participated in this study. Average time in a wheelchair was 5.5 years. A custom data logger with six force sensor resistors was designed and installed on participants' personal daily-use wheelchair seats. Sitting behaviors were recorded for 24 hours per day over a 1-week period. Participants spent an average of 9.2 hours (range 3.2–12.2 hours) per day in their own wheelchair. They sat for an average of 97 min (range 24–284 min) without displaying any lift-off (pressure relief) behavior. The average lift-off frequency was 9.4 times (range 2–20 times) per day. There was no difference between participants with paraplegia and those with tetraplegia. Education on the pressure relief activity should still be a core component for all manual wheelchair users regardless of neurological level.

Yang YS, Chang GL, Hsu MJ, Chang JJ. Spinal Cord. 2008 Jun 17. [Epub ahead of print]

BONE HEALTH

■ Osteoporotic fractures and hospitalization risk in chronic spinal cord injury.

In a study population of 315 veterans with chronic SCI, 1,487 hospital admissions occurred; 39 (2.6%) of these were hospitalizations for bone fractures. Median length of stay was 35 days. Fracture-related complications occurred in 53% of these cases. Low-impact fractures were more common in motor complete SCI and associated with greater alcohol use after injury. Record review indicated that osteoporosis diagnosis and treatment considerations were not part of a clinical assessment, indicating the need for improved protocols that might prevent low-impact fractures and related admissions.

Morse LR, Battaglini RA, Stolzmann KL, et al. Osteoporos Int. 2008 Jun 26. [Epub ahead of print]

■ Does standing protect bone density in patients with chronic spinal cord injury?

Seventy-one patients with chronic SCI were recruited and assigned to 1 of 3 groups according to their reported daily standing time: patients with daily standing times of more than 1 hour, patients with daily standing times of less than 1 hour, and nonstanding patients. The groups were similar in terms of demographics and clinical variables. Bone density of lumbar and proximal femoral regions was measured with dual-energy x-ray absorptiometry. Although the difference between groups was not significant, patients in the group that stood more than 1 hour daily had a slight tendency to have slightly higher bone density in the lumbar and proximal femoral regions, leading the authors to conclude that standing might be partially helpful in protecting the bone density in SCI by opposing the effects of immobilization.

Goktepe AS, Tugcu I, Yilmaz B, et al. J Spinal Cord Med. 2008;31(2):197-201.

FATIGUE

■ Fatigue and spinal cord injury: a qualitative analysis.

To explore experiences of fatigue among people with SCI, four focus groups were conducted with a total of 29 participants, including: 21 people with complete and incomplete SCI with tetraplegia and paraplegia, two family members, two assistants and four occupational therapists. Results showed that fatigue has cognitive, emotional and physical dimensions and exerts a profound effect on the lives of many people with SCI, such that pleasurable activities were often missed in order to

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accomplish more mundane tasks. Factors most consistently associated with fatigue were pain, depression and hopelessness, side effects of medications, poor quality sleep, spasticity, poor posture, diet, and the effort required to accomplish routine and self-care tasks.

Hammell KW, Miller WC, Forwell SJ, et al.

Spinal Cord. 2008 Jun 10. [Epub ahead of print]

WOMEN WITH SCI

■ Women living with a spinal cord injury: perceptions about their changed bodies.

This study collected information from 15 women (ages 18 to 60, both quadriplegia and paraplegia) through structured interviews on social adaptation three or more years after injury. A three-phase process of living with their changed bodies emerged: 1) discomfort or uneasiness related to one's own body; 2) moving toward comfort, employing strategies progressing from social isolation to representing themselves in a positive light through appearance and behavior; and 3) comfort, achieved by educating others about visible disabilities and surrounding oneself with an accepting environment. Physical therapy can potentially influence the process of women's gaining comfort with their changed bodies following an SCI.

Chau L, Hegedus L, M, et al.

Qual Health Res. 2008 Feb;18(2):209-21.

TREADMILL TRAINING

■ Automating activity-based interventions: The role of robotics.

Studies have found that interventions such as a robotic-assisted body weight supported treadmill training can improve gait in SCI, but few studies have investigated the use of these devices in improving the overall health and well-being. The authors discuss the use of robotic devices in delivering intense, activity-based therapies that may have significant exercise benefits. They also present preliminary data from studies that investigated the metabolic and cardiac responses during and after 6 months of lower-limb robotic training. Advantages of using robotic devices instead of therapists include the capacity for longer training periods, at higher intensities and in a well-controlled environment. Therapists engaged in treadmill training with patients have reported repetitive strain injuries and lower back problems. However, robotics are very expensive and not usually able to a subject's effort level, spasticity or fatigue. Future models must have better monitoring and interactive capabilities, and future studies should monitor cardiac and metabolic responses.

Hidler J, Hamm LF, Lichy A, Groah SL.

J Rehabil Res Dev. 2008;45(2):337-44.

SHOULDER PROBLEMS

■ Comparative shoulder kinematics during free standing, standing depression lifts and daily functional activities in persons with paraplegia: considerations for shoulder health.

In three female and two male subjects at least 12 months post-SCI, a magnetic tracking device was used to measure three-dimensional positions of the scapula, humerus and thorax (shoulder joint) during common upper extremity weight-bearing activities (standing depression lifts used in brace walking, weight-relief raises, transfers) and postures (sitting rest, standing in a frame). Standing in a frame offered the best shoulder joint positions (significantly less scapular anterior tilt and greater glenohumeral external rotation) when compared to sitting rest posture, weight-relief raises, transfers and standing depression lifts. Choosing specific activities or modifying techniques within functional activities that promote favorable shoulder positions may preserve long-term shoulder health.

