Physiology and Management of Bladder and Bowel Continence following Spinal Cord Injury

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Patients with spinal cord injury commonly develop bladder and bowel symptoms that can affect their quality of life. The level of spinal cord injury is an important factor in considering bladder and bowel management strategy options to facilitate re-establishment of some level of elimination control. Bladder management involves choosing a drainage method appropriate to individual capabilities; options include clean intermittent or indwelling catheterization, Credé's method, reflex voiding, and surgical options. Bowel management strategies incorporate schedule, nutrition, stimulation, and surgical approaches. Bladder and bowel management regimens must include a thorough physical evaluation, patient/caregiver education, follow-up care, and a multidisciplinary team approach. Additional research to help clinicians recommend safe, effective, and evidence-based elimination management strategies to patients with spinal cord injuries is needed.

KEYWORDS: urinary incontinence, bladder, fecal incontinence, bowel, spinal cord injury

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Spinal cord injury (SCI) is among the most devastating healthcare issues. It affects individuals and their families psychologically, physically, economically, and socially. The injury often results in complete loss of control of genitourinary and gastrointestinal function as well as loss of motor function or paralysis of the extremities. These impairments can have a profound effect on the person’s ability to perform common tasks and activities of daily living. Patients with incontinence suffer from anxiety, depression, social isolation, and loss of self-esteem.1 Experiences teaches that continence issues, including fear of urinary and fecal accidents, cause patients to isolate themselves or to spend countless hours attempting to eliminate. These factors negatively impact the patient’s quality of life.

Data2 submitted by 25 federally funded SCI centers in the US and compiled by the National Spinal Cord Injury Statistics Center (NSCISC) suggest that between 225,000 and 293,000 persons living in the US have a SCI and approximately 11,000 new cases

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occur each year. The typical SCI patient is a young male — data submitted to NSCISC indicate that 52.2% of the injuries occur in patients between 16 and 30 years of age and 81.1% of all SCIs occur in men.2-4

The etiology of SCI is varied. Approximately 40% of SCIs occur as a result of motor vehicle accidents and an estimated 25% are the result of violence. The remaining causes include falls, injuries related to recreational sports, and work-related injuries.2,3

**History**

Spinal cord injuries have been identified throughout history. Prognoses regarding SCI traditionally have been bleak. The earliest cases of SCI were documented in an Egyptian surgical papyrus5 dated 2,500 BC. The author (unknown) described the resultant paralysis, bladder incontinence, and poor prognosis. Hippocrates is credited with some of the first clinical descriptions of paralysis, bladder incontinence, and constipation related to SCI. He also believed that SCI victims had a poor prognosis and were likely to die because no cure was available for their ailments.5

Despite their dire prognoses, many physicians who followed continued to devise treatment strategies in an attempt to find a cure for SCI. During World War I, almost half of the patients with SCI died from urinary tract infection (UTI) or renal disease.6 Today, management strategies for bladder and bowel control have advanced and the incidence of renal failure has drastically decreased. Although a cure has yet to be discovered, advances in the scientific foundation, research, and understanding of the pathophysiology of SCI have led to substantive improvements in care. Although the SCI patient’s life expectancy has increased over the years as a result of initial treatment protocols, life expectancy is still decreased when compared with persons without SCI.5

**Pathophysiology**

*Spinal cord injury* is defined as damage to the spinal cord that results in a loss of sensation, function, or mobility.7 Injury can occur when direct physical force crushes, bruises, or tears the structures surrounding the spinal cord or from direct penetrating injury, such as a gunshot wound.8 Regardless of the mechanism of the injury, edema of the spinal cord results, decreasing blood flow and oxygenation below the level of the injury.9,10 Spinal neurogenic shock results in systemic hypotension that causes additional ischemia to neuronal cells. The end result is excessive release of neurotransmitters from the damaged cells,3,8 The cardinal sign of SCI is the marked loss of sensory and motor function with an intact neurological pathway above the level of the injury.

