Inovations for Daily Living

I am a gadget guru. I absolutely love getting my hands on the newest electronic gizmos that utilize the latest technologies.

One reason that I am such a techno geek is because I always want to know if something is out there that I can use in my everyday life. After all, I have been living with C5 spinal cord injury (SCI) for over 20 years, and I continue to find better ways to get things done as well as help me prevent health problems.

Back in 2004, an issue of Pushin' On featured articles on the use of the Internet to identify products that may be particularly useful for individuals living with SCI. Although some items were more useful and interesting than others, the idea of writing about such items was welcomed by most readers.

This Pushin' On is similar. As with the 2004 issue, no payment has been made to get an item featured. I am also not endorsing one product over another. Instead, this article simply features products of personal interest that I have discovered while searching the Internet. I am going to provide information on gadgets, gizmos, and other potentially useful products or items that are just plain cool in my opinion. You are likely to find some things I have found useful and interesting to you too. If you also take the time to explore what else the Internet offers, you will almost certainly find other items that you find personally useful and interesting.

Mobility

Back in 1994, there was a very short-lived TV series called "M.A.N.T.I.S." It featured a brilliant scientist with paraplegia who created "futuristic" high tech mobility aids to augment his lost body functions and become a crime fighting superhero. Don't expect to be leaping tall buildings any time soon, but the "future" may be closer than you think.

Honda Motor Company (yes, maker of cars, trucks and the ASIMO Robot) has created a currently unnamed prototype "walking aid device" meant to aid people with walking problems such as those associated with lower levels of paraplegia. The form-fitting device is designed to be tightly worn around the waist with extensions from the waist to the legs. It aids in walking by providing power assist to rotate hip joints and force lower limb movements. Now, I am not suggesting that this device is going to eliminate your need for wheelchair, but you may soon see it in rehabilitation centers to determine what, if any, use it will have for individuals with SCI.

continued on next page
Many individuals with SCI utilize a dry floatation (air) cushion for wheelchair seating. If you use such a cushion, you have worked with a professional who used a pressure mapping system to properly inflate your cushion. You should consulted a professional whenever you get a new wheelchair or cushion because properly inflated air cushions are relatively effective at minimizing pressure areas.

However, the major drawback of an air cushion is maintaining proper inflation level over time. If you have too little or too much air in your cushion, you have a higher risk for skin damage. You are almost certain to have skin damage if you lack the sensation to realize that your cushion has gone flat.

I have found two products that have finally been introduced to monitor inflation levels for air cushions. The ROHO Group, maker of the ROHO Cushion, has introduced the Merlin™ Proximity Sensor. This flat pad is fixed via Velcro to the underside of your ROHO cushion. The sensor is calibrated at the time you are pressure mapped by a professional seating specialist. Merlin wakes every 10 minutes to make sure your ROHO cushion’s inflation level has not changed. An audible alarm will sound if any adjustment is needed.

The i-Pressure cushion sensor is also designed to monitor air pressure and reports cushion inflation level. The i-Pressure is connected to the valve stem on the cushion (Multi-chamber cushions require a sensor on each valve) and is also calibrated by a professional. Once calibrated, the sensor monitors the air pressure and sounds an alarm when the cushion is becomes under or over inflated.

Bluetooth is a short-range wireless technology. It connects multiple voice and data devices and enables users to enjoy a variety of wireless applications such a printing or faxing as well as hands-free operation of devices such cell phones. Infrared (IR) is another form of wireless technology. IR is a light signal that is commonly used in the remote control operation of audio, video and other electronic equipment. Both Bluetooth and IR technology are used to enhance

**Skin Care**

**Wheelchair Technology**

I am sure that most of you have heard of those off-road wheelchairs. Some manual chairs include the Beast, Trekinetic K-2, and the Boma - all are pretty cool in their on right. Some all-terrain power wheelchairs include the X4-Extreme, Predator, and the TankChair, which is the mega-monster that the name implies.

