Supplemental Digital Content 1– Data extraction table from the included studies.

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| **Author, Year, Country** | **Aim** | **Population, Sample** | **Study design** | **Intervention or Event** | **Results** | **Findings that answer the review question (Key Concept: nursing intervention)** |
| Ayas *et al*. 17, 2006, Turkey. | To investigate the effect of abdominal massage on clinical aspects and colonic transit time of NBD resulting from complete SCI. | 24 patients with SCI. | Uncontrolled clinical study. | Phase I (duration: 2 weeks): patients were placed on an intestinal program in which they received a standard diet containing 15 to 20g fiber/day and underwent daily digital stimulation. All laxatives, suppositories and enemas were discontinued prior to the study.  Phase II: occurred after obtaining plain abdominal radiographs. Patients continued to receive the same standard diet and digital stimulation. After digital stimulation, each subject received at least 15 minutes of abdominal massage. | * Decrease abdominal distention. * Decrease fecal incontinence. * Decrease difficult evacuation. * Decrease abdominal pain. * Mean time for evacuation without changes. * Increase bowel frequency. * Increase colonic transit time. | Digit-anal stimulation or perianal stimulation; Manual abdominal massage.  The additional of abdominal massage to a standard bowel program resulted in decreased abdominal distention, fecal incontinence, mean frequency of defecation and decreased transit time. |
| Borsh *et al*. 24 2019, United States. | To establish a NBP for NBD resulting from SCI; to examine the knowledge of the nursing staff regarding the implementation of the NBP during care and assess the satisfaction and quality of life of patients with the program. | 52 patients (Intervention: 24; Control: 28).  193 Staff (158 nurses and 35 physical and occupational therapists, pre and post test). | Prospective cohort and control case. | Implementation of a NBP for SCI. Educational therapeutic intervention to the patient through an information leaflet. At least one bowel educational intervention (includes anatomy review, importance of the benefits of a standardized program, instructional video, and instructions on upper and lower motor neuron bowel program) and at least one demonstration of the procedure. Duration: 1 year and 8 months. | * Significant impact on the bowel function. * Prevention of complications. * Reduction in the use of laxative drugs. | Digit-anal stimulation or perianal stimulation; Manual stool extraction or Manual digital evacuation.  The implementation of a program for the management of the neurogenic bowel in patients with acute SCI allows for earlier bowel care, improving bowel function and consequently preventing related complications. |
| Coggrave & Norton10, 2010, United Kingdom. | To compare the application of a protocol "step by step" based on previously published study to examine whether the systematic use of assistance minimally invasive reduces the need to use oral and invasive interventions laxatives, such as manual evacuation, improves the results of the intestinal management in patients with neurogenic bowel resulting from SCI; to compare the protocol with the usual care. | 68 patients with SCI in the groups (Intervention: 35; Control: 33). | Randomized controlled trial. | A single daily diet was included for each week of the bowel diary. Participants received guidance (verbal and written). A 6-week bowel diary recorded all interventions and resulting bowel movements, duration of bowel management, frequency of bowel movements (outside the bowel management period), stool consistency (Bristol Scale) and other relevant information.  The control group received the usual care. Stepwise form: Gastrocolic reflex stimulation 20 min before starting bowel care, abdominal massage; perianal stimulation; anal digit stimulation; glycerin suppositories; rectal stimulants: bisacodyl or minienema suppositories; manual extraction of feces; oral laxative. | * There was no improvement in results after bowel management. * More frequent fecal incontinence. * There was no reduction in the use of oral laxatives and invasive interventions. | Digit-anal stimulation or perianal stimulation; Manual stool extraction or Manual digital evacuation; Manual abdominal massage; Gastro-colic reflex or Bowel training after the main meals.  The use of controlled interventions does not reduce the need for manual evacuation and oral laxation in chronic SCI. The study findings support the need for manual evacuation in bowel management and provide evidence of acceptability of the technique to SCI individuals. For some individuals oral laxatives are an essential part of management. |
| Coggrave *et al*. 9, 2006, United Kingdom. | To check whether the use of laxatives is inevitable component for effective management in neurogenic bowel resulting from SCI. | 17 patients with neurogenic bowel resulting from SCI. | Prospective cohort study. | A 6-week progressive protocol with physical interventions and rectal stimulants being used prior to oral laxative therapy was used. | * Bowel management employing laxatives was significantly less in the intervention phase. * The effectiveness of glycerin suppository use was significantly higher * The need for manual stool extraction was significantly reduced. | Digit-anal stimulation or perianal stimulation; Manual stool extraction or Manual digital evacuation; Gastro-colic reflex or Bowel training after the main meals.  The use of laxatives is not essential as an adjunct to bowel management for newly injured patients. |
