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# Neurogenic Bladder in the Patient with SCI: Management Challenges in the Era of Managed Care

*Tamara King and Bruce Green*

This article discusses the impact of managed care on the evolution of urologic management of the patient with a spinal cord injury. A brief view of urologic treatment standards is presented. We present the Marcus Community Bridge Program, an innovative case management approach to following patients after discharge. The article presents outcomes and a case study to demonstrate the effectiveness of the program. Key words: *collaborative practice, intermittent catheterization, managed care, outcomes, spinal cord injury, urologic options*

The management of the neurogenic bladder in the patient with a spinal cord injury (SCI) has changed dramatically over the past five decades. Literature attests to some of the changes by documenting the dramatic decrease in mortality associated with renal deaths in the post-WWII era.<sup>1</sup> Two practice initiatives can be credited with revolutionizing urologic management: the intermittent catheterization procedure and the use of urodynamic diagnostics.<sup>2</sup> The development of SCI Model Centers further promoted practice initiatives by providing data that supported the advantages of modern urologic management. Shepherd Center, a hospital in Atlanta, Georgia, specializing in brain and spinal cord injury, neuromuscular diseases processes, and multiple sclerosis, is an SCI Model Center. As a Model Center member, Shepherd Center not only contributes to the database but also sets the standard for innovative approaches for long-term bladder management.

It would appear that clean intermittent catheterization (CIC) is the safest bladder management method for patients with SCI. Despite this knowledge and the advances that have been made in the past 50 years, many of the problems that existed in the past are resurfacing in the modern era. Zerman et al.<sup>3</sup> carried out an audit of initial bladder management as it related to subsequent complication rates prior to patients being admitted to a SCI rehab center. They discovered that over 50% of their patients were trans-

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ferred with indwelling urethral catheters; only 16% of their patients were transferred on intermittent catheterization. Urine culture reports were 100% positive on the patients using indwelling catheters, and 64% of the patients had clinical symptoms. The high infection rate in these patients at the time of admission was associated with a high rate of severe urinary tract complications including acute pyelonephritis, pyogenic cystitis, peri-urethral abscess, and urethral fistula. They concluded that knowledge of the urologic care of the patient with acute SCI is unsatisfactory in the general district hospitals.<sup>3</sup>

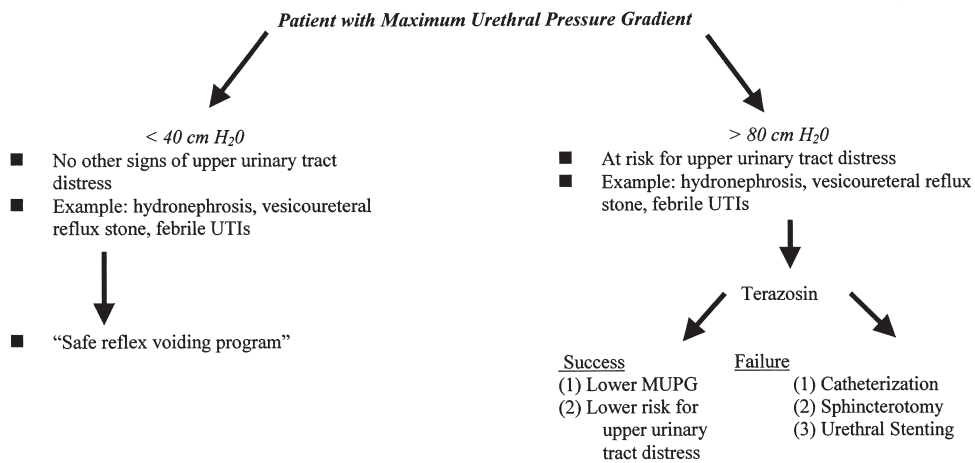
Compliance with a discharge bladder program from an SCI center can also present problems. Of 38 patients discharged on CIC, Yavuzer et al.<sup>4</sup> reported that 20 patients (52%) converted to indwelling catheters within 24 months after discharge. Weld et al.<sup>5</sup> also discovered that most patients had changed bladder management programs at least once post discharge. The most common change occurred in patients with quadriplegia who changed from CIC to indwelling catheters, at which point the incidence of complications substantially increased. Patients who revert to chronic indwelling catheters have a much higher incidence of urologic complications. Weld et al.<sup>5</sup> reviewed 316 medical records of SCI patients. They determined that over 53% of the patients on chronic urethral catheterization had urologic complications compared to 27% on CIC.<sup>5</sup>

