The following excerpt has been taken from the Christopher & Dana Reeve Foundation Paralysis Resource Center website.
http://www.christopherreeve.org/site/c.mtKZKgMWKwG/b.4453411/k.BF84/Bladder_Management.htm

Bladder Management

Paralysis at any level almost always affects bladder and bowel function. This is because the nerves controlling these internal organs are attached to the very base of the spinal cord (levels S2–4) and are therefore cut off from brain input.

Although it may not be possible to regain the same control one had before paralysis, a wide range of techniques and tools are available to manage bladder and bowel function.

How the bladder works:

Urine consists of excess water and salts that are extracted from the bloodstream by the kidneys. From the kidneys the urine is pumped down thin tubes called ureters, which normally allow the urine to flow only in one direction. The ureters connect to the bladder, which is basically a storage bag. When the bladder is full, nerves send a message by way of the spinal cord to the brain.

When one is ready to go, the brain sends a message back down the spinal cord to the bladder, telling the detrusor muscle (the bladder wall) to contract, and the sphincter muscle, a valve around the top of the urethra, to relax and open. Urine then passes down the urethra to exit the body. It's a rather elegant process of muscle coordination just to go pee.

After paralysis, though, the body's normal system of bladder control goes haywire; messages can no longer pass between the bladder muscles and the brain.

It is quite common for people with MS to have some problems with bladder control. This can involve a little leaking after a sneeze or laugh, or it can involve loss of all control. Appropriate clothing, padding and devices for incontinence are useful to cope with lack of control.

After spinal trauma, the bladder is usually affected in one of two ways:

Spastic (reflex) bladder is when your bladder fills with urine and a reflex automatically triggers the bladder to empty. Spastic bladder usually occurs when the injury is above the T12 level. With a spastic bladder you do not know when, or if, the bladder will empty.

Flaccid (non-reflex) bladder is when the reflexes of the bladder muscles are sluggish or absent. If you do not feel when the bladder is full, it can become over-distended, or stretched. The urine can back up through the ureters into the kidneys (called reflux). Stretching also affects the muscle tone of the bladder.

Dyssynergia occurs when the sphincter muscles do not relax when the bladder contracts. The urine cannot flow through the urethra, which can result in the urine backing up into the kidneys. The bladder may also not empty completely. Treatments include medications or surgery to open the sphincter.

The most common methods of bladder emptying are with intermittent catheterization (ICP); indwelling catheter (foley); and an external condom catheter for men.

There are several surgical alternatives for bladder dysfunction. A Mitrofanoff procedure constructs a new passageway for urine using the appendix. This allows catheterization to be done through the abdomen to the bladder, a great advantage for women and for people with limited hand function.

Bladder augmentation is a procedure that surgically enlarges the bladder (using a portion of the intestines) to reduce the need for frequent catheterization.

Sphincterotomy reduces pressure on the valve and thus allows urine to flow out of the bladder easier. There is a chance that the operation will affect a man's ability to obtain a reflex erection. This operation is not normally carried out on women.

Urinary Tract Infection

People who are paralyzed are at a high risk for urinary tract infection (UTI). The source of infection is bacteria -- a group or colony of tiny, microscopic single-celled life forms that live in the body and are capable of causing disease.

Bacteria from the skin and urethra are easily brought into the bladder with ICP, foley, and suprapubic methods of bladder management. Also, many people are not able to completely empty their bladder; bacteria are likely to grow in urine that stays in the bladder.

Some of the symptoms of UTI are fever, chills, nausea, headache, increased spasms, and autonomic dysreflexia (AD). You may also feel burning while urinating, and/or discomfort in the lower pelvic area, abdomen, or lower back.

The key to preventing UTI is to halt the spread of bacteria into the bladder. Proper cleaning of urinary care supplies can help prevent infection. Sediment in the urine can collect in tubing and

connectors. This can make it harder for your urine to drain and can make it easier for bacteria to spread. Clean skin is also an important step in preventing infection.

