

# spinal cord injury

UPDATE

Department of Rehabilitation Medicine

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UW Medicine

DEPARTMENT OF  
REHABILITATION MEDICINE

NW REGIONAL SPINAL CORD  
INJURY SYSTEM

## Transitioning Back to an Active Lifestyle

Lan Remme was a self-described “exercise fanatic”—cycling, swimming and weight-training several times a week—when he went over the handlebars of his bicycle during a ride one spring day in 2011. The crash broke his neck, leaving him with a complete spinal cord injury at the C5-6 level. While he was in the hospital coming to grips with his new life as a person with tetraplegia (quadriplegia), he couldn’t imagine he would ever be able to exercise again.

But during his acute inpatient rehabilitation stay, Lan learned about the SCI Transitions and Wellness Program in the UW’s Department of Rehabilitation Medicine. Launched just a few months before his injury, this program helps people with SCI participate as fully as possible in life and their communities after injury by providing opportunities for exercise, driver training, computer access, counseling and more, all free of charge. Program funding has been provided through an initial grant from the Craig H. Neilsen Foundation and a generous gift from Mr. Kenny Salvini, his family and friends.

Increasingly, research shows that people with SCI can benefit from regular exercise as much as anyone else. Recognizing this, the Transitions program has made exercise a key component of its wellness goals by offering twice-weekly supervised adapted exercise classes at both UW Medical Center and Harborview Medical Center.

“People with SCI are at risk for many secondary medical complications,” says Dr. Rina Reyes, director of SCI care at UW Medicine and a founder of the Transitions program. “But we now know that exercise can reduce these risks significantly. Since there are so many barriers to getting exercise for people with SCI, we wanted our program not only to get people started on a safe, individualized exercise program, but to expand opportunities in the community so that they and others with mobility disabilities can be active and stay as healthy and independent as possible.”

When Lan heard about the Transitions program, he jumped at the chance to participate. “I had to wait until a pressure sore healed,” Lan recalls. “The minute it did, I showed up at the door.”

The exercise equipment available through the Transitions program includes arm ergometers (stationary hand bikes), wall weights and other accessible devices. Lan attended the exercise class every Monday and Wednesday for the maximum 6 months. He supplemented that with a lunch-hour class offered twice a week at the UWMC rehab gym under the supervision of a therapist.

Lan Remme uses the accessible wall weight machine at the University YMCA.

*I feel healthy and good again, kind of like before my injury.*

—Lan Remme



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# Tips from the *Wheel World*

...wisdom and ideas for making life with SCI a little better, from individuals living with spinal cord injuries.

## Stay Hydrated!

Wheelchair users with SCI know they need to have water available at all times to keep hydrated, monitor liquid intake, and wash down medications on schedule. There are many different products on the market to meet your hydration needs. Most have been developed for cycling and can easily be found online or in bike stores and outdoor/sports retailers, like REI.

For this Tips column, three of our SCI Consumer Advisory Board members shared their hydration system preferences, based on many years of trial and error.

### Bottles

There are so many different manufacturers, styles and prices! If you are buying a plastic water bottle, look for BPA-free products (to avoid any possible negative health effects from BPA leaching into your water) or stainless steel. Aditya Ganapathiraju (who has tetraplegia) likes the 24-ounce CamelBak Eddy Stainless Steel Water Bottle. “Unlike most plastic water bottles, it fits into bike cages because it’s tapered at the base.”

### Mounting devices and cages

Bottle cages and cage mounts can come as a set or separately. Many of the systems are made for cycling and can be attached to tubing on the wheelchair’s frame or foot rest. They can be found in bicycle stores as well as online. There are many different styles, materials and features to choose from, depending on what is important to you—adjustability, bulkiness, weight, and ease of mounting and removal.

Julie Grant (who has paraplegia) prefers the Quick Caddy Stainless Steel Water Bottle Holder by Twofish, Unlimited (figure 1). It consists of a simple metal cage with a Velcro mounting strap and is designed to fit wheelchairs, walkers, lawn chairs, and more.

“I’ve explored many a bike shop, and nothing has ever been better for me than this,” she says. “It’s incredibly light and comes off easily (in seconds). I remove it when flying, when spending time with small children (who like to fuss with the bottle) or if I’m in someone’s wedding photos.

Figure 1  
The Quick Caddy by Twofish attaches to wheelchairs and other equipment with a Velcro strap.