Complete or partial injury to the spinal cord can occur. Complete injury refers to transection or degeneration of nerve tissue that will not recover; any functional damage will be permanent. Transection of the spinal cord leads to immediate flaccid paralysis, loss of all sensation and reflex activity, and anatomic dysfunction below the level of the injury.3 Partial injury involves injury or compression of the spine that does not comprise the entire cord — ie, a portion of the cord is spared at the level of the injury. The injury can be permanent or temporary, depending on the etiology. The temporary loss of motor and sensation is referred to as *spinal shock*. Return of movement and sensation in the first week post injury is a positive indication. Notably, any loss of function and sensation that persists after 6 months is likely to be permanent.3

Continence clinicians have the specialty training required to focus on the identification, assessment, and management of urinary and fecal incontinence.

**KEY POINTS**

- Every year, an estimated 11,000 people, mostly young men, suffer a spinal cord injury.
- The effects of this trauma are frequently compounded by bladder and bowel elimination problems and resultant complications.
- The author describes how a thorough physical and social assessment, combined with a complete patient history and an evidence-based, multidisciplinary approach to care may help improve patient quality of life and prevent potential complications.
An effective management program requires the advanced knowledge and understanding of the physiology of normal bowel and bladder function as well as common alterations in function the continence care clinician can provide. The Wound Ostomy Continence Nurses (WOCN) Society and the Society of Urologic Nurses and Associates (SUNA) offer an avenue for specialty certification in incontinence care. Specialty certification validates and ensures that the clinician has the required skill set to meet the needs of the patient who requires assistance to achieve bowel and bladder control.

### Autonomic Dysreflexia

Autonomic dysreflexia (AD) can occur in patients with SCI at spinal cord level at or above the sixth thoracic vertebrae (T6) and usually is a result of noxious stimuli such as hard stool in the rectum, a full bladder, or an infected pressure ulcer. The most common conditions known to cause AD have been identified as bladder distention that results from detrusor-sphincter dyssynergia (DSD) — ie, the loss of coordination between the striated sphincters and the detrusor muscle so the sphincter does not consistently relax when the detrusor contracts — as well as fecal constipation and impaction. The syndrome presents with hypertension and sweating, flushing, goose bumps, chills, and feelings of anxiety; however, 30% to 40% of people with AD only present with elevated blood pressure. The hypertension can be severe and presents the greatest risk of mortality. Treatment involves placing patients in the semi-Fowler position if the patient is supine and identifying the possible causes, eliminating the etiology, and administering antihypertensive medication. Implementing effective bladder and bowel management strategies has been shown to prevent autonomic dysreflexia.

### Bladder Control

Urinary continence is defined as the act of storing urine in the bladder until the bladder can be appropriately evacuated. Urinary continence requires control of the detrusor muscle and is the result of complex coordination between multiple centers in the brain, brain stem, spinal cord, and peripheral nerves.

Micturition is a coordinated act of bladder elimination that involves relaxing the pelvic floor muscles, contracting the detrusor muscle, and simultaneously opening the urethral sphincter to achieve complete emptying of the bladder. An intact neurological system is essential for these activities to occur. Three main areas of the central nervous system control the inhibition and facilitation of micturition: the sacral micturition center, the pontine micturition center, and the higher centers of the cerebral cortex. The pontine micturition center is primarily responsible for coordinating the relaxation of the urinary sphincter when the detrusor contracts. The cerebral cortex exerts an inhibitory effect on the sacral micturition center, allowing micturition when socially acceptable.

The sacral micturition center is located at sacral spinal cord level two to four (S2 to S4). Primarily a reflex center, it relays efferent parasympathetic impulses to the bladder to affect bladder contraction while afferent impulses to the sacral micturition center provide feedback regarding bladder fullness. Damage to these neurons causes paralysis or areflexia of the detrusor muscle and subsequent urinary retention. In addition, neurons in the sympathetic nervous system affect detrusor control through the spinal cord. Sympathetic control for storage in the bladder originates between the tenth thoracic (T10) and the second lumbar (L2) vertebrae. Injury to the spinal cord at T10-L2 will result in urinary incontinence and an overactive bladder. With injury above the sacral micturition level, the detrusor muscle will spasm and DSD can occur. This can result in a functional obstruction that may damage the upper renal system. In addition, the prolonged duration of bladder contractions can increase intravesical voiding pressures, possibly resulting in hydronephrosis (the distention and dilation of the renal pelvis caused by obstructed urine outflow).