### Current Urologic Management

It is imperative that a thorough understanding of urologic evolution after an injury guides the physician in making appropriate decisions to identify those patients at risk for upper tract distress. Empirical treatment of

neurogenic bladders is no longer acceptable. The ability to diagnose and treat detrusor external sphincter dyssynergia (DESD) using multichannel equipment has become the standard of care in the management of the SCI patient.<sup>6</sup> Upper tract surveillance has come a long way from the cumbersome use of yearly intravenous pyelogram (IVP) studies to more sophisticated and less invasive studies to evaluate renal function and anatomy<sup>7,8</sup> (see article by Dr. Gousse and colleagues in this issue). There are now many options of pharmacological therapies and even more on the horizon.<sup>9,10</sup>

The standards of urologic management of the patient with an acute SCI include an assessment of the level and completeness of the injury, institution of intermittent catheterization once the patient is medically stable, and the design of a bladder program that is consistent with the patient's level of function, preference, and social environment upon discharge. Bladder management decisions should be based on urodynamic findings to preserve renal function via low-pressure storage systems. In the male patient with quadriplegia, video-urodynamics help define the patients with significant detrusor-sphincter dyssynergia using a parameter called Maximum Urethral Pressure Gradient.<sup>11</sup> The urologists at Shepherd Center developed a treatment algorithm for detrusor-sphincter dyssynergia based on urodynamics and outcomes experienced over the years of treating patients with neurogenic bladders (**Fig. 1**) This algorithm functions as a practice guide for preventing the development of upper urinary tract distress for those patients at risk. Shepherd Center's complete approach to acute bladder management is available in a previous publication.<sup>12</sup>



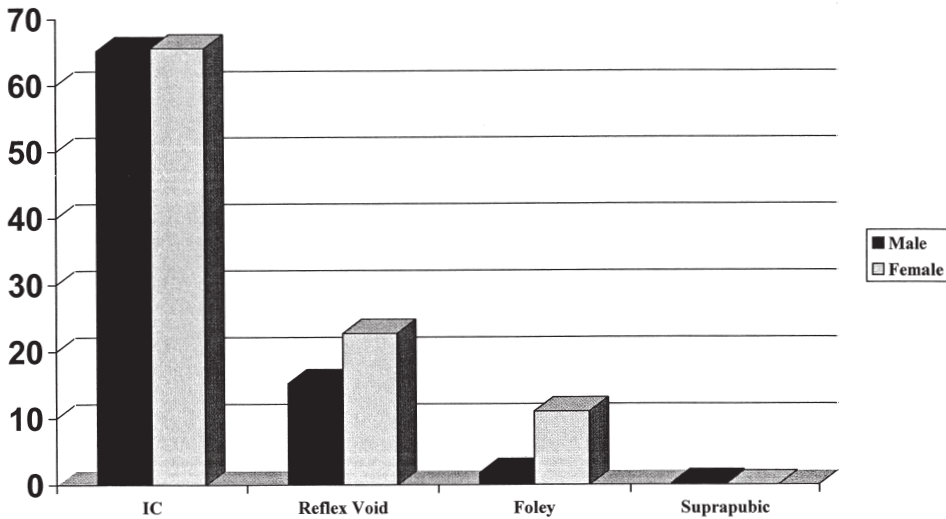
**Figure 1.** Treatment algorithm for detrusor-sphincter dyssynergia.

### Impact of Managed Care on Bladder Management

The initiation of managed care has had a profound effect on the rehabilitation industry. At Shepherd Center, a 1993 retrospective analysis reported that the average length of stay (LOS) was 92 days, with a range of 74–118 days.<sup>12</sup> A separate Shepherd Center report that investigated the LOS from 1990 to 1993 indicated that LOS for patients with quadriplegia decreased from 120 days to 65 days and for patients with paraplegia it decreased from 62 days to 42 days.<sup>13</sup> These numbers are similar to the national statistics that averaged 115 days in 1974 and decreased to an average of 44 days in 1999.<sup>14</sup> Although there may be some benefits to shorter stays, the concern is that many medical issues do not arise until after the acute rehabilitation has been completed and the patient is discharged home. As Eastwood et al.<sup>15</sup> stated, “Since the early 1990s as the number of managed care organizations have