Figure 2  
Aditya Ganapathiraju uses a Topeak mount with a Profile Design bottle cage.

“I’ve never experienced any rattling, wobbling or spilled drinks. They even make a cage sized for a pint glass!”

Aditya has tried many different bottle and cage systems. He has the Twofish set-up on his manual chair but finds that it loosens and rattles around too much on his power wheelchair.

For his power chair he uses a Topeak mount with a Profile Design Bottle Cage (figure 2). It attaches firmly to the frame and can take a lot of abuse.

### Water reservoir (bladder) systems

CamelBak pioneered the now-common hydration system consisting of a non-rigid reservoir bag (“bladder”) that is filled with water and placed inside a backpack-type carrier. Tubing connected to the reservoir bag ends in a bite-release mouth piece. Biting the valve opens the tube so the user can drink as if from a straw. The tube can be positioned so it is easy to grab. There is no need to pull out or open a bottle. There are many varieties, sizes and backpack styles to choose from.

CAB member Lan Remme, who has tetraplegia, finds CamelBak systems “very user friendly.” (Figure 3.) I have two different versions, one that has zipper pockets and

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Figure 3  
Lan Remme drinks from his CamelBak water reservoir system tucked inside his backpack.





## TRANSITIONS

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He learned that exercise post-injury, while challenging, provided the same benefits to physical and psychological health as he experienced previously. “The Transitions class taught me that exercise keeps me strong and feeling good,” Lan says. “I get the same psychological benefits that I used to get exercising before I was injured—it makes me feel energetic and positive.”

Hooked on exercise again, Lan explored accessible opportunities in the community after the class ended. Buying his own equipment for the home was too expensive. Rental hand bikes were often not available or were in need of repair. At the University YMCA, where he had been a member before injury, the exercise machines were located in the basement with no elevator access. The downtown and Shoreline YMCAs had elevators and some accessible equipment, but these facilities required an extra hour of transportation for himself and someone to help him—either a family member or paid assistant. Once he went back to work, his time was even more limited.

Upon learning of this, Transitions staff offered to work with the University YMCA to develop accessible exercise opportunities at its facility. In addition, two members of the Y who knew of Lan’s dilemma generously donated funds to purchase an accessible hand bike and wall weights, and these were installed on the wheelchair-accessible main floor of the facility.

“This has been wonderful,” Lan says. “It’s in my neighborhood, so it doesn’t take too much time, and I can go at convenient times on weekends and evenings.” He is also pleased that others in the community now have accessible equipment available to them. Lan also pushes his wheelchair in parks and—when it rains—malls for additional exercise during the week.

Lan says getting regular exercise gives him more energy and stamina and keeps him alert throughout the day. “Despite my injury, I feel healthy and good, kind of like before.”



## TIPS

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doubles as a backpack. They are much easier for me than a water bottle.”

Aditya uses the Geigerrig Pressurized Hydration Engine (a pressurized water reservoir system) when riding his handcycle. (See Figure 4, right.) “You pump it up so that when you bite the valve the water sprays into your mouth,” he says. “It is pretty effective and fun to use. Even if it runs out of pressure and you can’t pump it up yourself, it turns into a regular type of bladder system.”

Water reservoir systems can be found online or at outdoor and sporting goods stores such as REI.

## Cleaning

Make sure you clean your bottle and all its parts regularly to avoid build-up of bacteria and other yucky stuff.

The CamelBak Bottle Brush Kit (\$10.99) includes a large brush for cleaning the bottle and a little brush for scrubbing the small parts like straw, bite valve and cap.

Julie uses denture tablets: “I find that half of a tablet soaking in a bottle overnight gets the bottle squeaky clean with no scrubbing at all.”



Figure 4  
Aditya likes the Geigerrig Pressurized Hydration Engine, which can be pumped up so it will spray water into your mouth.

For more information about the UW’s SCI Transitions & Wellness Program, visit <http://sci.washington.edu/transitions> or call 206-744-2060. The Transitions Program is available to anyone with an SCI who receives health care at any UW Medicine hospital or clinic.

Learn from the experts—people living with spinal cord injuries.