### Bladder Management

Bladder management strategies for the SCI...
patient aim to maintain and preserve renal function by preventing complications, such as hydronephrosis, renal and bladder calculi, and urine reflux. Renal calculi (stones) can result in urine reflux back into the renal pelvis and result in hydronephrosis. If not alleviated, hydronephrosis can result in chronic renal failure.

An equally important goal is to achieve social and vocational adaptability so the bladder management program will be accepted and followed by the patient. For this reason, the patient’s individual needs should be assessed and identified when planning a bladder management program. The level and type of the injury, the patient’s ability to transfer and independently perform activities of daily living, and his/her ability to self-catheterize are considered during the planning phase.

**Baseline evaluation.** Because each patient’s history regarding mechanism and level of injury and symptoms is not enough to determine whether the patient is experiencing high intravesical pressures, every SCI patient should have a baseline urological evaluation at the time of injury to determine voiding parameters and establish upper and lower renal function. To identify upper renal system baseline function, the evaluation should include an intravenous pyelogram, computerized tomography (CT) scans, ultrasound, and renal scans in addition to laboratory values. To identify lower renal baseline functions, urodynamic studies must be conducted to determine bladder function. Cystogram and cystoscopy can be used to determine vesicoureteral reflux and bladder anatomy. Although no studies to identify and evaluate the optimum frequency of follow-up urological examinations have been performed, clinicians generally recommend that subsequent examinations be performed on an annual basis.

**Multidisciplinary support.** Because SCI patients likely will have lower and possibly upper body mobility deficits, occupational and physical therapy should be included in the plan of care. Physical therapy can have a positive affect on the bladder management program by maximizing the patient’s wheelchair mobility; occupational therapy can be instrumental in developing any needed assistive devices.

**Bladder drainage.**

*Clean intermittent catheterization.* Bladder drainage is generally achieved via catheterization. Clean intermittent catheterization (CIC), the most popular method, can be utilized to completely empty the bladder without leaving an indwelling catheter in place. It involves insertion of a straight catheter into the bladder at specified time intervals, usually every 4 to 6 hours, depending on the individual (bladder capacity of >200 cc is required to prevent bladder and renal complications). This approach has been demonstrated to lessen the incidence of complications related to hydronephrosis, renal and bladder calculi, and autonomic dysreflexia. It also affords some freedom to the patient, who will not require the
appendage of an indwelling catheter and leg bag or extensive preparation before any sexual activities.\textsuperscript{13,17}

Clean intermittent catheterization should be considered for patients who have sufficient manual dexterity or a willing caregiver to perform the catheterization.\textsuperscript{6,13} As a general rule, if patients can write and feed themselves, they have the necessary manual dexterity to perform CIC.\textsuperscript{17} Patients with poor cognition or who are unmotivated or unwilling to adhere to the catheterization time schedule are not candidates for CIC.\textsuperscript{6}

Because normal bladder capacity is approximately 500 cc, limiting fluid intake and ensuring timely CIC will prevent bladder overdistention. The volume of urine in the bladder should be maintained at or below 450 cc. If the patient consistently has urine volumes >450 cc, increased CIC frequency is advised.\textsuperscript{17} Urine leakage can occur between catheterizations and can be attributed to UTI and bladder and sphincter spasms. Anticholinergic and antimuscarinic medications can be used to decrease uninhibited contractions, in turn reducing urine leakage and ensuring normal intravesical pressures.\textsuperscript{12}

Patients choosing CIC for bladder management need to be educated on proper CIC technique and the importance of routine follow-up to detect potential complications. The clinician can develop and implement patient-centered education that should include strategies for managing urine leakage and recurrent UTI. Non-pharmacologic measures to prevent urine leakage between catheterizations include ensuring adequate fluid intake evenly spaced throughout the day and avoiding high-volume intake within short time frames.\textsuperscript{12} Dietary restrictions such as avoiding chocolate or caffeine may help reduce bladder irritation and also decrease the risk of urine leakage between catheterizations.\textsuperscript{12} In addition, instructing one or more caregivers on CIC procedures should the patient become temporarily unable to self-catheterize due to illness is prudent. The patient also should be able to direct another person through the procedure should the need arise. Clinicians should keep the instructions simple and emphasize the use of clean (rather than sterile) technique.\textsuperscript{12,17}

