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Nursing Interventions for Patients With Neurogenic Bowel Dysfunction Arising From Complete Spinal Cord Injury

A Scoping Review

André Aparecido Ramos ◆ Thaís Martins Gomes De Oliveira ◆ Ana Lúcia Da Silva ◆ Gisele Martins ◆ Ivone Kamada ◆
Regina Ribeiro Cunha ◆ João Batista De Sousa ◆ Simone Roque Mazoni

ABSTRACT

PURPOSE: We mapped key concepts and identified 4 fundamental nursing interventions for patients with neurogenic bowel dysfunction due to complete spinal cord injury (SCI).

METHODS: A scoping review was conducted according to the recommendations of the Joanna Briggs Institute.

SEARCH STRATEGY: Searches were performed in PubMed, LILACS, CINAHL, COCHRANE, and SCOPUS electronic databases. We use searched the gray literature using the Google Scholar search engine. We formulated a question to guide the search, based on the participants, concept, and context format: “What are the key manual nursing interventions performed in patients with neurogenic bowel dysfunction resulting from complete spinal cord injury?” We included nursing intervention strategies that may be performed by health professionals, patients, or caregivers. Two reviewers independently participated in the selection; disagreements were resolved by a third reviewer and 5 experts.

FINDINGS: Thirteen studies conducted between 1998 and 2019 were selected; 5 were randomized clinical trials. Four main interventions were identified for conservative management of neurogenic bowel dysfunction in patients with complete SCI. They were digital-anal stimulation, manual extraction of feces, abdominal massage, and strategies used to stimulate the gastrocolic reflex.

CONCLUSIONS: Research suggests that each of these interventions, administered alone or in combination, supports bowel evacuation in patients with a complete SCI. Each of these interventions may be performed by a nurse, and taught to the patient and/or lay caregiver.

IMPLICATIONS FOR PRACTICE: An individualized bowel management program for patients with neurogenic bowel dysfunction due to SCI is necessary to ensure regular bowel evacuation, preserve fecal continence, and support dignity and health-related quality of life. The conservative interventions identified in this scoping review should be incorporated in protocols or guidelines for management of neurogenic bowel dysfunction in this vulnerable population.

KEY WORDS: Colonic diseases, Fecal incontinence, Neurogenic bowel, Nursing, Rehabilitation, Spinal cord injuries, WOC nursing.

André Aparecido Ramos, RN, Sarah Group of Rehabilitation Hospitals, Brasília, Brazil.

Thaís Martins Gomes De Oliveira, RN, Graduate Nursing Program at the University of Brasília, Brasília, Brazil.

Ana Lúcia Da Silva, PhD, RN, Nursing Department, Faculty of Health Sciences, University of Brasília, Brasília, Brazil.

Gisele Martins, PhD, RN, Nursing Department, Faculty of Health Sciences, University of Brasília, Brasília, Brazil.

Ivone Kamada, PhD, RN, Graduate Nursing Studies Program in Faculty of Health Sciences, University of Brasília, Brasília, Brazil.

Regina Ribeiro Cunha, PhD, RN, Federal University of Pará, Belém, Pará, Brazil.

João Batista De Sousa, PhD, MD, Faculty of Medicine, University of Brasília, Brasília, Brazil.

Simone Roque Mazoni, PhD, RN, Nursing Department, Faculty of Health Sciences, University of Brasília, Brasília, Brazil.

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Correspondence: Simone Roque Mazoni, PhD, RN, Faculty of Health Sciences, University of Brasília, Darcy Ribeiro Campus, Asa Norte, Brasília, Federal District 70910900, Brazil (simazoni@unb.br).