Now, there is a new meaning to "power" for all of you x-treme wheelchair users. German wheelchair maker, Otto Bock, has introduced the SuperFour. It is a gas/electric hybrid similar to hybrid cars. The SuperFour has an automatic tilt seat system and operate this 4-wheel drive outdoor vehicle using a joystick similar to joysticks commonly used by power wheelchair users. When the batteries are drained from all of your all-terrain fun, a gas engine kicks in to keep the fun going while also recharging the vehicle batteries. The SuperFour has a top speed of over 9 mph, a range of about 124 miles, and handles 40 percent inclines. With all that power, you can bet that the roll bar cage along with the sweep-over canopy and windshield will be valued safety features. OK, I admit that the SuperFour probably should not be under the heading of "Wheelchair Technology" as it is technically an "outdoor vehicle." However, it is built for all of you daring thrill seekers who might feel "confined" to your current wheelchair.
Pressure Sore Stage Update

In past years, a pressure sore diagnosis was made in one of four stages. Such a staging system is used in diagnosis to describe the extent of wound damage.

The National Pressure Ulcer Advisory Panel (www.npuap.org) recently updated the classified stages for pressure sore diagnosis. This update better defines deep tissue injury (having visible surface damage and suspected deep tissue damage) and unstageable wounds (having visible surface damage with known deeper tissue damage to an unknown extent). Stages I - IV were also updated to improve the accuracy of diagnosing pressure sores and separate them from other skin lesions.

(Suspected) Deep Tissue Injury

Purple or maroon localized area of discolored intact skin or blood-filled blister due to damage of underlying soft tissue from pressure and/or shear. The area may be preceded by tissue that is painful, firm, mushy, boggy, warmer or cooler as compared to adjacent tissue.

Deep tissue injury may be difficult to detect in individuals with dark skin tones. Evolution may include a thin blister over a dark wound bed. The wound may further evolve and become covered by thin eschar. Evolution may be rapid exposing additional layers of tissue even with optimal treatment.

Stage I

Intact skin with non-blanchable redness of a localized area usually over a bony prominence. Darkly pigmented skin may not have visible blanching; its color may differ from the surrounding area. The area may be painful, firm, soft, warmer or cooler as compared to adjacent tissue. Stage I may be difficult to detect in individuals with dark skin tones. May indicate “at risk” persons (a heralding sign of risk).

Stage II

Partial thickness loss of dermis presenting as a shallow open sore with a red pink wound bed, without slough, May also present as an intact or open/ruptured serum-filled blister. Presents as a shiny or dry shallow sore without slough or bruising (indicating suspected deep tissue injury). This stage should not be used to describe skin tears, tape burns, perineal dermatitis, maceration or excoriation.

Stage III

Full thickness tissue loss. Subcutaneous fat may be visible but bone, tendon or muscle are not exposed. Slough may be present but does not obscure the depth of tissue loss. May include undermining and tunneling. Depth of a stage III pressure sore varies by anatomical location. The bridge of the nose, ear, occiput (back of head) and malleolus (ankle) do not have subcutaneous tissue and stage III sores can be shallow. In contrast, areas of significant adiposity (fat) can develop extremely deep stage III pressure sores. Bone/tendon is not visible or directly palpable.

Stage IV

Full thickness tissue loss with exposed bone, tendon or muscle. Slough or eschar may be present on some parts of the wound bed. Often includes undermining and tunneling. Depth of a stage IV pressure sore varies by anatomical location. The bridge of the nose, ear, occiput and malleolus do not have subcutaneous tissue and these sores can be shallow. Stage IV sores can extend into muscle and/or supporting structures (e.g. fascia, tendon or joint capsule) making osteomyelitis possible. Exposed bone/tendon is visible or directly palpable.

Unstageable

Full thickness tissue loss in which the base of the sore is covered by slough (yellow, tan, gray, green or brown) and/or eschar (tan, brown or black) in the wound bed. Until enough slough and/or eschar is removed to expose the base of the wound, the true depth, and, therefore, stage cannot be determined. Stable (dry, adherent, intact without erythema or fluctuance) eschar on the heels serves as “the body’s natural (biological) cover” and should not be removed.
As an individual with spinal cord injury (SCI), you probably first became familiar with physical therapy (PT) and occupational therapy (OT) in the early weeks following injury. Your therapy probably began in the hospital and intensified during inpatient rehabilitation. Your therapy may have also continued following inpatient discharge with outpatient therapy or home-health therapy.

PT and OT are essential in those early days of rehabilitation. Therapy does not bring back movement or sensation that you have lost following injury, but PT and OT are essential because both can help you maximize your independence with the movement and sensation that you do regain following injury.

It is equally essential that you maintain your lifestyle beyond rehabilitation. This can be very challenging as you probably know from experience. However, you should also know that PT and OT services can continue to be very helpful throughout your life.

PT versus OT

You can find physical and occupational therapists working across a variety of settings. They work in hospitals, rehabilitation centers, nursing homes, schools, home health, and wellness centers.