\textbf{Indwelling catheterization.} Indwelling catheterization involves insertion of a catheter into the bladder that is maintained for an extended period of time, allowing urine to be continually emptied. Indwelling catheterization may be achieved by inserting a urethral catheter or by surgically placing a suprapubic catheter. The suprapubic catheter is less traumatic to the urethra and offers the patient more sexual freedom because less preparation is required before sexual activity; this catheter has been found to offer more comfort and convenience.\textsuperscript{13} Indwelling catheterization should be considered for patients with poor manual dexterity, cognitive impairments, and limited assistance from caregivers.\textsuperscript{12} Researchers conducting retrospective review and case studies report that SCI patients with upper extremity impairments find CIC challenging.\textsuperscript{17,18} These patients report greater satisfaction with suprapubic catheter placement for bladder management.\textsuperscript{6,21}

Indwelling catheterization also should be considered for patients who have high fluid intake or elevated detrusor pressures managed with anticholinergic medications. A retrospective chart review comparing urodynamic changes over time in patients with SCI who utilize indwelling catheterization for bladder management versus those who use other methods indicated lower detrusor pressures and less trabeculation (hypertrophy of the bladder wall) in the indwelling catheter group.\textsuperscript{17,19} However, indwelling catheters tend to cause uninhibited bladder contractions and complete bladder filling does not occur. Inconsistent decompression of the bladder can occur; inflammation from the catheter can lead to vesical wall fibrosis. As a result, bladder capacity and compliance decrease over time.\textsuperscript{6}

Patient and caregiver instructions for indwelling catheter use should include catheter care techniques, tube stabilization methods, and proper management of the drainage system. In addition, the caregiver should be instructed about potential complications related to indwelling catheter use and strategies to prevent UTI. Catheter leakage often is a sign of potential or existent problems. The clinician should provide information about...
methods to prevent catheter leakage and when to seek medical assistance.\textsuperscript{12,23}

\textit{Credé’s method.} Credé utilizes the application of suprapubic pressure to elicit bladder drainage. This method usually is used when the bladder is flaccid or when bladder contraction needs to be augmented\textsuperscript{6} and may utilize the valsalva method (the abdominal muscles and the diaphragm are used to empty the bladder). The clinician can instruct the patient on proper technique for maximum bladder emptying. According to Hsieh et al,\textsuperscript{21} “Valsalva or Credé maneuver may assist some individuals to void spontaneously but also may produce high intravesical pressure, increasing the risk for long-term complications.” Patients who use either of these methods and present with frequent urinary tract complications should consider alternative methods for bladder management.

\textit{Reflex voiding.} Because bladder filling triggers an involuntary detrusor contraction that results in voiding when the urethral sphincter relaxes, reflex voiding requires an intact sacral micturition reflex (damage above S2 to S4). Reflex voiding can result in elevated voiding pressures due to DSD.\textsuperscript{6} In addition, DSD can trigger autonomic dysreflexia due to bladder distention and incomplete bladder emptying.\textsuperscript{6,21} A transurethral sphincterotomy can be surgically performed to decrease urinary outflow resistance due to DSD.\textsuperscript{6,10,15} Bladder capacity can diminish over time as the bladder develops reflex contractions to avoid distention.\textsuperscript{6} This factor should be considered before changing from CIC to reflex voiding because the former requires large bladder capacity and reverting back to CIC if bladder capacity decreases can be difficult.\textsuperscript{6,21} Also, because reflex voiding requires a collection device such as a condom catheter, it is better suited for male patients. Unfortunately, no similar external device exists for women; hence, female patients who choose reflex voiding will be required to wear incontinence padding, which has its own disadvantages.\textsuperscript{6,12}

\textit{Surgical options.} Surgical options for SCI urinary continence have been found to be beneficial in maintaining renal function when all conservative approaches have been tried without the desired results. The most common surgical procedure for bladder management is the transurethral sphincterotomy, which can include ureteral stent placement.\textsuperscript{21} Bladder augmentation (ileocystoplasty) also can be incorporated to increase bladder capacity. In this procedure, a segment of small bowel is used to create a larger bladder, thereby, decreasing the pressure within the bladder while increasing bladder capacity and the ability of the bladder to distend to accommodate a larger volume of urine.\textsuperscript{12,13} Once the cystoplasty is completed, the patient can utilize CIC for bladder management.