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INTRODUCTION

A spinal cord injury (SCI) or spinal cord lesion is defined as any damage to the structures of the spinal canal that affect the nervous functions of the spinal cord, conus medullaris, or cauda equina.¹⁻³ Spinal cord injury can cause permanent or temporary damage and is associated with traumatic or non-traumatic causes. Traumatic SCI is usually attributable to automobile and motorcycle accidents, falls from heights, physical violence, sports, and diving in shallow water. Nontraumatic SCI can be caused by spinal stenosis, severe spinal deformities, herniated discs, tumors, cardiovascular diseases, systemic infections, and autoimmune diseases.^{1,4}

Individuals with traumatic SCI can be classified as having quadriplegia, also referred to as tetraplegia; it is characterized by a cervical injury, leading to partial or total loss of use of all 4 limbs and torso. It can also result in paraplegia, characterized by injury below the cervical level—thoracic, lumbar, or sacral—leading to loss of use of the lower half of the body, including both lower extremities. Patients may experience complete or incomplete SCI; the former is characterized by

complete loss of sensory motor and sensory function below the level of the SCI, whereas incomplete injuries are characterized by partial preservation of sensory or motor function below the level of the lesion.⁵

Considered one of the most severe types of injury, traumatic SCI can result in different degrees of motor changes and loss of sensation, along with dysfunction of multiple organs, including the bowel, resulting in neurogenic bowel dysfunction.^{4,6,7} The most common clinical manifestations of neurogenic bowel dysfunction are constipation, incomplete bowel evacuation, and fecal incontinence.^{1,6,7} Additional clinical manifestations are hemorrhoids, abdominal distension, and discomfort; distension of the bowel also may provoke autonomic dysreflexia in some patients with SCI.⁸

Skilled nursing care is needed for daily management of neurogenic bowel dysfunction; the goal of management is to support regular and effective bowel elimination, prevent fecal incontinence episodes and related symptoms, reduce the risks for complications, and improve health-related quality of life.⁸ Nursing management also includes teaching the patient and family member or caregiver to carry out these interventions in the patient's home.

A successful bowel management program or strategy for patients with SCI usually consists of multiple interventions, such as adequate hydration and nutrition, usually combined with manual interventions such as stimulation of the gastrocolic reflex, with or without use of oral laxatives and rectal suppositories. Implementation of a bowel management program requires knowledge and experience with managing neurogenic bowel dysfunction, the ability to construct and implement an individualized bowel management strategy based on an individualized assessment of the patient and supports in the home, along with use of strategies to promote long-term program adherence to this program. Neurogenic bowel dysfunction is based on a regular routine that includes fluid and dietary measures, manual manipulation such as digital-anal stimulation and manual evacuation, and use of oral laxatives and rectal suppositories can be considered adjuvants to these fundamental conservative interventions.^{9,10}

In Brazil, the WOC nurse is charged with developing an individualized bowel management program for patients with complete SCI, along with a team approach that incorporates other clinical staff and (ultimately) the patient and family or other caregivers.¹¹ Brazilian legislation has specifically gated the WOC nurse to autonomously provide care services to people with fecal and urinary incontinence, including spinal cord injured patients with neurogenic bowel dysfunction.^{12,13} The purpose of this scoping review is to map and identify the key nursing interventions for patients with complete SCIs and neurogenic bowel dysfunction. Our search was guided by a query based on the participants, concept, and context format.¹⁴ We asked, "What are the key manual nursing interventions performed in patients with neurogenic bowel dysfunction resulting from complete spinal cord injury?"

METHODS

A scoping review was conducted using recommendations of the Joanna Briggs Institute manual and a structured protocol according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses Extension for Scoping Reviews checklist.^{14,15} We sought to both extract results and descriptively map them.¹⁴ The review was registered in the *Open Science*

Framework and the study protocol can be accessed at the web address: <https://osf.io/bt2s7/files/>.