increased, rehospitalization rates have also been increasing, suggesting that the maximal point of efficiency may have been exceeded.”<sup>15(p1457)</sup> DeVivo<sup>16</sup> reported a higher incidence of nursing home placement for SCI patients by HMO case managers. The bladder management of patients who are discharged from an acute facility to a nursing home was more likely to be indwelling or condom catheter and less likely to be CIC, thereby increasing the risk of lower urinary tract complications.<sup>16</sup> Data from the National Spinal Cord Injury Statistical Center (NSCISC) database have indicated a disturbing increase in medical complications since 1996 including pressure ulcers, autonomic dysreflexia, and pulmonary atelectasis/pneumonia.<sup>17</sup> Indeed, previous lengths of stay allowed decision making about long-term bladder management to occur prior to the patient’s discharge from Shepherd Center.

The long-term bladder management program of 692 patients who were discharged since 1996 indicates that the majority of our



**Figure 2.** Management of bladder method at discharge.

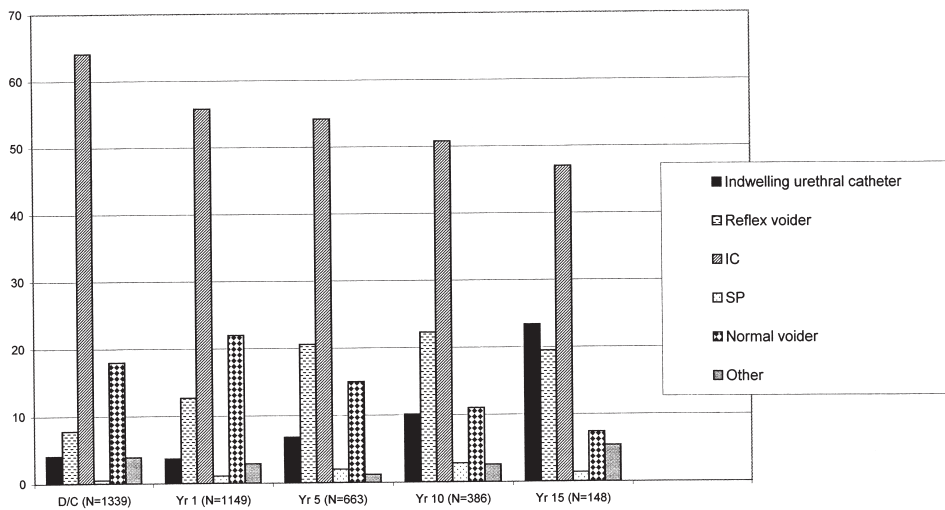
patients are still discharged on CIC (**Fig. 2**). However, a query of 1,339 patients over a 15-year time span revealed that a high incidence of patients converted from CIC or reflex program to chronic indwelling urethral catheters (**Fig. 3**).

### **A Collaborative Approach to Bladder Management**

Shepherd Center recognizes that catastrophic injuries challenge the coping and problem-solving skills of clients and their families. Furthermore, the shortened LOSs have added to the level of anxiety. Presentation of medical issues and feedback from patients, families, and home health agencies consistently identified the need to extend the continuum of care beyond the walls of the facility. The idea for extending the continuum of care was presented to our community supporters, and the Marcus Community Bridge Program (MCBP) was born.

The MCBP program is an enhanced case management program that is offered to our patients; it provides post discharge support for up to 1 year. It is designed to bridge the transition from hospital to home. The 8-year project is funded through a generous grant from the Billie and Bernie Marcus Foundation, Inc. The purpose of the MCBP is to provide discharge support and to ensure that skills learned during rehabilitation are appropriately applied at home and in the community.

Although the MCBP is designed to focus on community reintegration and to ease the transition from hospital to home, it acknowledges that medical concerns often take priority immediately after discharge. One of the most pressing medical issues facing our population with an SCI is the management of the client's bladder program. The management of neurogenic bladder presents significant challenges to health care professionals unfamiliar with the subtleties of neurogenic



