Research Article

A safe and effective multi–day colonoscopy bowel preparation for individuals with spinal cord injuries

Shawn H. Song [1,2], Jelena N. Svircev[1,2], Brandon J. Teng[3], Jason A. Dominitz[3,4], Stephen P. Burns[1,2]

[1]Spinal Cord Injury Service, Veterans Affairs Puget Sound Health Care System, Seattle, Washington, USA, [2]Department of Rehabilitation Medicine, University of Washington, Seattle, Washington, USA, [3]Department of Internal Medicine, University of Washington, Seattle, Washington, USA, [4]Division of Gastroenterology, Hospital and Specialty Medicine Service, Veterans Affairs Puget Sound Health Care System, Seattle, Washington, USA

Context/Objective: Colonoscopy with polypectomy is associated with a reduced risk of colorectal cancer (CRC), but poor bowel cleansing limits the diagnostic yield of the procedure. Patients with spinal cord injury (SCI) frequently have suboptimal bowel cleansing with standard pre-colonoscopy bowel preparation regimens. We aimed to assess the safety, tolerability, and efficacy of a multi–day inpatient bowel preparation regimen in a population of patients with SCI.

Design: Retrospective case series.

Setting: VA Puget Sound SCI Center.

Participants: All patients with SCI (n = 53) who underwent inpatient colonoscopy at the VA Puget Sound from July 12, 2013 to February 12, 2015.

Outcome Measures: Patient characteristics, tolerance of full bowel preparation, pre- and post-bowel preparation electrolyte values, adverse events, and adequacy of bowel cleansing were abstracted.

Results: Sixty-eight percent of patients had a cervical level of injury and the majority were either American Spinal Injury Association Impairment Scale A (41%) or D (43%). The full bowel preparation was tolerated by 91% of inpatients. In those with pre- and post-bowel preparation laboratory testing, there were small, but statistically significant decreases in serum calcium and phosphate. No patient had symptoms associated with electrolyte abnormalities or required treatment. Five out of 53 inpatients experienced autonomic dysreflexia (AD) during bowel preparation. Eighty-nine percent of patients had adequate bowel cleansing at colonoscopy.

Conclusions: We demonstrate a safe and effective inpatient bowel preparation regimen in a SCI population. The regimen was associated with mild, asymptomatic hypophosphatemia and hypocalcemia. AD was an uncommon event, predominantly occurring in patients who experienced frequent AD episodes at baseline.

Keywords: Autonomic dysreflexia, Colonoscopy, Spinal cord injuries

Introduction

The improved life expectancy of individuals with spinal cord injury (SCI)[1] has increased the focus on preventative care including colorectal cancer (CRC) screening. The rate of abnormal findings on colonoscopy in patients with SCI is at least equivalent to the general population,[2–5] and CRC is possibly more advanced upon presentation.[6] Despite this, patients with SCI receive fewer colonoscopies than the general population,[7,8] representing missed opportunities to reduce mortality, as colonoscopy with polypectomy is associated with a reduced risk of CRC.[9,10]

Colonoscopies present several unique challenges to individuals with SCI. The frequency of voluminous stools during the bowel preparation places high demands on the patient and/or caregivers due to frequent transfers and bowel care. Typically, there are frequent episodes of fecal incontinence as well as prolonged commode sitting, potentially increasing the risk for skin-related complications. Finally, the bloating, nausea, and abdominal discomfort associated with

Correspondence to: Shawn H. Song, 1660 South Columbian Way, Seattle, WA 98108, USA. Email: Shawn.Song@va.gov

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bowel preparation can trigger episodes of autonomic dysreflexia (AD) in this population.[11] Perhaps it is for these reasons that patients with SCI are less likely to receive screening colonoscopies compared to the general population, despite more frequent encounters with health care providers.[8]

In the patients with SCI that do undergo colonoscopy, achieving adequate bowel cleansing represents another obstacle. As a result of autonomic system dysfunction, many patients with SCI have neurogenic bowel with decreased colonic motility[12] and have suboptimal bowel cleansing with standard pre-colonoscopy bowel preparation regimens.[2,13,14] Poor bowel preparations limit the diagnostic yield of screening colonoscopy,[15–18] placing patients with SCI at increased risk of missed precancerous lesions. In addition, when the bowel preparation is inadequate, the procedure needs to be repeated at an earlier interval,[19] exposing the patient to additional risk, inconvenience and cost. It is clear that the standard pre-colonoscopy bowel preparation must be modified for the SCI population, but to date there have only been a handful of studies assessing the safety, tolerability, or efficacy of modified bowel preparations.[3,5,13,20]

In this study, we assess the safety, tolerability, and efficacy of a multi–day inpatient bowel preparation regimen in a population of patients with SCI.