Drinking the proper amount of fluids helps to "wash out" bacteria and other waste materials from the bladder. This can help prevent UTI and lessens the chance of other problems of the urinary system.

A complete medical check-up is recommended at least once a year. This should include a urologic exam, including a renal scan or ultrasound to know the kidneys are working properly. The exam may also include a KUB, an X-ray of the abdomen that can detect kidney or bladder stones.

Even with a regular bladder management program and proper prevention methods, the risk remains for urinary tract infection. Treatment for a UTI almost always includes an antibiotic medication prescribed by a doctor.

Bladder cancer is another concern for some individuals with spinal cord injury. Research shows an increase in the risk of bladder cancer among those who have been using indwelling catheters for a long period of time. Smoking also increases the risk for developing bladder cancer.

Sources: National MS Society, Spinal Cord Injury Information Network, University of Washington School of Medicine/Department of Rehabilitation Medicine

Web Sites

http://www.spinalcord.uab.edu/show.asp?durki=21484
University of Alabama at Birmingham's InfoSheet #11 "Bladder Care and Management"

http://www.spinalcord.uab.edu/show.asp?durki=59866
University of Alabama at Birmingham's Effects of Cranberry Pills to Prevent and Treat UTIs among Persons with SCI

http://sci.rutgers.edu/
CareCure Community
CareCure Community features a forum with informed comments on matters of the bladder and bowel, and all issues related to paralysis health and wellness.

http://www.myvitalconnections.org
Shepherd Center: articles on bladder care for patients

http://calder.med.miami.edu/pointis/urinary.html
University of Miami School of Medicine
The University of Miami School of Medicine offers clinical information on bladder, bowel and other paralysis-related conditions.

www.spinalcord.uab.edu/show.asp?durki=21543&site=1021&return=24467

Spinal Injury Information Network
The Spinal Cord Injury Information Network, links to several articles and fact sheets related to bladder function. Simply search under bladder.

http://www.myvitalconnections.org/webmanualspreview.nsf/3478d43e5c5c8dcb85256ae60061f897/a80d151599e8078685256b4200537fcf!OpenDocument
Shepherd Center Learning Connections: Bladder Care
An online course for patients and their families.

http://sci.washington.edu/about_us/index.asp
University of Washington School of Medicine
The University of Washington School of Medicine/Department of Rehabilitation Medicine offers details on bladder management.

> http://sci.washington.edu/info/pamphlets/bladder.asp
> Bladder Management
> http://sci.washington.edu/info/pamphlets/uti_1.asp
> Urinary Tract Infection Intermittent Catheterization
> http://sci.washington.edu/info/pamphlets/uti_2.asp
> Urinary Tract Infection Indwell (Foley) Catheter
> http://sci.washington.edu/info/forums/reports/urinary_problems.asp
> Management of Urinary Problems Caused by Spinal Cord Injury streaming video

http://www.suna.org/resources/adultCICGuide.pdf
Society of Urologic Nurses and Associates: Clinical Practice Guidelines—Adult Clean Intermittent Catheterization

http://www.bioscience.org/1997/v2/d/baskin/5.htm
Frontiers in Bioscience: Cellular Signaling in the Bladder

http://sci.rutgers.edu/index.php?page=viewarticle&afile=5_November_2001@Capsaicin_**bladde**r.html
CareCure's Capsaicin and Resiniferatoxin Therapy of Bladder Spasticity: Recent clinical trials indicate that instillation of capsaicin (the essence of pepper) or resiniferatoxin (RTX, from a cactus like plant) into the bladder can reduce bladder spasticity for weeks.

http://www.incontact.org/publications/suprapubic-catheters.html
In Contact: Suprapubic Catheters

http://www.nlm.nih.gov/medlineplus/ency/article/003981.htm
Medline Plus: Urinary Catheters

http://kidney.niddk.nih.gov/kudiseases/pubs/yoururinary/index.htm
National Kidney and Urologic Diseases Information Clearinghouse: Your Urinary System and How it Works

www.AUAFoundation.org or www.UrologyHealth.com
American Urological Association Foundation
1000 Corporate Blvd.
Linthicum, MD 21090
410-689-4038
Hosts webinars, helps patients find a urologist, get info from their resource center.