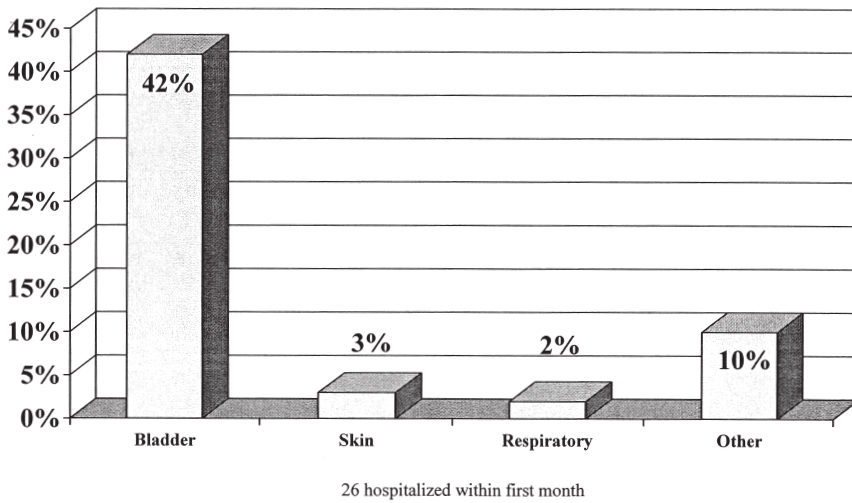
**Figure 3.** Management of bladder method over 15-year span.

bladder. Shortened hospital stays accentuate the problem because time is needed for bladder functions to stabilize. A flaccid bladder may become hyperreflexic and a spastic bladder may become areflexic. Patients need time to make decisions regarding long-term choices. Functional ability plays an important role in the decision-making process, and patients may not achieve their optimal functioning capacity until months after discharge. Although it may be more desirable for women to perform intermittent catheterizations, it may not be practical if they are dependent on someone else. Women must be able to transfer, disrobe, and perform the catheterization. Men must also demonstrate adequate hand dexterity to open their pants, expose their anatomy, and perform catheterizations. In the case where the bladder is hyperreflexic and the patients find it too difficult to inhibit the reflex, men may choose to wear a condom. Obviously a condom is not an option for women. Their choices are limited to using an indwelling Foley or opt for bladder augmentation

with or without a continent abdominal stoma.<sup>18</sup> Consequently, it is predictable that the long-term bladder management goals will not be achieved by discharge. Patients, families, and health care professionals need continued post discharge support to make appropriate decisions regarding long-term bladder management. Too frequently, patients develop serious urologic complications as a result of poorly managed bladder programs. Complications may include frequent symptomatic urinary tract infections, hydronephrosis, dysreflexia, and renal failure.

The MCBP tracks several outcome indicators, including bladder management outcomes, at 1 month, 3 months, 6 months, and 1 year post discharge. To date, the program has followed 243 patients with SCI. One hundred fifty patients are currently enrolled, and 111 patients have been discharged from the 1-year follow-up.

The data collected in the MCBP have validated some of our concerns. We determined that one of the most prevalent causes of hospi-