Methods

Study design

We conducted a retrospective case series of all patients with SCI who underwent colonoscopy at the VA Puget Sound from 07/12/13 to 02/12/15. In 2013, the SCI service developed an electronic order set for colonoscopy bowel preparation. Although this bowel preparation had been used by the service for approximately seven years, the hospital committee that approves order sets requested lab testing be performed for a sufficient number of patients to assess for frequency and severity of electrolyte abnormalities. Preliminary data were thus collected as a quality assurance project. Subsequently, collection of additional data from the electronic medical record (EMR) for research purposes was approved by the institutional review board.

Participants

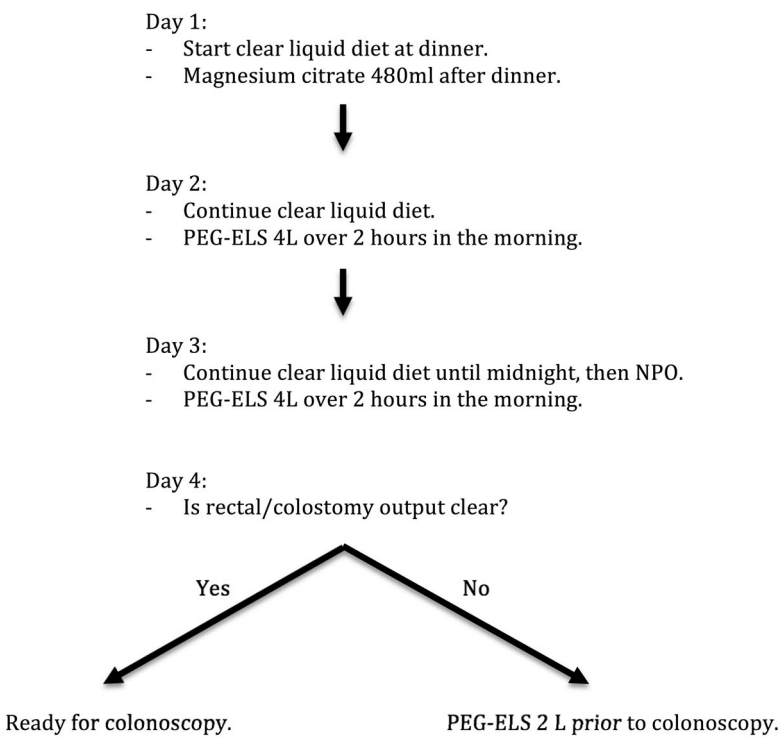
Patients who underwent colonoscopy during the study inclusion dates were identified using a combination of a locally maintained SCI patient registry, a database of colonoscopies performed by the gastroenterology service, and a search of EMR data for colonoscopy procedure codes. Demographic data including age, sex, duration of injury, level of injury (cervical, thoracic, or lumbar), American Spinal Injury Association Impairment Scale (AIS), presence of colostomy, and usual bowel care received at home (spontaneous vs. stimulated bowel movements; frequency of bowel care).

Bowel preparation

As per the clinical protocol for bowel preparation, patients receiving inpatient colonoscopies were placed on clear liquid diets beginning the evening 3 days prior to the colonoscopy and were made nothing per os (NPO) on the day of the procedure. One bottle (480 ml) of magnesium citrate was administered three days before the scheduled colonoscopy procedure. Four liters of polyethylene glycol-3350 and electrolyte colonic lavage solution (PEG-ELS) was administered orally over a two-hour period in the morning two days before the scheduled procedure. This was repeated one day before the procedure. On the morning of the procedure, an additional two liters of PEG-ELS was administered if rectal/colostomy output was not clear (Fig. 1). The portion of the full bowel preparation received was recorded in nursing notes. Routine bowel care continued during the preparation process. Additionally, inpatients had rectal digital stimulation performed by nursing staff as needed to facilitate complete evacuation following each bowel movement. A small proportion of studies were performed on an outpatient basis, with these patients being excluded from analysis due to lack of bowel preparation compliance and tolerability data.