Find more Tips and submit your own online at *Tips from the Wheel World:*

<http://sci.washington.edu/tips>

# Get Moving! Exercise & Spinal Cord Injury

By Kristin Kaupang, PT, Harborview Medical Center, University of Washington

*Excerpted from the SCI Forum presented on February 12, 2013. See the complete report, video and links to all hand-outs, instructions and resources at <http://sci.washington.edu/exercise>.*

Regular physical activity is important for staying healthy and feeling good, especially if you have an SCI.

In addition to reducing your risk for heart disease, research with people who have SCI has shown that exercise improves respiration, muscle strength, circulation, body composition, self-esteem, self-confidence and independence and reduces depression and anxiety. It also helps to prevent secondary complications (such as urinary tract infections, pressure ulcers, and respiratory infections), reduce the risk for diabetes, improve immune system function, and reduce constipation.

Despite paralysis, there are still ways to get exercise. This article can help you get started with an exercise program that is safe and effective.

## How much should I exercise?

The American College of Sports Medicine (ACSM) provides these guidelines for all healthy adults (**including** those with SCI):

- At least 5 days/week: moderate intensity exercise.
- 2-3 days/week: muscular strength and endurance, resistance exercise, calisthenics, balance and agility exercise.

For people with SCI, the ACSM also says exercise sessions should include short bouts of 5–10 minutes of moderate intensity alternating with active recovery periods of 5 minutes.

You can combine endurance and strengthening exercises in one session. Flexibility exercises can be done daily.

SCI Action Canada also has evidence-based SCI exercise guidelines and a toolkit at <http://sciactioncanada.ca>.

## Intensity: How hard are you working?

Exercise must be vigorous enough to be beneficial. The goal is to work hard

enough to reach 50–80% of peak oxygen uptake, but most of us don't have a way to measure that. Heart rate alone is not a good measure for individuals with spinal cord injury. Instead, try one of these methods:

### ▪ The talk test

Try talking while you exercise. You need to exercise hard enough to be breathing heavily but not so hard that you can't carry on a conversation without gasping for air.

### ▪ Rate of perceived exertion (RPE)

This method is based on the physical sensations a person experiences during physical activity, such as increased heart rate or breathing rate, increased sweating, and muscle fatigue. The RPE uses a scale that ranges from 6 to 20, where 6 means "no exertion at all" and 20 means "maximal exertion." The goal is to work out hard enough to feel that you are in the "somewhat hard" category, or around 13.

While it is good to insert short spurts of "hard" or "very hard" exercise (15–17 on the scale) within your workout, you should not stay at 16 or above for very long.

## Quality of technique—avoid injury!

Make sure you maintain good form throughout your exercise. As soon as your form starts to decline, stop the movement. In strengthening exercises, only do as many repetitions as you can using good technique; your last repetition must be as good as the first one.

## Three components of an exercise program

1. Cardiovascular conditioning (aerobics)
2. Muscle strengthening and endurance
3. Flexibility/stretching

## Cardiovascular conditioning (aerobic exercises)

Aerobic exercise can be achieved through wheelchair pushing, seated aerobics, arm ergometer exercise, swimming, rowing, cycling, circuit training, sports (such as wheelchair rugby and basketball), and boxing or overhead punching. Walking can provide aerobic exercise for some people who have incomplete injuries.

## Where to find aerobics programs

- NCHPAD—National Center on Health, Physical Activity, and Disability ([www.nchpad.org](http://www.nchpad.org))—has many resources on their website, including exercise videos for individuals with tetraplegia (quadriplegia) and paraplegia.
- SCI Total Fitness (<http://scitotalfitness.com>) is an online exercise and weight loss program specifically designed for people with SCI. Signing up (for a fee) gives you a program tailored to your unique needs and interests.

**Note:** You don't need fancy equipment to exercise! You can use your own body weight for resistance, or purchase inexpensive hand weights, cuff weights or Therabands.

## FES for cardiovascular endurance

Functional Electrical Stimulation (FES) exercise delivers electrical current to the muscles via electrodes placed on the muscles of the lower limbs. This drives paralyzed muscles to perform movements that allow you to do activities like cycle or walk if you are set up on the right equipment. As your body moves, blood circulation increases and muscles get stronger, providing benefits such as improved heart health, increased endurance, improved bone density and reduced spasticity. You need access to the equipment, either through a facility or by pur-

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chasing it yourself. FES is not appropriate for everyone. Discuss this option with your rehab health provider to see if FES might be feasible or appropriate for you.