| Janssen *et al*.23, 2014, Netherlands. | To evaluate the effects of noninvasive abdominal massage using an electromechanical apparatus on bowel function in individuals with SCI and chronic bowel problems. | 21 patients with chronic intestinal problems (3 women, 18 men, time since injury 221 ± 146 months; ASIA A (N=8), ASIA B (N=2), ASIA C – D (N=11); 13 tetraplegic and 8 paraplegic participants. | Prospective evaluation. | Over a 10-week period, participants wore a massage device daily for 20 minutes. This self-administered therapy was incorporated into the everyday life situation 6 to 10 hours before the usual defecation time. Compliance, effects, side effects and user satisfaction were assessed using questionnaires. Participants were instructed to maintain the use of diet and medication during the treatment period. | * Positive changes regarding evacuation time, amount and consistency for some of the subjects. * None felt better or more confident after using the massage device. * Some individuals experienced adverse effects, predominantly pain or discomfort. | Massage with an electromechanical device.  The use of an electromechanical massage device does not improved bowel function in all individuals with SCI who have chronic bowel problems. In some individuals, the evacuation time was faster, but the majority of users did not notice changes. In addition, in some individuals, this device may even cause side effects such as pain and discomfort. |
| Korsten *et al*.21 2007, United States. | Assess intestinal colonic motility colonic motility before, during, and after digital rectal stimulation in subjects with SCI using solid state manometric techniques. | 6 participants with SCI(4 with paraplegia: complete SCI in 3; 2 with tetraplegia: complete SCI in 1). | Observational study. | Colonic motility was assessed using a manometric catheter (attached endoscopically to splenic flexion) at baseline, during digital-anal stimulation and after digital-anal stimulation. A synthetic stool with barium oat paste with stool consistency was introduced into the rectum and descending colon and was evaluated simultaneously using fluoroscopic techniques. | * There was an increase in left colonic motility | Digit-anal stimulation or perianal stimulation.  Digital rectal stimulation causes left-sided colonic activity in subjects with SCI. There were no problems or complications as a result of using this technique. |
| Ozisler *et al*.25 2015, Turkey. | Determine gastrointestinal problems associated with NBD in SCI patients and to assess the efficacy of bowel program on gastrointestinal problems and the severity of NBD. | 55 patients with SCI participants of arehabilitation program. | Quasi-experimental study. | A rehabilitation program was developed. Patients were divided into 2 groups according to the severity of your injury as a complete engine (ASIA A, B) and incomplete engine (ASIA C, D). Before and after the bowel program, gastrointestinal problems and bowel evacuation methods were determined. The NBD score was used to assess the severity of bowel dysfunction. All subjects used digital-anal stimulation as part of their usual bowel care. | * Common gastrointestinal problems: constipation and incontinence. * Digital rectal stimulation was the most used method. * Decreased use of oral medication, enema and manual evacuation. * Reduced constipation, abdominal distention, and abdominal pain rates. * Decreased NBD score. | Digit-anal stimulation or perianal stimulation; Manual stool extraction or Manual digital evacuation; Manual abdominal massage; Gastro-colic reflex or Bowel training after the main meals. Digit-anal stimulation or perianal stimulation.  Mean NBD score decreased after the bowel program. An effective bowel program lessens the severity of NBD and reduces gastrointestinal problems in SCI patients and improves socialization and quality of life. |
| Shafik *et al.*19 2000, Egypt. | To analyze whether defecation induced by digital-anal stimulation used in patients with NBD resulting from SCI is mediated by a reflex mechanism. | 18 health participants (10 men, 8 women, mean age 36,6 ± 9,7 years old) e 9 participants with SCI (6 men, 3 women, mean age 35,1 ± 11,2 years old). | Randomized controlled trial. | The anal canal was dilated by an inflated balloon in increments of 2 ml to 10 ml, and the rectal pressure response was recorded in the both groups. The test was repeated after blocking the external and internal anal sphincters and after individual anesthesia of the anal canal and rectum. | * Increased rectal pressure occurred with external, but not internal, sphincter paralysis. * There was no rectal pressure response to 2 and 4 ml anal dilatations in paraplegic patients, while 6, 8 and 10 ml distensions showed significant pressure increases. | Digit-anal stimulation or perianal stimulation.  Anal dilatation induces rectal contraction through stimulation of the internal sphincter mechanoreceptors, which seem to evoke the anorectal excitatory reflex. |
| Campoy *et al.*6, 2018, Brazil. | Produce and validate an educational video about bowel emptying maneuvers for training of individuals with neurogenic bowel in bowel rehabilitation process. | 6 patients with NBD. | Methodological study. | The study was developed in four stages: script/storyboard production, validation, educational video production and pilot study. It took place from January 2013 to July 2015. For validation, instruments were used, being carried out by a committee of experts, from December 2014 to February 2015. A value equal to or greater than 70% was considered for validation of agreement and relevance of the script and storyboard, using descriptive statistics for data analysis. | * The script and storyboard were validated by 94% of specialists in the subject. * 100% of specialists. After validation and video recording. * A pilot study was carried out with six individuals with neurogenic bowel, of which 100% evaluated the video positively. | Digit-anal stimulation or perianal stimulation; Manual stool extraction or Manual digital evacuation; Manual abdominal massage; Gastro-colic reflex or Bowel training after the main meals.  The educative video produced is a technological tool that can be used in virtual and face-to-face learning environments. It may contribute to nursing care focused on the rehabilitation of individuals with neurogenic bowel and their caregivers. |