Assessment for adverse effects

Serum chemistry testing (calcium, magnesium, phosphorous, sodium, potassium, chloride, bicarbonate, blood urea nitrogen (BUN), creatinine, and glucose) was performed for the majority of SCI inpatients receiving this bowel preparation during the study dates. Testing was obtained prior to receiving PEG-ELS and again after receiving 8–10 liters of PEG-ELS (or as many liters as the patient tolerated). Testing was omitted or performed incompletely for a proportion of patients due to providers not placing the correct orders for serum chemistry testing. Given the possibility of AD episodes in patients with a neurological level of T7 or rostral, we reviewed progress notes for presence of a templated note used for documentation of AD episodes. For patients that did have documented AD, we reviewed nursing progress notes to determine symptoms associated with the AD episode. In order to evaluate any association between the bowel preparation and skin



Abbreviations: PEG-ELS = polyethylene glycol-3350 and electrolyte colonic lavage solution; NPO = nothing per os.

Figure 1. Bowel preparation.

breakdown in the perianal region, we reviewed each patient's discharge summary for documentation of pressure injuries that occurred during the admission.

Colonoscopy

Colonoscopy was performed either by board certified gastroenterologists or by gastroenterology fellows under direct supervision of a gastroenterologist, who rated the adequacy of colonic cleansing based on either the Aronchick[21] or the Boston Bowel Preparation Scale[22] (Tables 1 and 2). For this study, patients were judged to have adequate bowel cleansing if they were graded "excellent" or "good" on the Aronchick scale OR if they had a Boston score of greater than or equal to 2 in all three bowel segments.[23]

Table 1 The Aronchick Scale.

Rating	Description
Excellent	Small volume of clear liquid or >95% of surface seen.
Good	Large volume of clear liquid covering 5–25% of the surface, but >90% of surface seen.
Fair	Some semi-solid stool that could be suctioned or washed away, but >90% of surface seen.
Poor	Semi-solid stool that could not be suctioned or washed away and <90% of surface seen.
Inadequate	Re-preparation needed.

Table 2 The Boston Bowel Preparation Scale.

Segment Score	Description
3	Entire mucosa of colon segment seen well with no residual staining, small fragments of stool or opaque liquid.
2	Minor amount of residual staining, small fragments of stool and/or opaque liquid, but mucosa of colon segment seen well.
1	Portion of mucosa of the colon segment seen, but other areas of the colon segment not well seen due to staining, residual stool and/or opaque liquid.
0	Unprepared colon segment with mucosa not seen due to solid stool that cannot be cleared.

Statistical analysis

Data are expressed as mean ± standard deviation. Paired *t*-test was used to compare lab values (Na, K, Cl, CO2, Cr, glucose, Mg, Ca, Phos) pre-bowel preparation to post-bowel preparation in the patients for whom these lab results were obtained. The Chi-squared test was used to compare statistical differences in full completion of bowel preparation, AIS classification, level of injury, and frequency of bowel care between patients with adequate and inadequate colon cleansing. All statistical analyses were performed with SPSS 19 for Windows (IBM Corp., Armonk, NY, USA). A P value of <0.05 was considered statistically significant.