## Muscle strengthening/resistance training

An exercise program should include some strengthening activities. There are many ways to do this: free weights, bands / elastics, wall weights, circuit training, exercise machines and household tasks.

### What muscles should you strengthen?

Work on muscles that balance the ones you use all day long. For example, if you're pushing a manual wheelchair all day, you are using your biceps, pectoral (chest), hand and wrist muscles quite a bit. So you should focus on strengthening the opposite muscles, such as the triceps (back of upper arm) and muscles of your upper back. This will help you maintain stability and avoid overuse injuries. For power chair users, both front and back muscles need strengthening.

## Flexibility/stretching exercises

- Stretching allows you to maintain flexibility, which helps with posture, balance and activities of daily living like dressing and bathing.
- Think about the positions you are in all day and focus your stretching routine on those muscles that have been contracted.
- Stretching should always be gentle. Hold stretches for 20-30 seconds—no bouncing! Do them every day.

## Things to watch out for

### Skin problems

Be careful with all your transfers on and off equipment, and look for areas that could cause friction, pressure or shearing.

### Autonomic dysreflexia (AD)

Make sure you know your body's response to a stimulation that might be painful or cause irritation that could lead to AD. Empty your bladder or urine bag prior to exercise.

### Overuse injuries

Maintain good exercise technique to avoid repetitive motion injuries. Try not to perform only one motion or overwork one muscle in any session. Choose exercises that do not overuse muscles that you might already be using a lot during your daily activities, such as the muscles you use to push a manual wheelchair.

### Spasticity

If you have a lot of spasticity that might make it difficult to do an activity correctly or throw you out of position while using a machine, have someone with you the first time that you trial new equipment or exercises.

## Medications

If you are on medications that dampen your pain threshold, you may not be able to tell if an exercise is painful and possibly causing damage.

## Heart rate and temperature

Be aware that your heart rate and temperature may not increase as they normally would, and you may not sweat when exercising hard.

## Blood pressure

Many people with SCI have low blood pressure when they exercise because blood does not return as efficiently back up from the legs. This can cause you to feel light-headed or queasy. Talk to your health provider about ways to manage this.

## Pain

**Exercise should not be painful!** Have a therapist or trainer check you out to make sure you are doing an exercise properly.

## Tips for success

- Be realistic. If you're doing zero days of exercise right now, don't jump into a five-day-a-week program. Start with one day a week, and work yourself up gradually to get into the habit of exercise.
- Start with short bouts of 5–10 minutes of activity, then switch to a lower intensity activity. Gradually increase your high intensity times.
- Find activities you enjoy. This is essential for success!
- Keep things interesting. Don't do the same activity every time. Varying your exercise gives you more health benefit, reduces the risks for overuse injuries, and keeps you from getting bored and losing motivation.

## Getting started

- Whatever you are doing now, think of ways you can increase it a little.
- Check with your health care provider to address any health concerns and get more ideas for ways to exercise. This is especially important before you engage in standing programs or weight-bearing activities because of the risk for fractures.
- To get and stay motivated, set goals and track progress using a notebook, calendar, apps for mobile devices, or online resources such as My Fitness Pal ([www.myfitnesspal.com](http://www.myfitnesspal.com)) or Online Fitness Log ([www.onlinefitnesslog.com](http://www.onlinefitnesslog.com)).

**Remember,** even a little exercise has benefits and is better than nothing. Be patient; it may take some time and trial and error before you settle on what works for you.

## Where to find the information discussed here

Go to <http://sci.washington.edu/exercise> for the complete report, video, printable exercise instructions and guidelines.



# 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 Service (<http://www.lib.washington.edu/ill>).

## PSYCHOSOCIAL

### ■ Depression treatment preferences after acute traumatic spinal cord injury.

Depression is a common and disabling condition among individuals with SCI. Despite the prevalence and negative impact of depression after SCI, there is evidence that treatment of depression is not adequate. Depression severity (using the Patient Health Questionnaire-9), history of depression and treatment preferences were obtained from 183 participants with SCI. Among inpatients with SCI, 28% had Patient Health Questionnaire-9 score of 10 or more, indicating probable major depression. A physical exercise program was the most preferred treatment option (78%), followed by antidepressants prescribed by a primary care provider (63%) and individual counseling in a medical or rehabilitation clinic (62%). All treatment types were preferred over group counseling. Those with a prior diagnosis of depression and a history of antidepressant use were significantly more willing to take an antidepressant. Those over age 40 were more willing to receive individual counseling. Treatment preferences are important factors when choosing a depression treatment for patients with SCI.