Search Strategies

On February 24, 2020, searches were conducted in MEDLINE, Latin American and Caribbean Literature on Health Sciences (LILACS), Cumulative Index to Nursing and Allied Health Literature (CINAHL), Cochrane Collaboration (COCHRANE), and Scopus (SCOPUS electronic databases). We searched for gray literature elements using the Google Scholar search engine (Google LLC, Mountainview, California). We performed hand searches based on the descriptors "neurogenic bowel" and "spinal cord injuries." We also searched using appropriate key terms based on MeSH (Medical Subject Headings), DeCS (Descriptors in Health Sciences), and CINAHL Subject Headings taxonomies. No restrictions were applied regarding time and language (Figure 1). Our search was also informed by the participants, concept, and context format. Participants were humans with neurogenic bowel dysfunction resulting from complete SCI based on the American Spinal Injury Association Impairment Scale (ASIA Impairment Scale).⁵ Concept was defined as studies that included manual nursing intervention strategies (stimulation of the gastrocolic reflex, abdominal massage, digital-anal stimulation, and manual stool extraction). Finally, context was defined as elements that incorporate intervention delivered by health care professionals, patients, or lay caregivers.

Exclusion criteria were studies that used an *in vitro* or *in vivo* model studies conducted in infants and children. Additional exclusions included nursing interventions in patients with neurogenic bowel dysfunction not arising from SCI and studies in patients with incomplete SCI (ASIA Impairment Scale [AIS] classifications: B, C, D, or E).⁵ We also excluded surgical interventions, and use of mini-enemas, or other types of bowel irrigation. Finally, editorials, case reports, textbooks, review articles, and qualitative studies were also excluded.

Data from our scoping review were stored in Endnote Web (Clarivate, Philadelphia, Pennsylvania) and exported to the Rayyan tool (Qatar Foundation, Doha, Qatar); these tools were used to exclude duplicates. This software was also used to assist with title and abstract searches. Specifically, 2 reviewers independently took part in the selection of titles/abstracts and element to be read in full (A.A.R. and T.M.G.O.). At the end of each stage, disagreements were resolved by consensus and discussion with a third reviewer (S.R.M.), together with experts (first stage: A.L.S. and J.B.S.; second stage: A.L.S., J.B.S., G.M., R.R.C. and I.K.).

The following data were extracted from elements read in full and selected for inclusion in our scoping review: author, year, country of origin of the study, aim, population and sample size, study design, type of intervention or event, results, and main findings that addressed the review question we posed. The quality of individual studies was not evaluated, considering that the method was used to map and identify the main components of key interventions applied to patients with neurogenic intestine with SCI, in order to guide nurses to the implementation and guidance of the best practices. In a scoping review, it is possible to extract results and descriptively map them.¹⁴ Data extraction and mapping of findings were completed by an advanced nurse practitioner (G.M.), 3 stomatherapy nurses (A.L.S., R.R.C., and I.K.), 2 of whom were WOC nurses and a proctologist (J.B.S.).