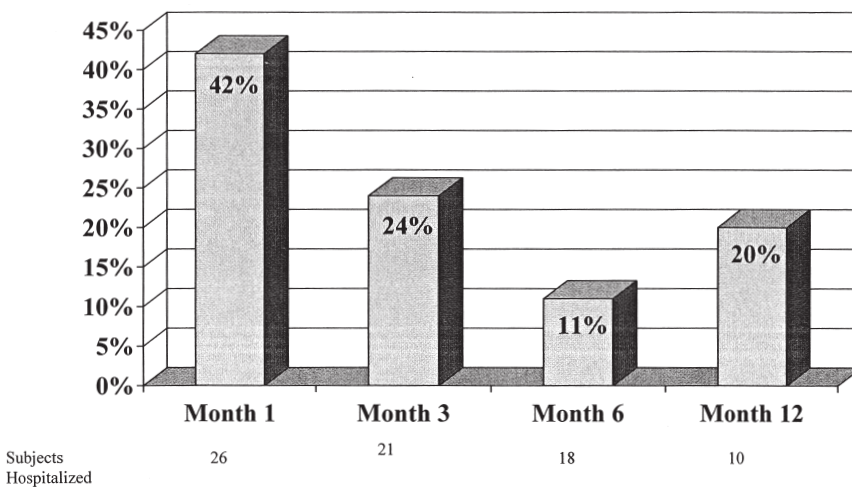


**Figure 4.** Causes of hospitalization post 1 month discharge.

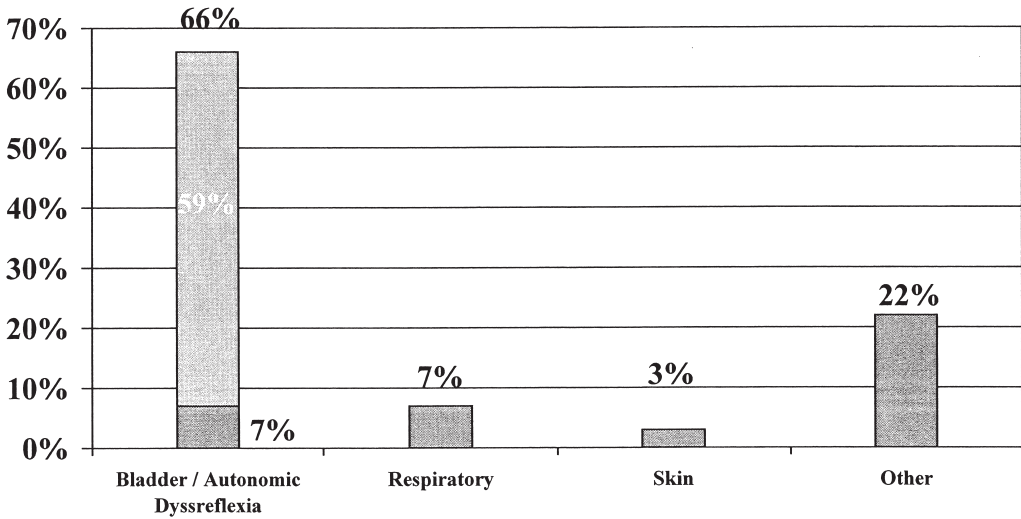
talization after acute rehabilitation is related to bladder problems. Within the first month of discharge from rehabilitation, 26 out of 243 patients were hospitalized. Eleven of the 26 hospitalizations (42%) were bladder related

(**Fig. 4**). The percentage of hospitalizations related to bladder problems decreases over time; it decreased to 20% at 12 months (**Fig. 5**).

Emergency room visits were tracked; out of 27 patients seeking services in the first