The primary focus of PT is on improving or restoring functional movement lost after illness or injury. PT services begin with an evaluation of the patient’s abilities. A treatment plan is then developed to specifically address issues such as pain, range of motion, balance, and mobility. Various physical therapy techniques are then utilized to improve overall health or restore functional independence.

The focus of OT is mainly on improving a patient’s daily living activities at home, work, and other environments. OT begins with an evaluation of a patient’s functional abilities and environment. A treatment plan is made to improve the patient’s daily independence with tasks such as dressing, bathing, grooming, and other activities of daily living (ADL). This treatment plan is accomplished with or without the use of adaptive equipment.

Secondary Conditions

As an individual with SCI, you are at risk for secondary conditions such as pressure sores, muscle spasms and contractures, heterotrophic ossification (HO), pain and others. Such conditions can negatively impact your life in many ways. You may experience a change or decline in your range of motion (ROM). You may become limited in your ability to perform ADL.

For example, people who develop a pressure sore are treated with bed rest. The time needed for bed rest varies. A minor pressure sore may heal in days. People who need surgical intervention (skin flap) will likely spend months in bed. This decrease in activity usually leads to some level of decline in the person's strength and ability to perform ADL once the sore is healed.

PT and OT are often needed for people who develop a pressure sore. An evaluation is often needed to assess the patient’s current wheelchair seating system, provide patient and family education in regards to positioning and pressure relief, and make adaptations to their environment to promote independence. If surgical intervention is required, the therapist can also provide education and treatment for alternate methods of transferring to reduce shearing and maintain skin integrity. Finally, PT and OT are important in helping patients regain strength and conditioning lost as a result of prolonged bed rest.

You may also have a decrease in ROM if you develop spasticity, contractures or HO. Limited ROM results in difficulties with your mobility and self-care.

PT and OT evaluations are usually needed to provide ways to maximize function following decreases in ROM. For example, the therapy can address splinting and orthotic needs to maintain ROM and protect the joints. Treatment for severe spasticity or HO can address mobility issues to determine appropriate techniques for safe and improved functional mobility.

Chronic pain is a common problem for many individuals...
with SCI. For example, you are likely to limit your mobility if pushing your manual wheelchair is painful on your shoulders muscles. Your independence may also decrease if the pain causes you to avoid ADL.

PT and OT can be helpful in managing your pain. Pain treatment options include TENS, cervical traction, ultrasound, moist heat, interferential current, iontophoresis, stretching, manual therapy, and exercise programs. Pool therapy may also be recommended.

**Environmental Changes**

Your home is a vital part of your environment. You probably relied on PT and OT recommendations for home accessibility prior to your discharge from rehabilitation. They commonly recommend structural changes to the home as well as adaptive equipment to maximize your safety and independence. You can also consult a PT or OT specialist to evaluate accessibility issues when you move to a new location.

Your wheelchair is also essential in that you probably rely on it for mobility. The average life-span for a wheelchair is generally between 5 to 7 years. However, much can change in 5 to 7 years. Wheelchair technologies evolve and improve. Your mobility needs may change. Your weight or posture can change, so your seating needs can change along with your effectiveness in preventing pressure sores.

Therefore, your doctor should prescribe a PT or OT wheelchair specialist when you order a new wheelchair. The specialist can evaluate your needs and understands how current wheelchair technologies fit your needs. The specialist will then work with your doctor and wheelchair vendor to ensure that you get a wheelchair that is right for you. The specialist can also address any seating issues to help prevent pressure sores.

Your car or van is another part of your environment. There are also constant changes in driving equipment and technologies. There are PT and OT specialists in driving who keep up with these changes. A specialist can evaluate your needs to help ensure you have the proper equipment for your car or van. If you switch from manual to a power wheelchair, a specialist can help you determine if it is best to drive from your power wheelchair or transfer to the driver’s seat.

**Issues with Aging**

Everyone experiences issues of aging. Aging affects your entire body including your cardiovascular health, respiratory system, muscles and joints, and every other aspect of your health.

Issues of aging are often compounded by health and lifestyle issues associated with SCI. Your blood pressure and heart rate are often affected by SCI. You likely have impaired respiratory muscle control, weakened pulmonary system, decreased lung capacity, and increased respiratory congestion. Your mobility is impaired. This puts your skin at greater risk for damage as your skin becomes weaker, thinner and less supple with age. Shoulder pain often occurs following years of repetitive muscle and joint overuse from pushing a manual wheelchair for a long period of time. Most of these issues of aging result in a decline in independence.