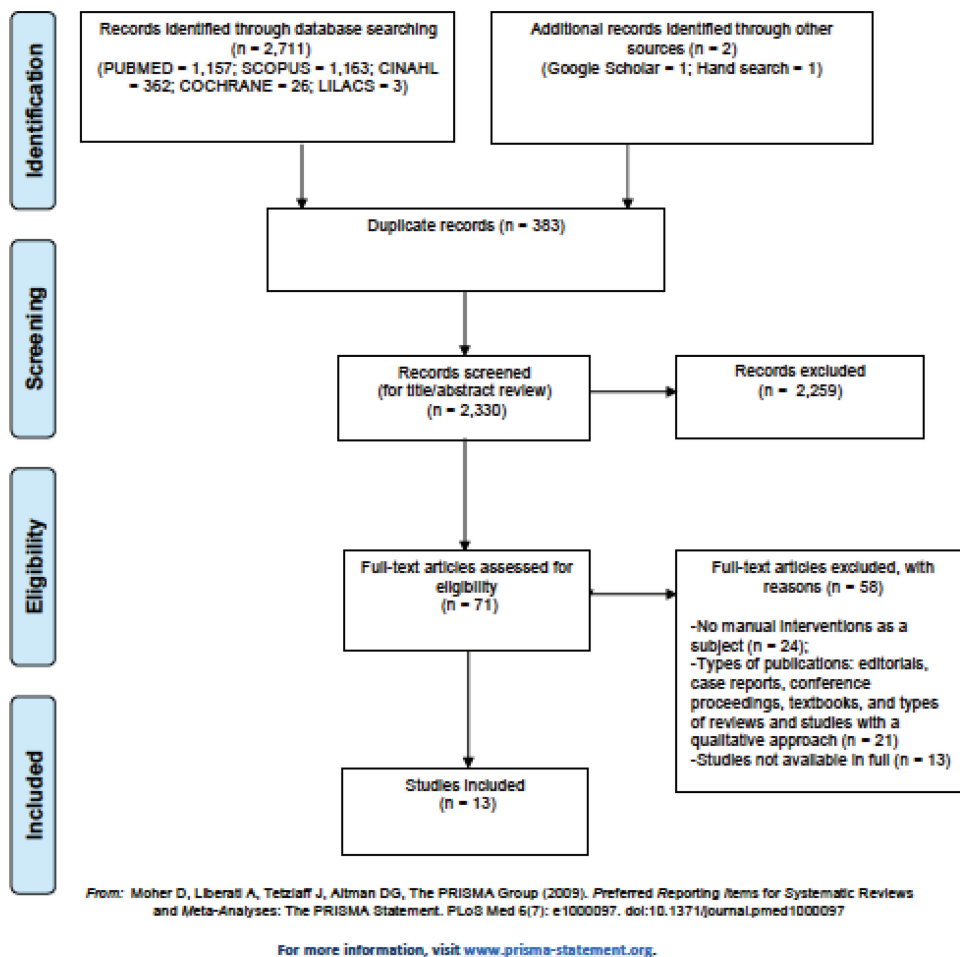


Figure 1. Flow diagram of the scoping review (modified from Moher et al¹⁶).

FINDINGS

The initial search resulted in 2711 elements retrieved from the electronic databases, and 2 elements retrieved from a search of Google Scholar and a hand search. Three hundred eighty-three duplicate results were excluded, leaving 2330 sources of evidence reviewed by screening titles and abstracts for exclusion. Articles using the alpha-Roman alphabet were considered for full review. A total of 71 studies were selected and read in full; an additional 58 studies were excluded based on inclusion and exclusion criteria presented in Figure 1. We also retrieved 13 studies that were ultimately excluded because we were unable to obtain access to a full research report, despite contacting the authors. Thus, the final review is based on findings from 13 elements (see Supplemental Digital Content Table 1, available at: <http://links.lww.com/JWOCN/A91>).

Characteristics of Included Studies

Publications comprised the years from 1991 to 2019. Most were published between the years 2011 and 2019 ($n = 6$; 46.1%), followed by 2001 to 2010 ($n = 5$; 38.5%), and 1991 to 2000 ($n = 2$; 15.4%, Figure 2). Included studies were published in English, Portuguese, and Chinese languages. The main continents of origin of studies were Asia and America with 3 (23.1%) and 4 (30.8%) studies, respectively, followed by Europe ($n = 3$; 23.1%) and Africa ($n = 1$; 7.7%). In Asia, 3 studies were from Turkey, 2 from China, and 1 from Korea.

In America, 3 studies were from the United States and 1 from Brazil. In Europe, 2 studies were from the United Kingdom and 1 from the Netherlands. Data from the African study were collected in Egypt (Figure 2).

The most frequent types of studies in the review were clinical trials^{10,17-20} ($n = 5$; 38.5%), followed by observational²¹/survey study²²/prospective evaluation²³ ($n = 3$; 23.1%), prospective cohort⁹/prospective cohort and control case²⁴ ($n = 2$; 15.4%), a validation methodological study⁶ ($n = 1$; 7.7%), a quasiexperimental exploratory study²⁵ ($n = 1$; 7.7%), and a guideline²⁶ ($n = 1$; 7.7%, Figure 2). Seven studies were published in the physical medicine and rehabilitation literature, 5 in the nursing literature, and 1 in the occupational therapy literature. All of the studies included patients with complete SCIs, identified according to the AIS Classification Scale as described previously.⁵

Summary of Evidence

Concept mapping led to identification of 4 nursing interventions for management of neurogenic bowel dysfunction in patients with complete SCI (Figure 2). They are (1) digital-anal stimulation ($n = 12$ elements^{6,9,10,17-22,24-26}); (2) manual evacuation of stool ($n = 9$ elements^{6,9,10,18,20,22,24-26}); (3) manual abdominal massage or massage with an electromechanical device ($n = 8$ elements^{6,10,17,18,20,23,25,26}); and (4) other means of gastrocolic reflex stimulation ($n = 6$ elements^{6,9,10,18,25,26}).