**Figure 5.** Percentage of hospitalizations related to bladder problems throughout the first year post discharge.

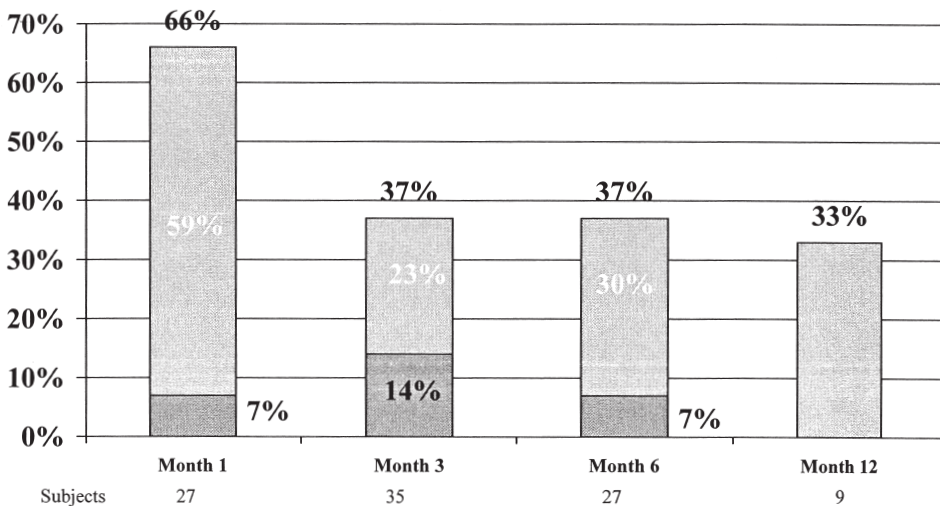


**Figure 6.** Causes of emergency room visits within first month post discharge.

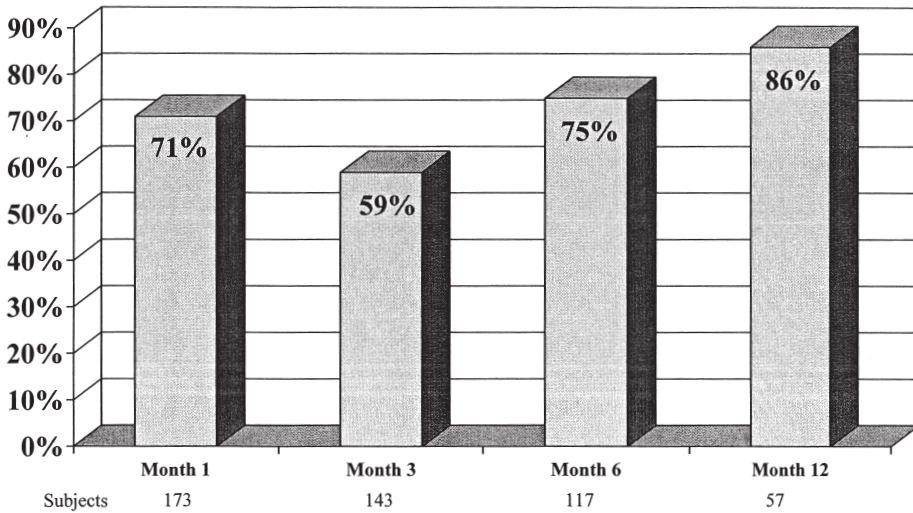
month, 66% of the visits were related to the bladder. Seven percent of the 66% was related to autonomic dysreflexia (**Fig. 6**). Bladder-related problems decreased by the third month, but still presented a significant problem representing over one third of the

causes for emergency room visits (**Fig. 7**).

Bladder complications were defined as any bladder-related problem requiring medical intervention. When patients were asked if they were free of bladder complications, the response ranged from 71% in the first month



**Figure 7.** Percentage of emergency room visits isolated to bladder problems first year post discharge.

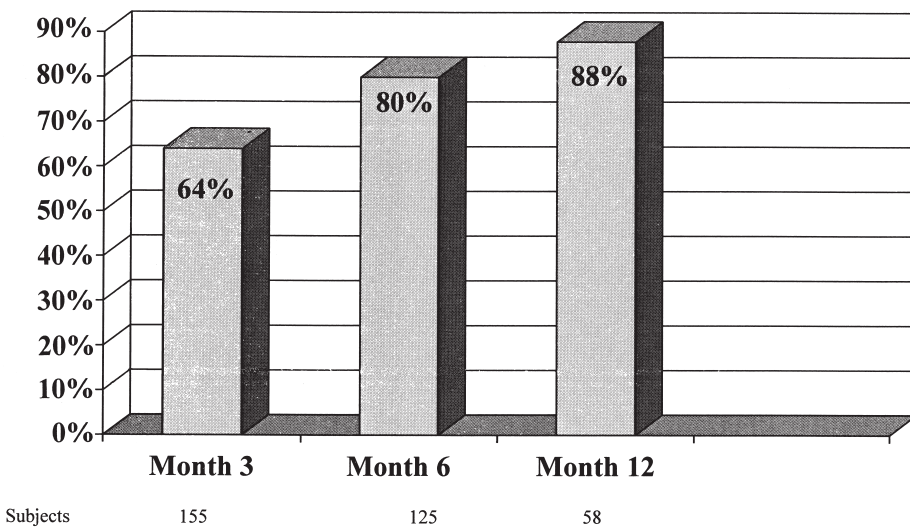


**Figure 8.** Free of bladder complications at specific time frames post discharge.

to 86% in the 12th month (**Fig. 8**). Eighty-eight percent of the patients felt they had met their long-term bladder management goal by the end of the 12th month after discharge (**Fig. 9**).

The overall results reinforce our impres-

sion that community health care providers need more knowledge about treatment of neurogenic bladders in the patient with an SCI. They have a tendency to over treat urinary tract infections and under treat other problems, because they do not understand



**Figure 9.** Bladder management goals met at specific time frames post discharge.



the differences between “normal” bladders and neurogenic bladders. In recognition of this, the MCBP has initiated an aggressive campaign to engage physicians in the treatment plan of their patient.

With the funds from the grant, educational tools have been developed for community physicians and patients. The MD Info Sheet (**Appendix 1**) is intended to direct the physician through bladder management options and treatment guidelines. The Patient Teaching Sheet (**Appendix 2**) is designed to reinforce the instructions the physician should be providing the patient during an office visit.

Another project soon to unfold for the physicians’ benefit is a Web-based instructional package complete with continued medical education credits (CME). Physicians will be able to access this package gratis, in the convenience of their office.

Because the MCBP is an enhanced case management program, physicians have a contact name and number to call in the event they need assistance with treatment plans. This communication has resulted in much better outcomes because a team instead of an individual reinforces the treatment plan.