Urinary diversions such as the ileal conduit or Kock pouch also are used when all other more conservative methods have failed.\textsuperscript{6} An ileal conduit often is used for patients who lack the manual dexterity needed for CIC; studies report improved quality of life with this bladder management approach.\textsuperscript{21} Continent urinary diversions have been found to have high satisfaction rates, particularly among female SCI patients.\textsuperscript{6}

\textit{Education.} The clinician can counsel and educate patients regarding bladder management choices and complication prevention. Bladder management must be individualized to meet patient-specific needs and consider the advantages and disadvantages of each method. Once the patient’s bladder management program has been implemented, the clinician should continue to evaluate its effectiveness and counsel the patient and caregivers on methods to ensure patient cooperation and optimal renal function. Spinal cord injury patients are at risk for upper and lower urinary tract complications\textsuperscript{12,13}; in addition, SCI patients who manage their bladders with long-term indwelling catheters have been identified as having higher bladder cancer rates.\textsuperscript{9} Therefore, it is prudent to counsel these individuals about their increased risk, especially if they report other risk factors such as smoking or potential occupational chemical exposures.

\textbf{Bowel Control}

\textit{Physiology.} Similar to urinary continence, bowel continence is the act of storing feces until a socially acceptable time and opportunity for elimination. Bowel continence requires competent internal and external sphincters, pelvic floor musculature, and
intact neurological pathways. Neurological control of bowel continence is complex and involves coordinated reflex activities from the autonomic and enteric nervous systems.\textsuperscript{24,25}

The colon can be visualized as a closed, pliant tube bounded by the ileocecal valve and the anal sphincter. The continuous smooth muscle layer at the end of the rectum thickens to form the internal anal sphincter (IAS); the external anal sphincter (EAS) is a circular band of striated muscle that contracts with the pelvic floor.\textsuperscript{26}

The IAS is innervated by both branches of the autonomic nervous system. The IAS is not voluntarily controlled — it receives sympathetic nervous stimulation via the hypogastric plexus, which exits the cord at T10-L2. Parasympathetic stimulation of the IAS from the pelvic plexus originates from the sacral cord (S1 to S3).\textsuperscript{13,25} Sympathetic stimulation of the IAS causes contraction; the effects of parasympathetic stimulation are less certain.\textsuperscript{25} The IAS relaxes as a reflex to rectal distention elicited by stimulation of afferent fibers in the pelvic floor.

The EAS is composed of both smooth and striated muscle. The smooth muscle of the EAS is innervated by the enteric nervous system, not by the autonomic nervous system. However, the striated component of the EAS is innervated by the pudendal nerve that exits the cord at sacral levels two, three, and four.\textsuperscript{25} Under normal conditions, the EAS remains contracted and can relax as a result of voluntary control.\textsuperscript{13,25} Continence is maintained by the tonic activity of the IAS.\textsuperscript{13}

The intrinsic nervous system of the gastrointestinal tract is situated in the colonic wall between the muscle layers and is the primary modulator of peristaltic activity. Small and large intestinal movements are mainly autonomous, with some spinal cord and minimal brain influence, and may be unaffected by spinal cord injury.\textsuperscript{13,25} Colonic motility is the result of three mechanisms: the transmission of electrical impulses, the activity of neurotransmitters and hormones, and the neurogenic mechanism. The myogenic transmission of electrical coupling and signals occurs between smooth muscle cells that are interconnected at the gap junctions. These signals are transmitted from cell to cell auto-rhythmically, causing colonic wall contractions.\textsuperscript{13,26} Chemical control occurs through the activity of neurotransmitters and hormones and helps promote or inhibit the contractions.\textsuperscript{13,26} The neurogenic mechanism involves the enteric nervous system’s local control and coordination of segmental motility. As the intestinal wall is stretched and dilated, the nerves of the mesenteric plexus cause the muscles above the dilation to contract and the muscles below the dilation to relax to help propel the colonic contents toward the rectum.