Fann JR, Crane DA, Graves DE, et al.

*Arch Phys Med Rehabil.* 2013 Dec;94(12):2389-95.

## FRACTURES

### ■ The association of anticonvulsant use with fractures in spinal cord injury.

In a group of 7,447 male veterans with a traumatic spinal cord injury of two years' or more, 892 sustained a fracture. Those who used anticonvulsants had more fractures than those who did not. Those who used a benzodiazepine subclass of drug were more likely to fracture than other types of anticonvulsants, as were those on multiple anticonvulsant drugs compared to a single anticonvulsant. These results suggest that there should be an emphasis on fracture prevention when anticonvulsants are prescribed in spinal cord injury, particularly when more than one anticonvulsant is used.

Carbone L, Chin AS, Lee TA, et al.

*Am J Phys Med Rehabil.* 2013 Dec;92(12):1037-50.

### ■ Surgical versus nonsurgical treatment of femur fractures in people with spinal cord injury: an administrative analysis of risks.

This analysis of Veterans Affairs data compared surgical and non-surgical treatment for femur (thigh bone) fractures in veterans with and without spinal cord injuries. The SCI group had lower rates of surgery (37%) for these fractures than the non-SCI group (78%). There was higher mortality in the non-SCI group treated without surgery than non-SCI patients who had surgery. In the SCI population, there was no difference in mortality between patients treated with and without surgery. Overall, adverse events were similar between groups except for pressure sores in the SCI population: rates of pressure sores were higher in the non-surgical SCI group (20%) compared to the surgical SCI group (7%). Rates of surgical interventions for those with SCI varied greatly among VA institutions. Surgical treatment minimizes the risks of immobilization and may be preferable in appropriate SCI patients.

Bishop JA I, Suarez P, Diponio L, et al.

*Arch Phys Med Rehabil.* 2013 Dec;94(12):2357-64.

## BOWEL

### ■ Effects of Manual Therapy on Bowel Function of Patients with Spinal Cord Injury.

Twenty persons with SCI received manual therapy applied to the intestine and along the colon on the surface of abdomen five times a week for 12 weeks (60 sessions total). Manual therapy was applied to the patients' abdomens to reduce tension and improve peristalsis (contractions) of the colon. A secondary goal was to exercise the pelvic floor muscles to help the patients to excrete. After the 12 weeks of manual therapy, there was a significant decrease in average time for bowel movement from 94 to 60 minutes and in dosage of glycerine enema from 86 mL to 31 mL. Manual therapy improved bowel function in this population.

Hu C, Ye M, Huang Q.

*J Phys Ther Sci.* 2013 Jun;25(6):687-688.

### ■ Colonoscopy is high yield in spinal cord injury.

In two large VA SCI centers between 1997-2008, 311 patients underwent 368 colonoscopies. Although quality colonoscopic care in this population is labor intensive, the data suggests that it appears safe and therapeutically beneficial. The population in this study was predominantly male and Caucasian, and 199 (64%) had T6 injuries or above. Although most of the colonoscopies were poorly prepped, the proportion that were adequately prepped increased over time (from 3.7 to 61.3%). Of the 146 polyps removed, 101 (69%) were adenomas or carcinomas. Ten subjects had 11 complications from the procedure, but none were serious. Results show that the risks of colonoscopies are outweighed by the likelihood of finding polyps. Providers should continue to offer colonoscopy to their SCI patients when needed, while being aware of the special challenges they face.

Hayman AV, Guihan M, Fisher MJ, et al.

*J Spinal Cord Med.* 2013 Sep;36(5):436-42.

## SECONDARY COMPLICATIONS

### ■ Spinal cord injury and type 2 diabetes: Results from a population health survey.

A review of 60,678 respondents to the Statistics Canada 2010 cross-sectional Canadian Community Health Survey found that persons with SCI were at a significantly greater risk of developing type 2 diabetes. This risk remained even after adjusting for sex, age, smoking status, hypertension status, body mass index, daily physical activity, alcohol intake, and daily consumption of fruits and vegetables. This demonstrated that there is a strong association between SCI and type 2 diabetes, which is not explained by known risk factors for type 2 diabetes.