### **Case Study (Bridge in Action)**

John Doe is an example of a typical client’s scenario at discharge. John, a client with C6 quadriplegia, was discharged after 5 weeks from the rehabilitation program. He has an areflexic bladder and is on an every-6-hours intermittent catheterization program. He is dependent on his family to perform intermittent catheterizations because he is not functionally ready to perform the technique. Within 2 weeks post discharge, John calls his physician and reports a prob-

lem with “leaking.” The local treating physician routinely orders a urinalysis and urine culture and sensitivity. As anticipated, the culture is positive, and the physician treats John with an antibiotic. The leaking ceases while John is on antibiotics, and John and his family are temporarily satisfied. Two days after the course of the antibiotics, the leaking continues. At this point, the local physician repeats the lab work and continues to treat with antibiotics. The client and family are becoming frustrated with the leaking and do not know how to contain the urine. This is when the expertise in the Bridge program supports the physician and family. The staff becomes a part of the team in providing information, suggestions, and options. In John’s case, the staff suggested the physician run a video-urodynamic test. The results showed that John’s bladder was hyperreflexic with a capacity of 200 cc, and there was evidence of sphincter dyssynergia. The team discussed his options because John had two choices:

1. He could remain on intermittent catheterizations, take anticholinergic medications, and monitor his fluid intake.
2. He could encourage reflex activity, consider alpha blockers for the sphincter dyssynergia, and get fitted for the most appropriate condom.

John preferred the second option, the reflex bladder program, for several reasons. He did not think he could be completely independent with intermittent catheterizations, did not want to be bothered by the potential side effects of anticholinergic medications, and did not mind wearing a condom catheter. The Bridge staff helped John and his physician taper catheterizations and check residuals until his bladder emptied completely. The

staff was also instrumental in assisting John in choosing the most appropriate condom, a non-adhesive condom for the transitioning period and an adhesive condom for daily use once he did not need regular catheterizations. Closer monitoring is imperative because John has sphincter dyssynergia, which can result in urinary complications. The Bridge staff was available to John and his physician for consultation and problem solving. The team approach prevented many unnecessary tests and anxiety and frustration for John and fostered a supportive relationship with the physician, who is now comfortable treating a patient with a neurogenic bladder.

Traditionally, health care professionals in

the rehabilitation arena have been comfortable with the treatment of bladder complications. The real challenge lies when complications from the neurogenic bladder occur outside of the rehabilitation milieu. The MCBP illustrates the benefits of continued follow-up and the advantages of a collaborative approach. One of our goals is to assist the health care professional in becoming more confident in their treatment of patients with neurogenic bladders. Our challenge is to accomplish a more subjective, but no less important goal, to encourage health care professionals throughout the United States in active involvement and acceptance of people with disabilities.

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## APPENDIX 1

# MD Info Sheet 1: Neurogenic Bladder After Spinal Cord Injury

### What is a neurogenic bladder?

A neurogenic bladder is defined as any bladder disorder that is attributable to problems with motor or sensory pathways in the central or peripheral nervous systems.

#### **Spastic Bladder aka: Reflexic Bladder**

- Upper motor neuron lesion
- Occurs in injuries above T<sub>12</sub>
- Control lost from higher brain centers; involuntary detrusor contractions; uncontrolled voiding; spinal reflex arc predominant
  - Inability of distal sphincter to relax in coordination with detrusor contraction (sphincter dyssynergia)
  - Results in ↑ bladder pressure with uncontrolled “reflex” emptying

#### **Flaccid Bladder aka: Areflexic Bladder**

- Lower motor neuron lesion
- Occurs in injuries below T<sub>12</sub>
- Control lost from higher brain centers; disruption of sensory & motor innervation of spinal reflex
- ↓ sensation; weak or absent detrusor contractions; increased bladder capacity with high residuals

## How is neurogenic bladder managed after spinal cord injury?

Bladder Type	Management Approaches
<p>Reflexic / Spastic Bladder Management (three approaches)</p>	<p>Option #1</p> <ul style="list-style-type: none"> <li>• Intermittent catheterization (IC) is choice if bladder capacity threshold can store at least 400 cc or if patient is motivated to practice fluid control</li> <li>• Anticholinergic medications may be required to inhibit detrusor spasms; Detrol, Ditropan, and Tofranil are drugs of choice               <ul style="list-style-type: none"> <li>• Consider the ability to IC every 4-6 hours important criteria before choosing this management program</li> <li>• Patient has competent sphincter</li> </ul> </li> </ul> <p>Option #2. Men reflex into a condom and women use an indwelling foley when:</p> <ol style="list-style-type: none"> <li>1. The bladder capacity cannot support storage</li> <li>2. Medications cannot control the strong detrusor spasms</li> <li>3. It is not practical to IC ever 4-6 hours</li> </ol> <p>Option #3. A bladder augmentation is an option if option #2 is not achievable. However the patient must be highly motivated to perform ICs. The augmentation increases the bladder capacity and reduces the high pressures caused by bladder spasms</p>
<p>Flaccid Bladder Management</p>	<ul style="list-style-type: none"> <li>• Intermittent catheterizations (IC) every 4-6 hours</li> <li>• Medications (such as Tofranil) may be needed to tighten the sphincter</li> </ul>