The extrinsic nervous system affecting colon motility includes the vagus nerve, the sacral parasympathetics, and the pelvic nerve.\textsuperscript{13,26} The enteric nervous system remains intact after SCI, allowing for peristalsis to continue.\textsuperscript{13,25} However, bowel continence problems can arise after SCI and are dependent on the level of the injury.

**Lower motor neuron syndrome (areflexic bowel).** Lower motor neuron (LMN) bowel syndrome occurs when the injury to the spinal cord is below thoracic level 12 of the spinal cord. This affects the parasympathetic cell bodies located in the conus medullaris, the cauda equina, or the pelvic nerve.\textsuperscript{13,26} Lower motor neuron bowel syndrome results in constipation because no spinal cord-mediated peristalsis occurs and, even though the enteric system is functioning, peristalsis is slowed. The stool becomes dryer and rounder due to the slowed propulsion.\textsuperscript{13,26} Because the LMN SCI denervates the EAS, the risk for incontinence increases as the EAS relaxes.

**Upper motor neuron syndrome (hyperreflexic bowel).** Upper motor neuron (UMN) syndrome occurs with SCI above the 12 thoracic vertebrae\textsuperscript{13,22} and is distinguished by increased colonic wall and anal tone. The EAS loses voluntary control and the sphincter remains tight, retaining stool.\textsuperscript{13,26} Patients with UMN bowel suffer from constipation and fecal retention.

**Bowel Management**

The goals of an effective bowel management program include having the patient 1) evacuate stool at a regular, predictable time within 1 hour of bowel care; 2) eliminate or minimize unplanned bowel movements; and 3) avoid gastrointestinal complications.
Another important goal is to design and implement a safe bowel management program that accommodates individual patient needs and capabilities.27

**Evaluation.** Before designing a bowel program, a comprehensive evaluation of bowel function, current impairment, and possible problems should be completed.13,26 The history and physical examination should include any gastrointestinal problems or other medical conditions present before the SCI. Medications used for pre-existing disorders such as diabetes or inflammatory bowel disease may affect bowel transit time. The patient's dietary habits, fluid intake, and bowel habits before the injury should be ascertained. A physical examination should include abdominal assessment, rectal examination, assessment of anal sphincter tone, and a neurological examination to reveal the extent of nerve damage.12,26 The patient's upper and lower extremity strength, his/her ability to sit and transfer, and the length of the patient's extremities also are evaluated to provide information regarding patient ability to self-manage a bowel program.13 The patient's decisions regarding a bowel program may be a factor of his/her dependence on assistance.

**Schedule.** A consistent schedule for bowel care is needed to develop a habitual, more predictable bowel movement.27 The time of day for the patient's bowel movement will be determined by the patient's lifestyle and work schedule. Many people prefer to conduct their bowel management program in the morning before commencing with the activities of the day. The average time needed to complete bowel care in patients with SCI is estimated to be 10.5 hours per week.27 If the bowel management program takes all day, the patient's quality of life will be adversely affected. Frequency of bowel care depends on the patient's food and fluid intake, the availability of any needed assistance, and pre-injury patterns.26 Generally, an alternate day schedule can be established for reflex neurogenic bowel dysfunction, while a daily routine has been found to be appropriate for flaccid neurogenic bowel dysfunction.27

**Nutrition, stool consistency, and medication.** The bowel management program should utilize a multifaceted approach. The implementation of a high-fiber diet with adequate fluid intake will maintain appropriate stool consistency. For example, a soft stool consistency that can be easily evacuated with rectal stimulation is preferred in reflex neurogenic bowel. A formed stool can be more easily retained between bowel care sessions and manually evacuated in flaccid neurogenic bowel.26 In addition, ingesting food or fluids approximately 30 minutes before starting bowel care will trigger the gastrocolic reflex and increase intestinal motility. Medications are frequently used to manage the neurogenic bowel and include stool softeners, colonic stimulants, and contact irritants.13