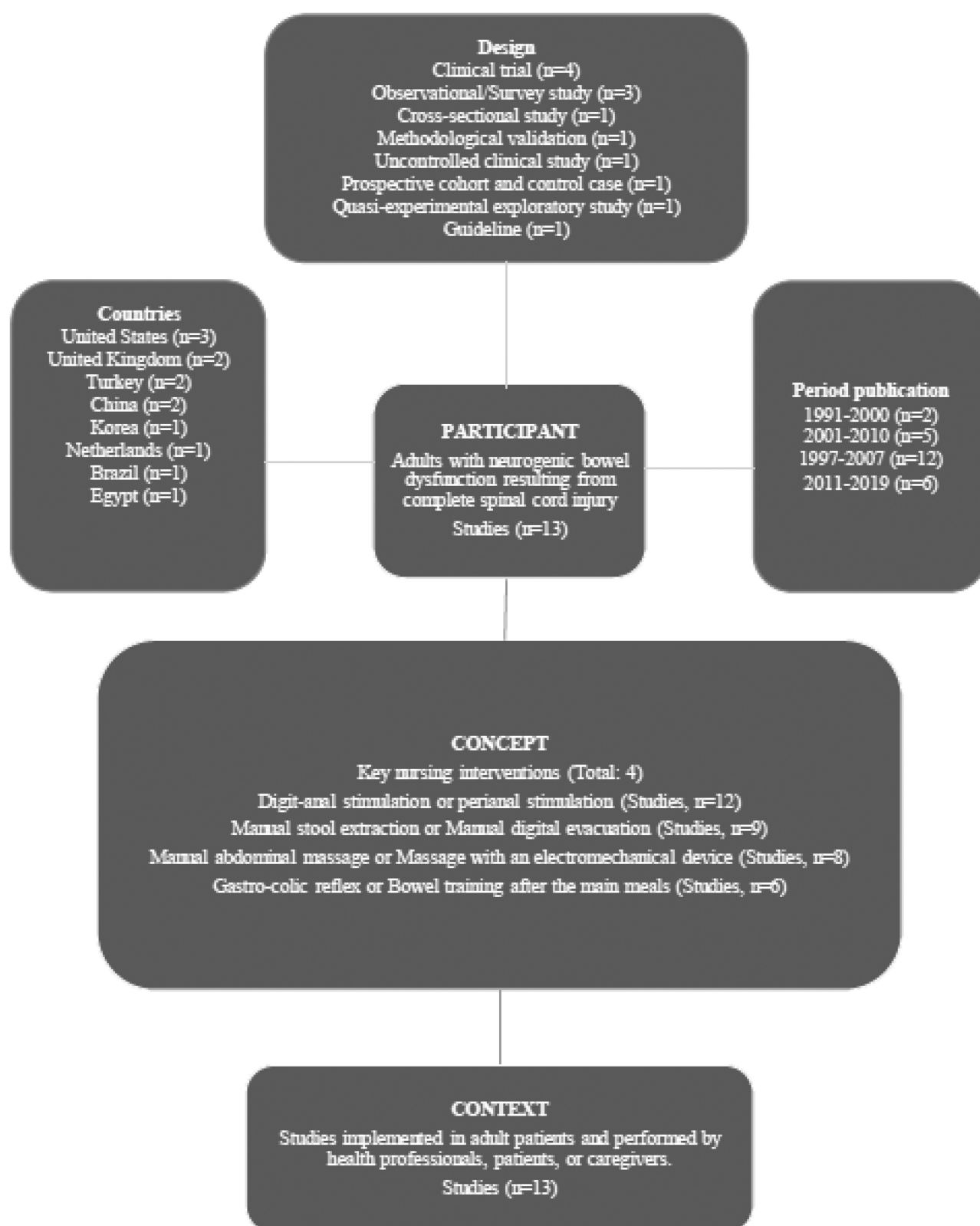


Figure 2. Characterization of included studies based on publication date, country where data were collected, design, participants, concept, and context.