Cragg JJ, Noonan VK, Dvorak M, et al.

*Neurology.* 2013 Nov 19;81(21):1864-8.

### ■ Frequency and age effects of secondary health conditions in individuals with spinal cord injury: a scoping review.

A review of 92 studies found that: (1) individuals with SCI experience a number of secondary health conditions, many of which occur at a higher rate in those with SCI than the general population; (2) the most common conditions or symptoms are pain, bowel and bladder regulation problems, muscle spasms, fatigue, esophageal symptoms and osteoporosis; (3) a number of conditions, including cardiovascular disease, diabetes, bone mineral density loss, fatigue and respiratory complications or infections, occur with higher frequency in older individuals or those with longer SCI duration, relative to younger individuals or those with shorter SCI duration; and (4) there is a lack of research examining

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the natural course of health conditions in individuals aging with SCI. The findings support the conclusion that individuals with SCI show signs of 'premature aging' in different organ systems.

Jensen MP, Truitt AR, Schomer KG, et al.  
*Spinal Cord*. 2013 Oct 15.

## EMERGENCY PREPAREDNESS

### ■ Evacuation preparedness in full-time wheelchair users with spinal cord injury.

Twenty-one individuals with SCI who previously indicated that they had a plan of evacuation from either their homes, places of work, or towns/cities were contacted by telephone and asked to describe their evacuation plans. The number of critical elements necessary for a good plan and assistive technology devices were recorded. Based on their answers, participants were given a score on a scale of 0–10, with 10 indicating a more thorough plan. Median home and town/city evacuation scores were both 3 (ranges: 1–4 and 0–8, respectively). Median evacuation scores of individuals with paraplegia were higher in home and town/city than individuals with tetraplegia. Median evacuation scores of subjects who were employed were higher in home and town/city than unemployed. Low scores indicate that individuals with SCI who think they have plans are not adequately prepared for an emergency evacuation. Interventions are needed to improve evacuation readiness and lack of preparedness. Emergency personnel should be aware of this when responding in a catastrophe.

Hogaboom NS, Oyster ML, Riggins MS, Boninger ML.  
*J Spinal Cord Med*. 2013 Jul;36(4):290-5.

## ELECTRICAL STIMULATION

### ■ Neuromodulation of the lumbar spinal locomotor circuit.

The lumbar spinal cord contains the necessary circuitry to independently drive locomotor behaviors. This function remains following spinal cord injury and is responsive to rehabilitation. Although the effectiveness of task-specific training and pharmacologic modulation has been repeatedly demonstrated in animal studies, results from human studies are less striking. Recently, lumbar epidural stimulation (EDS) along with locomotor training was shown to restore weight-bearing function and lower-extremity voluntary control in a chronic, motor-complete human SCI subject. Related animal studies incorporating EDS as part of the therapeutic regimen are also encouraging. EDS is emerging as a promising neuromodulatory tool for SCI.

Auyong N, Lu DC.

*Neurosurg Clin N Am*. 2014 Jan;25(1):15-23.

### ■ Restoring voluntary grasping function in individuals with incomplete chronic spinal cord injury: pilot study.

This study compared the effectiveness of functional electrical stimulation (FES) therapy to conventional occupational therapy (COT) for improving voluntary hand function in individuals with chronic (more than 2 years), incomplete spinal cord injury between C4 and C7. Eight participants were randomly assigned to receive either FES (5 subjects) or COT (3). Both groups received 39 hours of therapy over 13 to 16 weeks. Function tests were performed before the treatments started, after 39 sessions of therapy, and at 6 months. The FES group improved by 5.8 points on the Toronto Rehabilitation Institute Hand Function Test, whereas the control group changed by only 1.17 points. Similarly, after 39 sessions of therapy, the intervention group improved by 4.6 points on the FIM self-care subscore, whereas the control group did not change at all. The results of the pilot data justify a clinical trial to compare FES therapy and COT alone to improve voluntary hand function in individuals with chronic incomplete tetraplegia.

Kapadia N, Zivanovic V, Popovic MR.

*Top Spinal Cord Inj Rehabil*. 2013 Fall;19(4):279-87.

## ANTIBIOTICS

### ■ Antibiotic prescribing trends in the emergency department for veterans with spinal cord injury and disorder 2002-2007.