You can likely benefit from PT and OT services as you age. A therapist can evaluate your needs to determine appropriate interventions that ensure continued functional mobility and independence in ADL. For example, a PT or OT can help you design an individualized exercise program for improved cardiovascular and respiratory health. Many individuals with SCI eventually need to switch from manual to power wheelchair after years pushing a wheelchair. Although many people think of such a change as a decrease in independence, the switch usually restores independence because people (once hindered by pain) can return to their normal ADL. Again, a therapist can address seating issues to help prevent the occurrence of a pressure sore.

**Summary**

A doctor usually prescribes PT and OT, and most services are covered by insurance. In fact, your therapists and doctor usually work in partnership to help you reach your rehabilitative goals.

Individuals who are newly injured usually rely on PT and OT services, but similar services remain under-used beyond initial rehabilitation. This article offers a few circumstances in which you can benefit from PT and OT services. Simply ask your doctor if you can benefit from PT or OT in other aspects of your life.
Use of Neurologic Examination to Predict Awareness and Control of Lower Urinary Tract Function Post Spinal Cord Injury

This study is being sponsored by the United States Department of Education and the National Institute of Disability and Rehabilitation Research and conducted at the University of Alabama at Birmingham, Spain Rehabilitation Center. Marca Sipski Alexander M.D. is the Principal Investigator for this study.

Introduction

In addition to loss of motor and sensory function, many individuals with spinal cord injury (SCI) experience changes in bladder, bowel and sexual function following SCI. Whereas significant information is available to predict the impact of specific levels and types of SCI, little information is available that will allow one to use the clinical exam to predict the potential for bladder control when damage to the nerves leading to the bladder has occurred.

Objectives

The goals of this research study are to:

1) predict the potential for bladder control;
2) allow better planning for urinary management in persons with SCI; and
3) assist in prediction of which persons with SCI would most likely benefit from experimental therapies.

Participants

Individuals interested in participating in this study will come to the University of Alabama at Birmingham (UAB) for one visit. The visit will require a neurological examination conducted at Spain Rehabilitation Center outpatient clinic, immediately followed by a bladder testing procedure done by the UAB Department of Urology conducted at The Kirklin Clinic. The test involves the use of a catheter to fill the bladder to determine sensation of the need as well as the ability of the bladder to void.

Participants must be between 19 and 60 years of age and between six months and 3 years post-injury. Participants who are currently using medications to assist in bladder management may be asked to discontinue the use of those medications prior to participation in the study.

Compensation

Participants will be reimbursed $200 for time and travel expenses related to participation in the study.

Potential Outcomes

Based upon a simple neurologic examination, we should be able to better predict specific aspects of autonomic function and develop targeted methods to retrain neurogenic bladders. As one example, persons with SCI who have preservation of sensory function between levels T11 and L2 should have reliable sensation of bladder filling. So we may be able to develop methods of training patients to catheterize themselves based on their sensations. In another example, we may be able to develop new improved methods to train patients to voluntarily void on a timed basis if we find evidence that voluntary voiding should be possible in persons with preservation of motor function at levels S2 through S5. Both of those potential outcomes examples would be cost-effective since they place more emphasis than usual on optimally using the patient’s neurologic potential.

Although information on predicting autonomic function is already available for some persons with SCI, this continued research is needed to predict specific sensations indicating the need to void or predict who should have voluntary potential. Furthermore, it should be very easy to translate these research outcomes into clinical practice, simply through repeated dissemination of our results.

For questions on this study, contact Jim Higginbotham by phone at 205-934-2088 or by email at jhigg@uab.edu.
independence of many individuals with disabilities. In fact, you probably have more than one remote control for your electronic equipment, and you may use Bluetooth for your cell phone and computer operation.

Pride Mobility, manufacturer of the Jazzy and Quantum lines of scooters and power wheelchairs, has impressed me by integrating BOTH Bluetooth and IR technologies into their Q-Logic Drive Control System. It has many useful features. One is a programmable timer for regularly scheduling an alarm to remind you to do pressure relief. The Q-Logic Drive Control System allows users to also program both Bluetooth and IR functions into its operating system. This means you can remotely control your electronics, computer’s mouse, and most of your other wireless devices the same way that you operate your power wheelchair via joystick, head controls, or other user controller.