## Will my male patient always have to do ICs?

Male patients with a “reflex bladder” may opt to become “straight reflexers.” It is important that the patient have a videourodynamic study prior to starting this new bladder program.

Videourodynamics are an effective diagnostic tool for determining bladder pressures, capacities, and emptying patterns. It can help guide the physician with prescribing as well as determine if the patient may be at risk for urinary reflux.

The bladder may undergo some changes, such as leaking between ICs, after discharge from the rehabilitation center. This could indicate that the bladder is becoming more reflexic or that a urinary tract infection is present. Rule out the UTI and then consider an urodynamic study. The patient may have the option to choose between continuing to perform ICs, with or without medications, or to stop ICs & use a condom with leg bag. If the patient chooses to discontinue the IC program and has the function necessary to adequately empty his bladder, consider the following treatment option:

- IC q 6 hours until the amount of urine is < 300 cc
- IC q 8 hours until the amount of urine is < 180 cc
- IC qd until the amount of urine is < 30 cc
- When the bladder has been contracting enough to empty, the ICs can be stopped.

### **Will my female patient always have to do ICs?**

Females have the option of doing ICs or using an indwelling catheter. If she opts to continue with ICs, she may need medication to prevent bladder spasms and prevent leaking. See table above. Some patients may request surgical interventions such as placement of a suprapubic catheter or bladder augmentation.

### **How often should urodynamic studies be performed?**

<b>Test Name</b>	<b>Frequency</b>
Renal Ultrasound, Renal Nuclear Scan, IVP (upper urinary tract evaluation)	Every 2-3 years
Videourodynamics (for males with reflex voiding or frequent UTIs)	1-2 x in the 1st year post injury & then for symptomatic events
Cystoscopies	For symptomatic events & more often for patients with indwelling catheters
Urodynamic Studies (order when there is a change in bladder function)	More often in 1st year; then for symptomatic events

## APPENDIX 2

# Patient Teaching Sheet 1: Neurogenic Bladder After Spinal Cord Injury

### What is a neurogenic bladder?

A neurogenic bladder is a condition where the bladder muscles do not contract properly to allow urine to empty. This happens as a result of spinal cord injury or other neurologic conditions.

Bladder	Types
<i>Spastic Bladder</i> aka: Reflexic Bladder	<i>Flaccid Bladder</i> aka: Areflexic Bladder

### How will my bladder condition be treated?

There are three types of bladder programs: IC, condom, or foley catheter. Your doctor will give you the options that are right for you.

### For Men - Will I always have to do ICs?

The bladder may undergo some changes after you go home. It may start to leak between ICs. This could mean that the bladder is becoming more reflexic or that a urinary tract infection (UTI) is present. Check with your doctor if you suspect a UTI. If your bladder is becoming more reflexic, you may be able to become a “straight reflexer.” This means that you will empty your bladder through a condom catheter attached to a leg bag. You will not do ICs anymore. Prior to starting this new bladder program it is important to have certain urinary tests done. These tests help your doctor see how your bladder is emptying and whether you will need medications to help you transition into this new program.

If your doctor recommends that you stop doing ICs, you may be asked to:

1. IC every 6 hours until the amount of urine is less than 300 cc
2. IC every 8 hours until the amount of urine is less than 180 cc
3. IC every day until the amount of urine is less than 30 cc
4. When the bladder has been contracting enough to empty, the ICs can be stopped.

### For Women – Will I always have to do ICs?

Women have the option of doing ICs or using an indwelling catheter. If your doctor recommends that you continue with ICs, you may need medication to prevent bladder spasms

and leaking. Some people may be appropriate for surgical procedures such as placement of a suprapubic catheter or bladder augmentation. Your doctor will let you know if this is a good option for you.

**Do I need yearly check ups for my bladder?**

You may need certain tests yearly or at longer intervals depending your specific situation. Follow the schedule that your doctor has given you.