Stimulation of Gastrocolic Reflex

In healthy individuals without SCI or other neurological disorders affecting intestinal function, the gastrocolic reflex is triggered by feeding. It is characterized by propulsive peristalsis of the small intestine and colon that promotes a “mass

movement” of stool through the bowel.^{9,10,26} In some patients with SCI, defecation may be scheduled or planned based on bowel elimination patterns prior to SCI, and implemented following consumption of a meal. Stimulation of the gastrocolic reflex should be performed daily or at least every other

day, based on a standardized schedule. It can be performed between 20 and 30 minutes after meals; this timing reflects the gastrocolic reflex in individuals with normal gastrointestinal function.^{9,10,18,25,26}

The most frequently recommended position for stimulation of the gastrocolic reflex was sitting on the toilet, usually 30 to 40 minutes following a meal.⁶ Patients who are unable to sit on a toilet are positioned in a left lateral decubitus position.²⁵ The bladder should be emptied before scheduled defecation. One study recommended that bowel interventions be performed before 10 o'clock in the morning; however, they did not specify whether it was related to the gastrocolic reflex or facility routines; this study was set in an intensive care unit caring for patient with acute SCIs.²⁴

Abdominal Massage

Research suggests that abdominal massage may be used as a complementary method to gastrocolic reflex stimulation, as described previously. Massage may be completed using open or closed hands; oils or creams may be used to reduce dynamic friction as the hands are moved across the abdomen. The manual massage should be performed using a clockwise motion (from right to left) reflecting normal intestinal transit; the intent of massage is to further stimulate the peristalsis and movement of fecal material toward the rectum.^{6,9,10,17,18,20,26}

Recommendations regarding the duration of manual massage varied from 5 to 20 minutes.^{6,18} A duration of massage was between 5 and 10 minutes, focusing the first 5 minutes on the massage itself and the subsequent minutes on the Valsalva maneuver in 1 study.⁶ Abdominal massage may be performed once daily, 1 to 2 times per day, or 2 times daily for patients with mild, moderate, and severe neurogenic bowel dysfunction, respectively.²⁰ This auxiliary method can be used both for patients with upper motor neuron-type bowel dysfunction (upper motor neuron lesions affect cervical and thoracic spinal levels).²⁵

In a study using an electromechanical massage device for 20 minutes daily, between 6 and 10 hours before the usual time of defecation for a period of 10 weeks, no significant improvement in the bowel function of individuals with SCI was observed; in addition, the device sometimes caused side effects, such as pain and discomfort, among participants.²³

Digital-Anal Stimulation

Digital-anal stimulation also may be used to provoke peristalsis that aids in the expulsion of stool.^{9,10,20,26} It is also reported to relax the external anal sphincter, preventing constipation and unscheduled evacuation. Digital-anal stimulation contributes to dilation of the anal canal and relaxation of the puborectalis muscle, decreasing the anorectal angle, and reducing resistance to evacuation of stool from the rectal vault.²¹ Maintaining finger contact on the rectal mucosa is advised during digital-anal stimulation, combined with careful circular movements to prevent rectal lesions and autonomic dysreflexia.