Riek LM, Ludewig PM, Nawoczenski DA.

Spinal Cord. 2008 May;46(5):335-43. Epub 2007 Nov 20.

ORTHOSTATIC HYPOTENSION

■ Non-pharmacological management of orthostatic hypotension after spinal cord injury: a critical review of the literature.

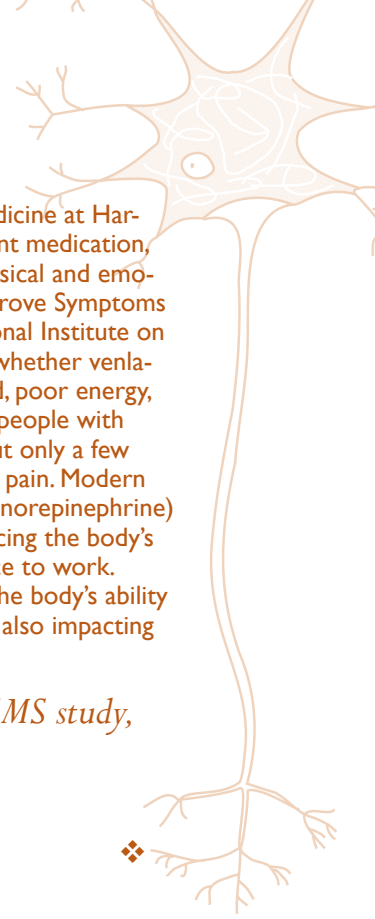
Orthostatic hypotension (OH; a sudden fall in blood pressure that occurs when a person assumes an upright position, such as going from lying to sitting) is a common problem in SCI that can delay rehabilitation progress. More than half of all SCI patients will develop OH within the first month after injury. Symptoms of OH (fatigue, weakness, light headedness, dizziness, blurred vision and neck pain) may be present in as many as 73.6% of all physical therapy treatments during early rehabilitation. In this systematic review of the literature, four distinct non-pharmacological interventions for OH were identified: application of compression and pressure to the abdominal region and/or legs, upper body exercise, functional electrical stimulation (FES) applied to the legs and biofeedback. Methodological quality varied dramatically between studies. Compression/pressure, upper body exercise and biofeedback therapies have proven inconclusive in their ability to control OH. During orthostatic challenge, FES consistently lessens the fall in BP; however, its clinical application is less well established. The clinical usefulness of compression/pressure, upper body exercise and biofeedback for treating OH has not been proven. FES of the legs holds the most promise.

Gillis DJ, Wouda M, Hjeltnes N.

Spinal Cord. 2008 Jun 10. [Epub ahead of print]

Research Participants Needed Project to Improve Symptoms and Mood after SCI (PRISMS)

After SCI, some people experience a cluster of symptoms including poor sleep, low energy, little interest in usual activities, depressed mood and pain. These symptoms can affect quality of life and may be treatable. Researchers at the University of Washington are trying to determine whether a 12-week trial of venlafaxine XR (Effexor XR) is an effective treatment for these symptoms. You may qualify for this study if you have a SCI, are 18-64 years old, have some of these symptoms, are not taking venlafaxine XR and live within travelling distance to Harborview Medical Center in Seattle, WA. If you would like to be considered for this study, please contact Christian Buhagiar at 206-341-4731.



Spinal Cord Injury Update is supported by grant H133N060033 from the National Institute on Disability and Rehabilitation Research (NIDRR), U.S. Department of Education, Office of Special Education and Rehabilitative Services (OSERS), to the Northwest Regional Spinal Cord Injury System, one of 14 model SCI care systems nationwide. Project Director: Charles Bombardier, PhD.

Editorial Board of Advisors: Charles Bombardier, PhD; Stephen Burns, MD; Michael K. Copass, MD; Chris Garbaccio; Barry Goldstein, MD, PhD; Jeanne Hoffman, PhD; Ronald V. Maier, MD.

To add your name to the mailing list, contact the editor, Cynthia Salzman, at the University of Washington Department of Rehabilitation Medicine, Box 356490, Seattle WA 98195-6490; 206-685-3999; csalzman@u.washington.edu.

Visit our Web site: <http://sci.washington.edu>.

The PRISMS Study

Researchers in the UW Department of Rehabilitation Medicine at Harborview are studying the potential benefit of an antidepressant medication, venlafaxine XR (Effexor XR), as a treatment for common physical and emotional symptoms after SCI. The PRISMS study (Project to Improve Symptoms and Mood after SCI) is a multi-site study funded by the National Institute on Disability and Rehabilitation Research. This is a study about whether venlafaxine XR is effective in treating symptoms such as low mood, poor energy, poor sleep, loss of interest in usual activities and also pain in people with SCI. Many antidepressants may help the former symptoms, but only a few seem to have potential to reduce pain, especially neuropathic pain. Modern antidepressants make certain brain chemicals (serotonin and norepinephrine) work more efficiently when a person is under stress by reducing the body's tendency to reabsorb the chemicals before they have a chance to work. Correcting this "chemical imbalance" is thought to improve the body's ability to regulate basic functions like sleep, mood and energy while also impacting how pain signals are processed.

For information about participating in the PRISMS study, see the announcement on page 7.



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