



BC Cancer Agency

CARE + RESEARCH

An agency of the Provincial Health Services Authority

Colonoscopy Education Day

Update on Bowel preparation

October 25, 2017

Objectives

- Review patient factors
- Review evidence on
 - Diet, regime, choice of laxative
 - Adverse events
- Screen for poor bowel preparation group
- Updated CSP Bowel Preparation Algorithm

Financial Interest Disclosure

No affiliation (financial or otherwise) with a commercial organization.

Conflict of interest

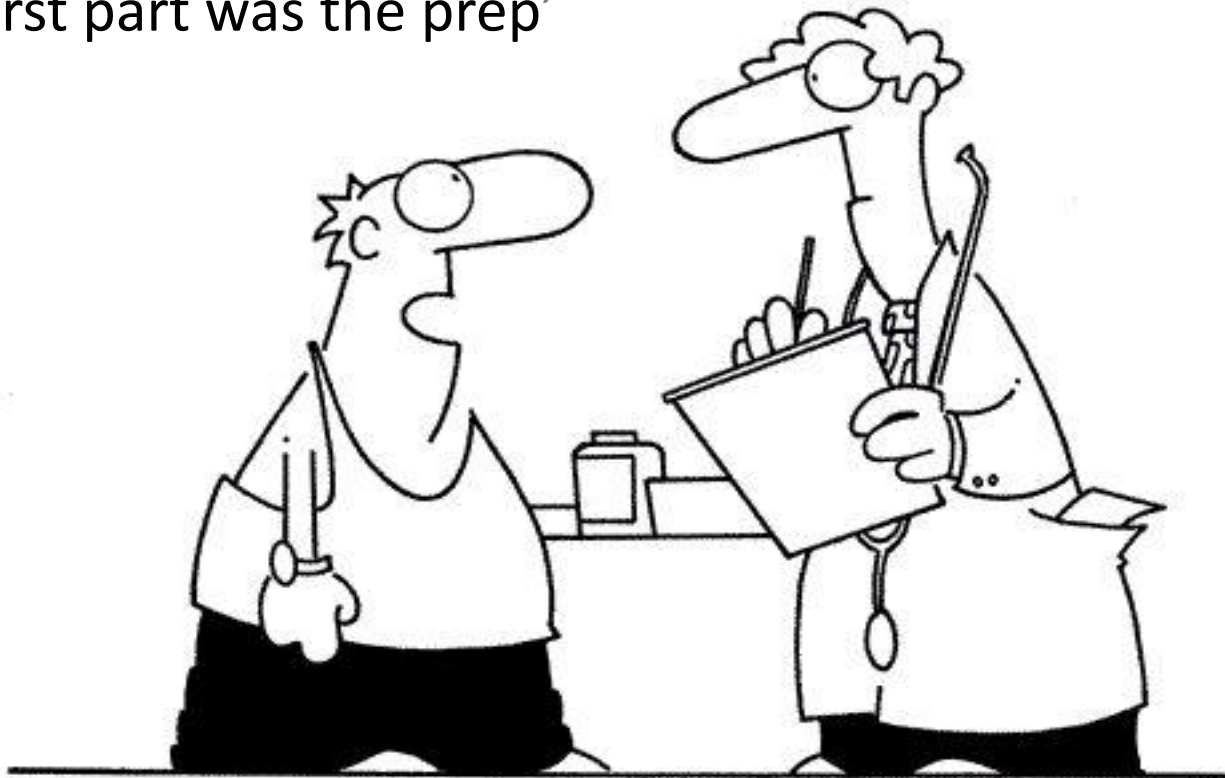
No real or apparent conflict of interest related to the content of the presentation

Ideal bowel preparation

- Quality - Excellent
- No change on colonic mucosa
- Tolerable
- Safe
- Cheap

Patient feedback

‘The worst part was the prep’



Patient feedback

- Difficulty with preparation
 - Palatability
 - Volume
- Diet change
- Duration of preparation time
- Social and financial support
- Distance to procedure unit

Low residue vs Liquid Diet

- Meta-analysis of 9 studies (diet 1 day prior)
 - Tolerability and willingness to repeat