**Stimulation.** Reflex neurogenic bowel or UMN dysfunction leaves intact reflex pathways that can be used to stimulate evacuation. Therefore, the usual bowel management program for UMN bowel dysfunction employs direct mechanical or chemical stimulation or a combination of the two. The typical program may involve inserting a bisacodyl suppository to stimulate evacuation, giving the suppository time to take effect, having the patient sit upright or positioned in side-lying position, and performing digital stimulation until evacuation occurs.26

The use of chemical stimulants has been debated. It has been suggested that the use of chemical stimulants should be avoided until they are absolutely necessary for bowel evacuation; however, in a double-blind study comparing the effectiveness of rectal stimulants, Stiens et al20 found that chemical triggers decreased the time needed for effective bowel evacuation. The clinician should instruct the patient and caregiver on the proper technique for suppository insertion and safe, digital rectal stimulation.

Flaccid or LMN bowel dysfunction results in hard round stool due to decreased intestinal motility. Because the anal sphincter is denervated, the bowel management program for LMN bowel dysfunction requires digital removal of feces. Because no active reflexes exist to be stimulated, the use of chemical stimulants is futile.27 The use of osmotic laxatives that allow the patient to use a valsalva maneuver is not recommended because this may cause persistent fecal incontinence.26,27 Using pulsed water irrigation to break up stool and stimulate peristalsis has been successful in patients who develop impactions.28
Patient and caregiver education is necessary for the safe, effective digital removal of feces. Patients and their caregivers may not be eager to accept this method. The clinician can provide support and advice and once the bowel management program is implemented, continue to evaluate its effectiveness, and suggest any needed changes.

**Surgical intervention.** Surgical intervention for bowel management includes the antegrade continence enema procedure (ACE), which involves creating a continent, catheterizable one-way stoma that can be used to perform colonic washouts.\(^\text{29}\) Surgical fecal diversion may be more palatable for some patients but is usually done as a last resort.\(^\text{26}\) The loss of or change in bowel function has been shown to be the most significant factor affecting their quality of life. Research\(^\text{28}\) has demonstrated that the time needed for bowel care is drastically reduced by an elective fecal diversion and that patients perceive improvements in their quality of life following an elective colostomy. The clinician can counsel the patient, site the stoma, and initiate patient and family education regarding stoma care.

**Discussion**

After SCI patients complete rehabilitation, many receive their medical treatment and management from non-specialists.\(^\text{2,11,22}\) Although it is suggested\(^\text{22}\) that the SCI patient receives annual urological and gastrointestinal follow-up, research to identify and evaluate the optimum follow-up frequency is needed. In addition, prospective studies on SCI bladder and bowel management programs could identify evidence-based findings that can be implemented in clinical practice and elucidate how these practices affect the SCI patient’s quality of life. Research studies designed to identify the relationship between neurogenic bladder and bowel management and the patient’s beliefs and cultural practices also are needed. Such information can benefit the process of developing patient-centered bladder and bowel programs.

**Conclusion**

Spinal cord injury is a devastating, life-changing event. Patients with SCI have multiple obstacles and burdens to overcome when adapting their lifestyle to their new physical selves. Adaptation to immobility and paralysis can occur with the use of equipment and prosthetics. Accessibility has become the norm in the workplace and it is not uncommon to see SCI patients in the workforce or out and about in the community. However, fecal and urinary incontinence can devastate these patients and negatively affect their quality of life. Fecal or urinary incontinence elicits feelings of shame, loss of control, and intense anxiety\(^\text{29}\); a continence nursing specialist has the required knowledge base and skill set to improve patient outcomes by advising and counseling, as well as by designing and implementing a bladder and bowel program that is safe, effective, and acceptable to the patient. Additionally, the continence clinician can be an important resource to other healthcare professionals who care for the SCI population. Successful development of a bladder and bowel management program requires collaboration with all members of the healthcare team. This coordination helps ensure that the bowel and bladder management program that has been carefully devised will be maintained and valued. - OWM

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