We retrieved one study that evaluated the effect of digital-anal stimulation on colonic motility using a manometric catheter affixed endoscopically to the splenic flexure. A barium oatmeal paste was created that also enabled fluoroscopic imaging as it traversed the lower colon and rectum. Digital-anal stimulation of the lower anorectal canal with a gloved and lubricated finger was undertaken. Stimulation caused an increase in the mean number of peristaltic waves in the lower colon from 0 wave

per minute before stimulation to 1.9 waves per minute during stimulation and 1.5 waves per minute immediately following digital stimulation. This maneuver was accompanied by expulsion of the barium oatmeal paste in every subject by the fifth stimulation. Results of this experiment add insight into the mechanisms by which digital-anal stimulation promotes evacuation of fecal material from the neurogenic bowel.²¹

Coggrave and Norton¹⁰ described digital-anal stimulation as moderately invasive, and emphasized exercising care to prevent anorectal damage. Nevertheless, they pointed out that digital-anal stimulation produces a faster response than chemical stimulation through use of a suppository.¹⁰ Several authors highlighted digital-anal stimulation as a recommended technique for patients with upper motor neuron lesions (involving cervical and thoracic injuries about T12).^{24,25}

Our review revealed variability in techniques for performing digital-anal stimulation. According to Borsh and colleagues, stimulation be performed with a finger of a gloved hand lubricated with 2% lidocaine gel.²⁴ The use of gloves and the use of liquid paraffin to lubricate the index and middle finger were also recommended in another study.²⁰ The use of lidocaine gel for anal lubrication was specifically recommended in patients with SCI above T6 to reduce the risk of autonomic dysreflexia.²⁵ Two other studies pointed out the need to perform stimulation with a gloved finger and lubrication, but they did not recommend any particular lubricants.^{6,26} Gloves were consistently recommended for health care professionals, lay caregivers, and patients when performing digital-anal stimulation.

Digital-anal stimulation is recommended daily or every other day, and the gloved finger may be placed in the 3-, 6-, 9-, and 12-o'clock position.²⁰ Stimulation should occur in a circular motion, keeping the finger in contact with the rectal wall; the maneuver should persist for 15 to 20 seconds, and not exceeding 60 seconds.^{24,26} Digital-anal stimulation may be performed every 5 to 10 minutes, if necessary, until the evacuation is complete.²⁶ It should be performed 15 to 20 minutes after use of an anal suppository, repeating the maneuver every 5 minutes, and limiting the maximum time between stimuli to 40 minutes.²⁶

Digital-anal stimulation of the perianal region was described as intimate and noninvasive care.^{10,18} The Consortium for Spinal Cord Medicine (based in the United Kingdom) emphasizes rectal stimulation as the recommended technique; nevertheless, stimulation should be performed cautiously because of the potential for provoking autonomic dysreflexia, a prevalent condition in patients with injury levels of T6 or higher.²⁶ Autonomic dysreflexia is an abnormal sympathetic nervous disorder in response to noxious system stimuli due to bladder or bowel distention; it causes a precipitous rise in blood pressure and is associated with a risk of brain hemorrhage and death if left untreated.^{1,9,26,27}

Manual Extraction of Stool

Manual evacuation is defined as mechanical removal of fecal matter from the bowel using a finger.²⁰ Evacuation is performed with 1 or 2 gloved and well-lubricated fingers, using circular movements to manually extract stool from the rectal vault via a hooked finger. Check for residual fecal material in the rectal vault at the end of the evacuation, to ensure all stool has been removed; otherwise the procedure is repeated until evacuation is complete.^{6,26} For patients with severe constipation, manual evacuation may be completed prior to digital-anal stimulation

in order to promote evacuation of stool higher in the intestinal tract.²⁰ Alternatively, manual evacuation may be undertaken after digital-anal stimulation to ensure completed evacuation of stool and it may be combined with use of an anal suppository.¹⁸

This procedure has been characterized as intimate and often enjoys less acceptance among individuals with SCI and their caregivers when compared to other bowel management strategies.¹⁰ Manual evacuation promotes fecal continence by ensuring evacuation of fecal matter from the rectal vault, thus avoiding the spontaneous evacuation of feces at inappropriate times. Manual evacuation is recommended for patients with lower motor neuron lesions affecting lumbosacral spinal segments.²⁴⁻²⁶