Results

Patient characteristics

Fifty-six patients with SCI underwent colonoscopy during the 19-month study period, including 53 that were conducted as inpatient procedures. The three patients who underwent colonoscopy on an outpatient basis were excluded from all subsequent analyses as their compliance with and tolerance of the bowel preparation were unknown. Patient characteristics are shown in Table 3. All patients were male with a mean age of 64.1 ± 7.3 years. Sixty-eight percent of patients had a cervical level of injury, 30% had thoracic, and 2% had lumbar. The percentage of patients with AIS A, B, C, and D injuries were 41%, 7%, 9%, and 43%, respectively. The mean time since SCI was 20.0 ± 13.8 years. The majority of patients (66%) had stimulated bowel movements and performed bowel care at least on a daily basis (64%), while 7% had colostomies. The most common indications for colonoscopy included surveillance after prior adenomatous polyps (43%), CRC screening (23%), evaluation of suspected gastrointestinal bleeding (15%), and occult blood in stool (11%). Less common indications included screening prior to diverting colostomy (4%), surveillance of known inflammatory bowel disease (2%), and chronic abdominal bloating (2%).

Bowel preparation safety and efficacy

Among inpatients who were prescribed the full bowel preparation as described above (n = 53), receipt of the full bowel preparation was tolerated by 91% while the remaining patients refused due to abdominal bloating (n = 1) and nausea (n = 2). The reason for inability to tolerate the full bowel preparation was not documented for two patients. Forty-eight patients (91%) had both pre- and post-bowel preparation lab testing completed for some lab components, although magnesium, phosphate, and calcium testing were obtained somewhat less frequently (Table 4). In those with pre- and post-bowel preparation lab testing, there were four statistically significant lab changes: calcium decreased by 0.25 mg/dL (95% CI 0.11–0.40), phosphate decreased by 0.45 mg/dL (95% CI 0.24–0.66), BUN decreased by 7.46 mg/dL (95% CI 5.77–9.15), and creatinine

Table 3 Patient characteristics.

Age in years (SD)	64.1 (7.3)		
Male sex (n, %)	56 (100%)		
Years since injury (SD)	20.0 (13.8)		
AIS (n, %)	Cervical	Thoracic	Lumbar
A	12 (21%)	10 (18%)	1 (2%)
B	3 (5%)	1 (2%)	0 (0%)
C	1 (2%)	4 (7%)	0 (0%)
D	22 (39%)	2 (4%)	0 (0%)
Bowel care method (n, %)			
Stimulated*	37 (66%)		
Spontaneous	15 (27%)		
Colostomy	4 (7%)		
Bowel care frequency (n, %)			
At least daily	37 (66%)		
Every other day or less	15 (27%)		
Not applicable (colostomy)	4 (7%)		
Colonoscopy indication (n, %)			
Prior adenomatous polyps	23 (43%)		
CRC screening	12 (23%)		
Suspected GI bleed	8 (15%)		
Occult blood in stool	6 (11%)		
Other**	4 (8%)		

AIS, American Spinal Injury Association Impairment Scale; CRC, colorectal cancer; SD, standard deviation.
*Bowel movements with the aid of enemas, suppositories, digital stimulation, and/or manual evacuation.
** Screening colonoscopy prior to diverting colostomy (n = 2), surveillance of inflammatory bowel disease (n = 1), evaluation of chronic abdominal bloating (n = 1).

Table 4 Comparison of pre- to post-bowel preparation laboratory values.

Lab	n	Normal range	Pre-prep (SD)	Post-prep (SD)	Difference (SD)	95% Confidence Interval		P-Value
						Lower	Upper	
Na (mEq/L)	48	133–145	137.6 (4.1)	137.7 (3.5)	0.17 (3.6)	–0.9	1.2	0.75
K (mEq/L)	48	3.3–5.1	4.2 (0.4)	4.1 (0.5)	–0.12 (0.48)	–0.26	0.02	0.08
Cl (mEq/L)	48	96–108	99.8 (3.7)	99.6 (3.3)	–0.25 (3.3)	–1.2	0.72	0.61
CO2 (mEq/L)	48	22–29	26.5 (3.6)	27.3 (3.3)	–0.73 (2.9)	–0.12	1.6	0.09
BUN (mg/dL)	48	6–20	16.6 (9.6)	9.1 (6.3)	–7.5 (5.8)	–9.1	–5.8	***0.00***
Cr (mg/dL)	48	0.5–1.2	0.76 (0.3)	0.70 (0.2)	–0.05 (0.09)	–0.08	–0.03	***0.00***
BG (mg/dL)	48	70–105	117 (39)	121 (49)	3.9 (53.7)	–11.7	19.5	0.62
Ca (mg/dL)	36	8.4–10.2	9.3 (0.4)	9.0 (0.5)	–0.25 (0.43)	–0.40	–0.11	***0.00***
Mg (mg/dL)	41	1.6–2.5	2.0 (0.23)	2.0 (0.2)	–0.02 (0.21)	–0.09	0.05	0.56
PO4 (mg/dL)	41	2.7–4.5	3.5 (0.6)	3.0 (0.8)	–0.45 (0.66)	–0.66	–0.24	***0.00***