Records of veterans with SCI/D between 2002-2007 were reviewed to identify emergency department (ED) visits that did not result in same-day hospital admission. This group had 21,934 ED visits and 5,887 antibiotics prescribed over the study period (rate of 268.4 prescriptions out of 1000 visits). The antibiotic prescribing rate increased from 238.8 out of 1000 visits in 2002 to 310.8 out of 1000 visits in 2007. This increase in the rate of prescribing was seen across all patient demographics and factors assessed. Although clinical guidelines for careful use of antibiotics in persons with SCI/D have been distributed to providers, antibiotic prescribing in an ED setting is high and continuing to rise in this population.

Evans CT, Rogers TJ, Chin A, et al.

*J Spinal Cord Med*. 2013 Sep;36(5):492-8.

## WHEELCHAIR COVERAGE

### ■ Disparities in Wheelchair Procurement by Payer Among People with Spinal Cord Injury.

A total of 359 individuals age 16 or older and at least one year post injury were divided into insurance coverage categories: Medicaid/Department of Vocational Rehabilitation (DVR) (125 individuals), Private/Prepaid (120), Medicare (55), Worker's Compensation (WC)/Veterans administration (VA) (30), and Self Pay (29). For manual wheelchair users, the likelihood of having a lightweight, customizable wheelchair was 97.5% for Private/Prepaid, 96.3% for Medicaid/DVR, 94.1% for WC/VA, 87.5% for Medicare, and 82.6% for Self Pay. For power wheelchair users, those with WC/VA (100%) were most likely to receive a customizable power wheelchair with programmable controls, followed by Private/Prepaid (95.1%), Medicaid/DVR (86.0%), Medicare (83.9%), and Self Pay (50.0%). The only payer group for which all beneficiaries received wheelchairs meeting standard of care were power wheelchairs provided by WC/VA.

Groah S, Ljungberg I, Lichy A, et al.

*PM R*. 2013 Nov 7. pii: S1934-1482(13)01150-7.

## BLADDER

### ■ Use of botulinum toxin in individuals with neurogenic detrusor overactivity: state of the art review.

Botulinum neurotoxin (BoNT) injected into the bladder decreases urinary incontinence and improves quality of life in persons with spinal cord injury and multiple sclerosis who have overactive bladders and do not tolerate anticholinergic medications. This article is a discussion of the structure and function, mechanisms of action, clinical and urodynamic studies, injection technique, potential beneficial and adverse effects, and potential areas of research of BoNT. The use of botulinum toxin has increased because of the medical literature, which has supported its effectiveness, safety, easy use and learning curve, reproducibility of results on repeated use, and recent FDA approval of Botox® (onabotulinumtoxinA).

Linsenmeyer TA.

*J Spinal Cord Med*. 2013 Sep;36(5):402-19.

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**Editorial Board of Advisors:** Charles Bombardier, PhD; Stephen Burns, MD; Chris Garbaccio; Barry Goldstein, MD, PhD; Jeanne Hoffman, PhD; Cathy Warms, PhD, ARNP, CRRN.

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@uw.edu](mailto:csalzman@uw.edu).

Visit the NWRSCIS at <http://sci.washington.edu>.

## SCI studies at the UW now recruiting...

### SCI-CARE Study

The Northwest Regional SCI System is seeking participants for a study designed to improve care for people with SCI who are dealing with pain, low mood, or being less physically active than they want to be. You may qualify for this study if you have a traumatic SCI, are at least 18 years old, and receive care at either Harborview or UW Medical Center Rehabilitation Clinics.

Participants will be randomly assigned (50/50 chance) to receive either usual medical care or usual care plus a health assistant who will:

- Strengthen the connection between you and your doctor or nurse practitioner.
- Monitor your progress and assist with any problems that keep you from reaching your goals.
- Relay information to and from your health care provider in between appointments.
- Offer help with non-medical alternatives to pain, mood, or becoming more active.

Study participation will take place over four months. Most study activities will take place over the phone or at regularly scheduled clinic visits so extra trips to Harborview or UW will not be necessary. Participants will complete three questionnaires by phone. There is payment of up to \$50 for participation.

Learn more about this study and find out if you qualify by calling 206-744-3608 (Toll Free 866-495-7015) or send an email to [scicare@uw.edu](mailto:scicare@uw.edu). (Note: we cannot guarantee confidentiality of information sent via email.)

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