**Bladder Management**

If you have not heard it already, doctors usually recommended that individuals with SCI drink at least 64 ounces of water per day. However, some people simply find it difficult to remember to drink the proper amount of fluids, or they are too busy to keep track of their daily water consumption.

Help is here! HydraCoach has introduced the world’s first interactive water bottle. It features a hydration monitor that calculates your personal hydration needs, tracks your real-time fluid consumption, paces you throughout the day, and motivates you to achieve and maintain optimal hydration.

Of course, you may need a leg bag emptier even if you do not need to increase your fluid intake. You have probably seen power leg bag emptiers such as the HydroFlush Mini, ASL Low Voltage Power Leg Bag Emptier, Freedom Flow, and the Electric Leg Bag Emptier 2 to name a few. These emptiers are commonly wired into a power supply (often the power wheelchair batteries) and attached to the leg bag. A push button is mounted on the wheelchair where the user can press for an electronic valve release of urine from the leg bag.

You may have also seen a manual leg bag emptier such as the JB-3. It is similar to power emptiers in the way it is mounted on your wheelchair, but the leg bag is emptied by manually pulling on a cable instead of pressing a button or flipping a switch.

Although either power or manual leg bag emptiers might work for you, I prefer something a bit more modern. How about wireless? Oh, yea! Say "goodbye" to those wires with the soon-to-be-available Freedom Flow II. It has three main parts:

1. A small rectangular tube clamping unit with internal rechargeable battery;
2. A switch (different types of switches such as a puff switch are available); and
3. A battery charger for recharging clamping unit.

The small unit easily slips onto the drain tube at the bottom of your leg bag. The separate operating switch is positioned on your wheelchair wherever you can best operate it. The rechargeable unit will last about a week on a single overnight charge.

**Conclusion**

Here you have my list of cool technologies that I hope you find as interesting as I did. I found these products and more by simply searching the Internet, and I bet that you will almost certainly find other gadgets, gizmos, and other products that you find personally interesting.

However, the point of this article is to find something useful in every day life. I have given you a few items that I think might be useful for some individuals with SCI. I encourage you to search now. Hopefully, you will find useful things for your every day life.
Announcements

Participate in our Home-Based Weight Loss Program. You must be a person with spinal cord injury for at least 1 year, be about 15% or more above the ideal weight, and use a wheelchair. For information on participating email Mark Leader (markl@uab.edu) or call 205-934-5056.

Participate in study on Effects of SCI on Female Sexual Response. You must be a woman with SCI or MS, between the ages of 19-60, not must not be pregnant, must have sensation between T11– L2 and have normal hand function. For information on participating email Dr. Marcalee Sipski Alexander (msipski@uab.edu) or call 866-706-5545.

Participate in study of UAB Index of Motor Recovery: Validation of an Outcome Measure for Motor Recovery in Incomplete Spinal Cord Injury. You need to be at least 19 years old and less than 18 days after a traumatic spinal cord injury or more than 5 years after injury. Five 15-20 minute testing sessions will be required over the course of one year for newly injured patients and 2 sessions of the same length during a one week period will be necessary for the chronic patients. For information on participating email Pat Taylor (poharet@uab.edu) or call 205-934-5463.

Participate in Controlled Trial of venlafaxine XR for depression after SCI: a multi-site study. You must be between the ages of 19 and 64, at least one year post spinal cord injury but no more than 20 years post injury, and with an ASIA level A-D (this may be determined from medical records). Female participants must not be pregnant or lactating and must use a reliable form of birth control during the trial. The trial is 12 weeks in duration and 4-5 visits are required during that time. Participants will complete a screening interview (may be done over the phone) to see if they qualify for the trial. Participants will be compensated for all interviews and visits to the clinic. All visits will be conducted at the Spain Rehabilitation Center. For information on participating email Jan Troncale (jtroncal@uab.edu) or call 205-996-5014.

Participate in study on The Effects of Nicotine on Pain in Spinal Cord Injury Patients. You must be at least 19 years of age or older, have an SCI of at least 1 year duration and experience SCI-related pain. We are recruiting participants who are both nicotine and non nicotine users. Payment for participation provided. For information on participating email Betsy Richardson (ejrichar@uab.edu) or call 205-934-3345.

Resources

- www.i-pressure.com
- http://conceptdg.com
- www.hydbracoach.com
- www.rohoinc.com/medical/merlin.jsp

Office of Research Services
619 19th Street South - SRC 529
Birmingham, AL 35249-7330

©2007 University of Alabama Board of Trustees