Na, sodium; K, potassium; Cl, chloride; CO2, bicarbonate; BUN, blood urea nitrogen; Cr, creatinine; BG, blood glucose; Ca, calcium; Mg, magnesium; PO4, phosphate; SD, standard deviation.

decreased by 0.05 mg/dL (95% CI 0.03–0.08). There were no significant changes in sodium, potassium, chloride, bicarbonate, glucose, or magnesium levels. Post-bowel preparation, there were two of 48 patients with hyperkalemia (range of 5.6–5.7 mEq/L), three of 36 patients with hypocalcemia (range of 7.3–8.2 mg/dL), and 13 of 41 patients with hypophosphatemia (range of 1.7–2.6 mg/dL). Additionally, one patient was found to have hypocalcemia (7.3 mg/dL) following bowel preparation but did not have pre-preparation labs checked. Of note, this patient has a history of chronic hypocalcemia with similar values during the year prior to this lab testing. No patient had symptoms associated with electrolyte abnormalities or required treatment. Five patients with tetraplegia (9% of study subjects, three with AIS A, one with AIS C, and one with AIS D), experienced a total of nine episodes of AD during the bowel preparation. Two patients experienced AD in the setting of nausea during consumption of PEG-ELS and there were no clear triggers in the remaining three patients. Among these five patients, four patients regularly experienced AD prior to and after the bowel preparation process. In the remaining patient, AD was triggered by nausea after he had inadvertently received improperly diluted PEG-ELS. All nine episodes of AD resolved with standard treatment. During the colonoscopy procedure itself, there were two patients who experienced AD, both of whom experienced AD during the bowel preparation. There was one occurrence of a new stage 2 sacral pressure injury in a patient with AIS B tetraplegia during the multi–day bowel preparation, thought to be secondary to recurrent fecal incontinence.

With regard to the efficacy of the bowel preparation, among inpatients who had been prescribed the full bowel preparation regimen (n = 53), 89% had adequate quality of bowel preparation at colonoscopy. Comparing those patients with adequate quality bowel preparations to those with inadequate quality bowel preparations, there were no statistically significant differences with regard to completing the full bowel preparation as described, AIS, level of injury, bowel care method (spontaneous versus stimulated), or frequency of bowel care (≥ daily versus ≤ every other day).

Discussion

In this study, we demonstrate that a multi–day, inpatient bowel preparation regimen is a tolerable, safe method of achieving a high percentage of adequate-quality bowel preparations in a population of patients with SCI with varied bowel programs.

Tolerability

Despite involving a large volume of PEG-ELS over multiple days, our bowel preparation regimen was well-tolerated with 91% of patients completing the full regimen. This completion rate compares favorably to published completion rates of standard volume (4L) PEG-ELS in able-bodied individuals (71% by Tan *et al*. in 2006, 56% by Kastenberg *et al*. in 2001).[24,25]

Safety

There are reports of renal impairment following administration of PEG-based bowel preparations: Hurst *et al*. found that 0.92% of 3,367 patients had acute kidney injury (defined as ≥ 50% increase in baseline serum creatinine) following a PEG-based bowel preparation.[26] Given the large amount of electrolyte lavage solution used in our protocol, pre- and post-bowel preparation labs were collected and compared. There were no cases of acute kidney injury in our SCI population—in fact, there was a statistically significant decreases in creatinine (0.05 mg/dL). We also noted a statistically