| Yim *et al.*22 , 2001, Korea. | To compare standards of bowel care in patients with NBD resulting from SCI based on the type of neurogenic bowel. | 42 patients with SCI (22 with UMNB; 20 with LMNB). | Survey study. | Face-to-face interviews were conducted with subjects about the following bowel care problems: (1) defecation frequency; (2) frequency of stools Incontinence; (3) time needed to defecate; 4) number of oral medications used for bowel care; (5) subjective difficulty in bowel care in daily activities living using the visual analogue scale; (6) bowel treatment methods; and (7) use of dietary modification for bowel care. The time equired for bowel care was defined as the total time elapsed since the beginning of bowel treatment with suppository, digital anal stimulation, Valsalva maneuver, enema, or other methods to complete bowel care. | * The frequency of evacuation per day was higher in patients with LMNB. * The frequency of fecal incontinence per month was higher in patients with LMNB. * The time required to defecate per week (min) was higher in patients with LMNB. * The number of oral medications used for bowel care was higher in patients with LMNB. * There was no significant difference in subjective difficulty of bowel care on a visual analogue scale. * Patients with UMNB emptied their bowels about three times a week, whereas individuals with LMNB emptied their bowels about twice a day. | Digit-anal stimulation or perianal stimulation; Manual stool extraction or Manual digital evacuation.  Patients with lower motor neuron bowel tend to suffer more difficulties in management of their neurogenic bowel than those with upper motor neuron bowel. Therefore, more intensive and aggressive bowel care programs should be provided for spinal cord injury patients with LMNB. |
| Zhang *et al*.20 2018, China. | To study the effect of the quantitative assessment of bowel-based nursing intervention functional and quality of life in patients with NBD after spinal resulting from SCI. | 184 patients with NBD resulting from SCI. Groups: Intervention: 92; Control: 92.  113 men and 71 women between 35 and 70 years old; 73 cases of complete SCI, 58 lumbosacral injury, 40 cervical SCI and 13 thoracic SCI). | Randomized controlled trial. | Patients in the control group received regular nursing care and patients in the observation group received a quantitative assessment – based on nursing interventions. Recovery of bowel function, quality of life and satisfaction were compared between the two groups. | * Bowel function scores, bloating, constipation, prolonged defecation, drug dependence for defecation and fecal incontinence in the observation group were significantly lower than those in the control group. | Digit-anal stimulation or perianal stimulation; Manual extraction or Manual digital evacuation; Manual abdominal massage.  Quantitative assessment-based nursing intervention contributed to recovery of bowel function and improvement of life quality and satisfaction. |
| Liu *et al*.21, 2015, China. | To evaluate the effect of intestinal management applied to patients with NBD resulting from SCI in a hospital institution from 2011 to 2013 and, to compare with 32 individuals who received usual care between 2009 and 2010. | 82 patientes  Groups: Intervention – 50;  50 (36 men; 14 women with mean age 30 ± 10,2); 20 SCI cases incomplete; 30 not complete; 44 thoracic lumbosacral; 6 cervical.  Control: 32 (retrospective cases). | Randomized controlled trial. | Two weeks of bowel management training: performed daily or on alternate days at a fixed time. Initially, feces were eliminated by enema or oral laxatives 3 days before training. Step 1, dietary plan. Step 2, Orientation of lower abdomen massage clockwise for 20 minutes. Step 3, stimulation of the skin around the anus, with an interval of 2 minutes. Step 4, insertion of 40 ml of glycerin enema into rectal ampoule or deeper parts. Step 5, advise patients not to first evacuate with heavy pressure; and 10 minutes after administration, massaging and trying to evacuate; or perform manual evacuation. | * Standardized bowel training significantly reduced the bloating or abdominal pain. * Increased independent evacuation by patients themselves. * Reduced bowel incontinence. * Shortened time of evacuation. | Digit-anal stimulation or perianal stimulation; Manual stool extraction or Manual digital evacuation; Manual abdominal massage; Gastro-colic reflex or Bowel training after the main meals.  Standardization bowel management intervention benefits the patients with SCI to form regular bowel habit, thus improving the life living quantity. |
| Consortium for Spinal Cord Medicine [CSCM]19, 1998, United States. | Guidelines developed to improve bowel neurogenic management, thus promoting physical, functional and psychosocial quality of life in patients with NBD. | Not applicable. | Guideline. | Not applicable. | * Described the interventions in the form of guidelines for the treatment of neurogenic bowel from the resulting SCI. | Digit-anal stimulation or perianal stimulation; Manual stool extraction or Manual digital evacuation; Manual abdominal massage; Gastro-colic reflex or Bowel training after the main meals. |

Legend: NBD: neurogenic bowel dysfunction; SCI: spinal cord injury; NBP: neurogenic bowel program; ASIA: American Spinal Injury Association; UMNB: upper motor neuron injury; LMNB: lower motor neuron injury.