Help lines

Teleflex Medical's Rusch Patient and Family Assistance Line
1-866-383-5124
You may contact the Patient and Family Assistance Line for information about their Backpack program and Sample program. They also offer resources for peer support groups, insurance and reimbursement questions, and referrals specific to product and medical distributors.

Bladder Cancer

http://www.oncolink.upenn.edu/types/article.cfm?c=21&s=66&ss=768&id=9464
Oncolink (University of Pennsylvania): Bladder Cancer

http://www.craighospital.org/SCI/METS/bladderCancer.asp
Craig Hospital
Bladder Cancer: Risk Factors

http://www.cancerpage.com/news/article.asp?id=4148
Increased Bladder Cancer Risk in Spinal Cord Injury Linked with Indwelling Catheters

http://www.cancerpage.com/articles/latest.asp?id=43
News articles about Bladder Cancer

http://www.biomedcentral.com/1471-2490/2/8/abstract
Problems in Early Diagnosis of Bladder Cancer in a SCI patient

Bladder Augmentation and Mitrofanoff procedure

Cellular Signaling in the Bladder
http://www.bioscience.org/1997/v2/d/baskin/5.htm

CareCure posting on Mitrofanoff:
http://sci.rutgers.edu/forum/archive/index.php/t-22424.html

Children's Hospital Boston: Bladder Augmentation

http://www.childrenshospital.org/az/Site2091/mainpageS2091P0.html

The following books and videos are available for free loan from the PRC library. For more information, please see www.paralysis.org and click the Lending Library tab.

Books

- **Bladder Management for Adults with Spinal Cord Injury: A Clinical Practice Guideline for Health-Care Providers**. Washington, DC: Paralyzed Veterans of America, 1996. Written for the health care professional.

- Gartley, Cheryle. **Managing Incontinence.** Ottawa, Illinois: Jameson Books, 1985.

- Lutkenhoff, Marlene. **Another Way to Go**. (for boys). Washington, DC: Spina Bifida Association of America, 2005. Teaches about catheterizing.

- Lutkenhoff, Marlene. **Another Way to Go**. (for girls). Washington, DC: Spina Bifida Association of America, 2005. Teaches about catheterizing.

Videos

- **Clean Intermittent Catheterization**. Lawrence, KS: Learner Managed Designs. 29 minutes

- **A Guide to Disabilities: Overcoming Problems with Bladder, Bowels, and Swallowing.** Princeton, NJ: Films for the Humanities and Sciences, 2001. 27 minutes

- **Toward Independence: Male Bladder Management**. Dallas, TX: Dallas Rehabilitation Foundation, 1985.

- http://www.spinalcord.uab.edu/show.asp?durki=97417
  University of Alabama at Birmingham's streaming video on Bladder Management (33 minutes)

- **Urinary Tract Infection in Individuals with Spinal Cord Injury**. Columbia, MO: University of Missouri-Columbia, 2001. 8:04 minutes.

- **A Video Guide to Intermittent Self-Catheterization for Children**. Mentor Urology, 1992.

The information contained in this message is presented for the purpose of educating and informing you about paralysis and its effects. Nothing contained in this message should be construed nor is intended to be used for medical diagnosis or treatment. It should not be used in place of the advice of your physician or other qualified health care provider. Should you have any health care related questions, please call or see your physician or other qualified health care provider promptly. Always consult with your physician or other qualified health care provider before embarking on a new treatment, diet or fitness program. You should never disregard medical advice or delay in seeking it because of something you have read in this message.