significant decrease in BUN (7.5 mg/dL), which was not unexpected given the dietary restrictions. In the five patients with hypocalcemia, the lowest calcium value was 7.3 mg/dL, which occurred in a patient with chronic hypocalcemia, and whose calcium was not checked prior to bowel preparation administration. All other patients with hypocalcemia had values for which treatment is not recommended in the absence of symptoms. None of the patients had documented symptoms of hypocalcemia (new paresthesias, carpopedal spasms, tetany, seizures) or required treatment. Of the 14 patients with hypophosphatemia, only one patient had a phosphate level that would warrant repletion at 1.7 mg/dL (repletion generally recommended at levels <2.0 mg/dL). None of the patients experienced symptoms of hypophosphatemia (worsening weakness, altered mental status). Previous studies have also shown electrolyte perturbations following oral sodium phosphosoda (OSPS) colonoscopy preparations. Ancha *et al*. found that two doses of OSPS 45 mL were associated with significant changes in serum phosphate (+2.0 mg/dL), calcium (–0.8 mg/dL), and potassium (–0.5mEq/L).[14] The changes in serum phosphate and calcium observed in our patient population were of smaller magnitude.

Based on the mild and asymptomatic electrolyte changes, we do not recommend routine lab testing for patients receiving this bowel preparation. Pre-bowel preparation testing can be considered for patients judged to be at risk for having significant abnormalities at baseline. Patients with pre-bowel preparation hypophosphatemia or hypocalcemia should have post-bowel preparation lab testing to monitor for worsening. Chronic antacid users are prone to hypophosphatemia due to phosphate binding by the antacids and should be considered for pre- and post-bowel preparation laboratory evaluation. In addition, post-bowel preparation labs should also be considered in patients with known renal disease, parathyroid dysfunction, congestive heart failure, and chronic alcoholism. The emergence of any clinical symptoms that could be secondary to hypocalcemia, hypophosphatemia, or hyperkalemia such as new paresthesias, carpopedal spasms, seizures, worsening weakness, altered mental status, or cardiac arrhythmias should be investigated with laboratory evaluation.

There were nine episodes of AD during bowel preparation, occurring in five patients (9%) with tetraplegia, three of whom were AIS A and two of whom were motor incomplete (AIS C and D). Four of the five patients regularly experienced AD at baseline with the remaining patient experiencing AD in the setting of nausea from inadvertent ingestion of improperly diluted PEG-ELS. Interestingly, only two of the five patients experienced AD during the colonoscopy procedure itself, which suggests that the use of moderate sedation during the procedure may mitigate the risk of AD. Though the study was not powered sufficiently to identify a definitive association between AD frequency and AIS, AD was an uncommon occurrence in our study population except in patients who experience regular episodes of AD at baseline. Patients who experience frequent AD at baseline are certainly at risk for AD episodes during pre–colonoscopy bowel preparation, regardless of AIS classification, and should be monitored for signs and symptoms of AD.

One concern with a multi-day bowel preparation involving a high volume of PEG-ELS is frequent fecal incontinence leading to skin maceration and possible pressure injuries, especially in patients with limited ability to transfer to a bedside commode or toilet. Our review of patient discharge summaries revealed one occurrence of a new sacral stage 2 pressure injury, thought to be secondary to frequent incontinence and exposure to stool. The patient died from respiratory failure secondary to chronic obstructive pulmonary disease within two months of his colonoscopy and we had no data regarding resolution of this wound. Though skin breakdown appears to be uncommon with our bowel preparation, frequent bowel care, turns, hygiene, and skin checks are necessary to ensure skin integrity. Nursing staff should be made aware of these increased care requirements when admitting a patient for a multi–day bowel preparation.

Efficacy

Eighty–nine percent of inpatients who were prescribed the high–dose bowel preparation regimen had adequate bowel cleansing at the time of colonoscopy, which is above the 85% benchmark recommended by the US Multi–society Task Force for Colorectal Cancer.[19] This is in stark contrast to published data on patients with SCI undergoing standard bowel preparations: Ancha *et al*. found that 73–100% of patients with SCI (n = 36) had unacceptable colonic cleansing regardless of whether they received 4L of polyethylene glycol electrolyte lavage solution, OSPS, or a combination of both.[14] The efficacy of our bowel preparation regimen also compared favorably to SCI–specific sodium phosphate bowel preparations: Morris *et al*. recently studied 148 patients with SCI who underwent a standardized bowel preparation of twice–daily administration of OSPS over 3.5 days and rectal sodium phosphate the evening and morning prior to the procedure.[5] The