A cross-sectional study was completed that evaluated patterns of bowel care in patients with SCI and neurogenic bowel dysfunction managed via manual extraction of stool. Data were collected via one-on-one interviews. Respondents with neurogenic bowel dysfunction with an upper motor neuron lesion origin tended to perform evacuation around 3 times weekly, while individuals with neurogenic bowel dysfunction due to lower motor neuron lesion origin emptied their bowels twice daily.²²

DISCUSSION

This scoping review provided evidence of a progressive increase in publications on manual interventions for patients with neurogenic bowel dysfunction in the last 30 years. Our review identified 4 key nursing interventions for patients with neurogenic bowel dysfunction due to complete SCI. More than one of these interventions are often performed in combination in order to create an effective neurogenic bowel management strategy.

Research in this area suggests that both knowledge and skills in interventions such as digital-anal stimulation or manual extraction must be combined with a professional care provider or lay caregiver to ensure adherence to a regular bowel management strategy. These strategies are combined with knowledge of methods to stimulate the gastrocolic reflex, which is normally triggered by food ingestion, resulting in increased peristalsis within the small and large bowel and particularly the sigmoid colon.^{26,28} Evidence suggests that abdominal massage may be used as a complementary intervention to promote a gastrocolic reflex and bowel evacuation in patients with upper motor neuron lesions.^{9,10,20,26}

If these methods are not effective for regular bowel evacuation, and depending on the level of the SCI, digital-anal stimulation may be used to provoke peristalsis and relax the external anal sphincter promoting expulsion of feces.^{9,10,21,26} In contrast, manual extraction of stool using 2 gloved and lubricated fingers may be used prior to or following digital-anal stimulation to promote complete evacuation of the rectal vault.^{9,10,26,29} It also may be used to evacuate stool from the rectal vault in a patient with a lumbosacral lesion and lower motor neuron neurogenic bowel dysfunction. Manual stool extraction often provokes anxiety, but it is often a fundamental component of a neurogenic bowel management strategy or program and it is recommended by the United Kingdom's National Patient Safety Agency.³⁰

A bowel management strategy or program must be individualized and often combines more than one strategy, based on the history of the patient's bowel habits before SCI, AIS

classification of the injury, and psychological factors including anxiety associated with digital manipulation of the anal area. Care planning should include educational strategies to teach caregivers to participate in a bowel program and enhance treatment adherence and continuity in the home setting.^{18,26,31,32}

Based on the list of interventions presented in this review, nurses should gain knowledge about the care and rehabilitation of patients with neurogenic bowel dysfunction due to SCI. Understanding neurogenic bowel dysfunction and its possible interventions provides nurses with specialized knowledge and skills to ensure quality care and possibly have a greater impact on preservation of optimal bowel evacuation, promoting fecal continence, and maintaining dignity and health-related quality of life.⁸

CONCLUSIONS

This scoping review identified 4 primary interventions used individually or in combination as indications for conservative management neurogenic bowel dysfunction due to complete SCI. These interventions are based on stimulation of the gastrocolic reflex based on feeding and scheduled defecation, digital-anal stimulation, and manual removal of stool when indicated. Additional research is needed to compare the efficacy of different manual intervention options and the role of complementary inventions such as abdominal massage. Studies are also needed to explore patient response to manual stimulation techniques and ways to enhance their acceptance of these often essential strategies for conservative neurogenic bowel dysfunction.

KEY POINTS

- First-line strategies for management of neurogenic bowel dysfunction include digital-anal stimulation, manual stool evacuation, manual abdominal massage or massage with an electromechanical device, and dietary provocation of a gastrocolic reflex.
- Conservative interventions may be used alone or in combination and are frequently combined with use of oral laxatives and suppositories to create an individualized bowel management strategy.
- The WOC nurse has an essential role in management of neurogenic bowel dysfunction in patients with spinal cord injuries.
- Clinical guidelines may contribute to improved patient adherence to the intestinal management program, reduce the risk of complications, and improve quality of life and cost-effectiveness.

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