authors found that 36% of these patients had unsatisfactory bowel preparations at time of colonoscopy. Another recently published study by Korsten *et al*. showed comparable efficacy (85% with acceptable Ottawa Score, n = 13) with MoviPrep (PEG–3350, sodium sulfate, sodium chloride, sodium ascorbate, and ascorbic acid) and neostigmine + glycopyrrolate.[20] However, these patients required close monitoring of blood pressure, heart rate, pulse oximetry, and airway resistance by impulse oscillimetry following neostigmine administration and reported significantly greater gastrointestinal discomfort compared to patients with SCI who received MoviPrep alone.

In order to explore potential factors associated with poor quality bowel preparations, we compared adequacy of bowel cleansing with respect to several variables including completion of the full bowel preparation, AIS classification, level of injury, bowel care method, and bowel care frequency. We found no statistical difference in adequacy of bowel cleansing when comparing patients with AIS A, B, C, or D SCI. Previous research has suggested that there are no differences in colonic motility between patients with tetraplegia versus paraplegia.[12] Consistent with this research, we found no significant difference in adequacy of bowel cleansing between patients with cervical versus thoracic/lumbar injuries. There was also no statistical difference in adequacy of bowel cleansing between individuals with spontaneous versus stimulated bowel movements, with the spontaneous bowel movement group and stimulated bowel movement group achieving adequate–quality bowel preparation rates of 93% and 86%, respectively. Finally, we compared adequacy of bowel cleansing between patients with ≥daily bowel care and ≤every other day bowel care, as higher stool burdens among patients with less frequent bowel care could represent a potential barrier to achieving adequate–quality bowel preparation. However, both groups of patients achieved similar rates of adequate–quality bowel preparations (86% in ≥daily bowel care group, 93% in ≤every other day bowel care group, P value 0.48).

There are several limitations to our study. Given the small number of patients (n = 6) who had inadequate quality bowel preparation, we had limited statistical power to identify factors associated with poor quality bowel preparations. As the study was conducted in a VA setting that predominately treats males, no females received colonoscopies during the study period. The results of our study should be applied with caution to patients with acute SCI, as only three of the included patients had injury durations of less than a year. The above results were obtained in an inpatient setting, which likely enhances compliance and minimizes complications, such as skin breakdown, given close supervision by medical providers. Although we are not alone in offering inpatient pre-colonoscopy bowel preparation for patients with SCI with neurogenic bowel,[2,13] we recognize that inpatient admission for pre-colonoscopy bowel preparations are not available to all patients with SCI. Of note, three patients with SCI underwent colonoscopy on an outpatient basis during the study period, all of whom had AIS D tetraplegia with spontaneous bowel movements. Despite receiving a standard bowel preparation (4L of PEG-ELS the day prior to colonoscopy), all three of these patients were judged to have adequate–quality bowel cleansing. Further study is needed to determine if patients with AIS D and spontaneous bowel movements could achieve similar rates of adequate–quality bowel cleansing with a standard outpatient bowel preparation compared to SCI-specific, inpatient bowel preparation. Finally, though complications such as AD and skin breakdown are routinely documented in the EMR, it is possible that incidents of AD, skin breakdown, or relevant clinical symptoms occurred but were not documented in the EMR.

Conclusion

Our study demonstrates a safe, well-tolerated, and effective inpatient bowel preparation regimen in a SCI population. Though the regimen was associated with mild hypophosphatemia and infrequent hypocalcemia, this was not associated with symptoms or adverse events and it did not require treatment. AD was an uncommon event, predominantly occurring in patients who experienced frequent AD episodes at baseline. In addition, new skin breakdown was also rare, occurring in only one patient. The bowel preparation regimen appears to be effective across AIS classification, level of injury, bowel care method, and bowel care frequency. This regimen represents an important tool in improving colorectal cancer screening in the SCI population.

Disclaimer statements

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ORCID

Shawn H. Song http://orcid.org/0000-0002-2894-7111

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