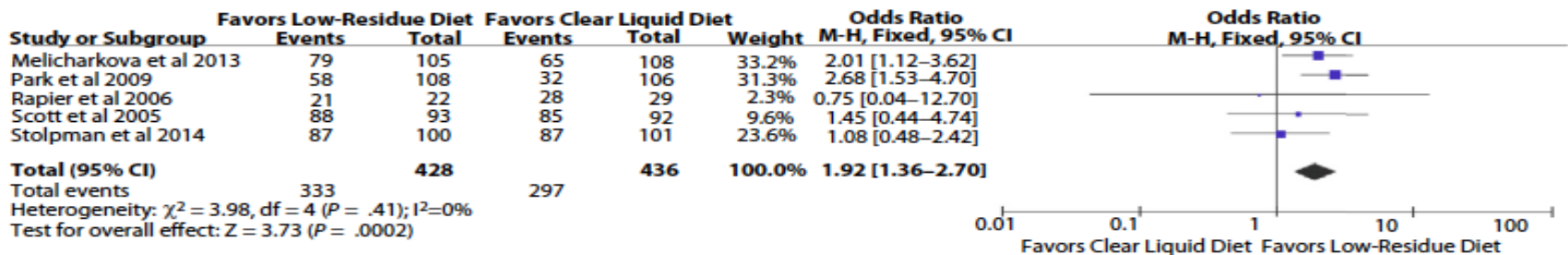


Figure 3. Forest plot comparing patient reported tolerability of bowel preparation and diet while on a low-residue diet compared with a clear liquid diet the day before colonoscopy. *CI*, confidence interval; *M-H*, Mantel-Haenszel.

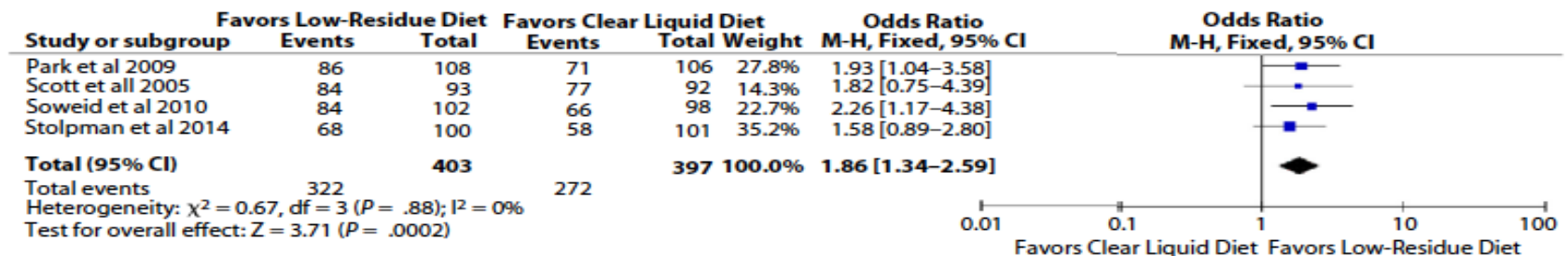


Figure 4. Forest plot comparing patient willingness to repeat bowel preparation and diet while on a low-residue diet compared with a clear liquid diet the day before colonoscopy. *CI*, confidence interval; *M-H*, Mantel-Haenszel.

Low residue vs Liquid Diet

– Adequate bowel prep, adverse event rate

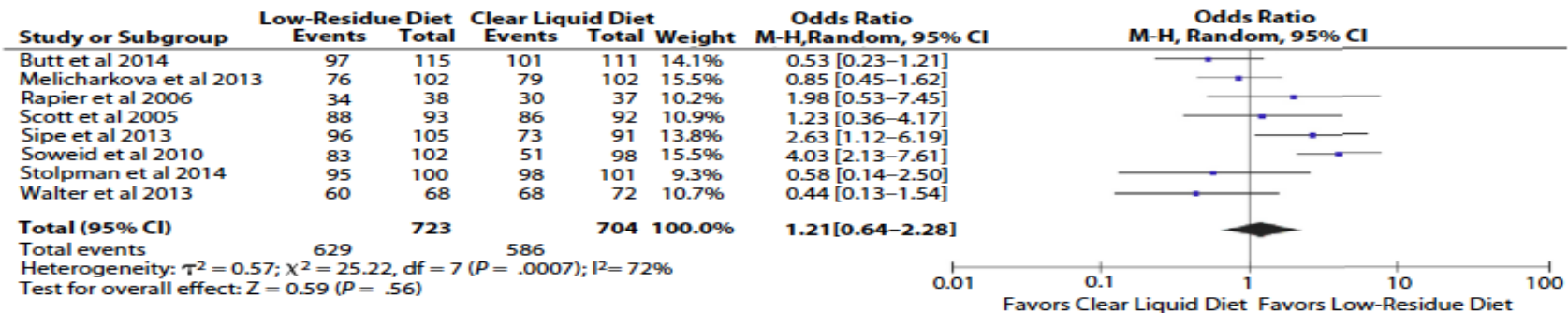


Figure 2. Forest plot comparing the frequency of adequate bowel preparations while on a low-residue diet compared with a clear liquid diet the day before colonoscopy. *CI*, confidence interval; *M-H*, Mantel-Haenszel.

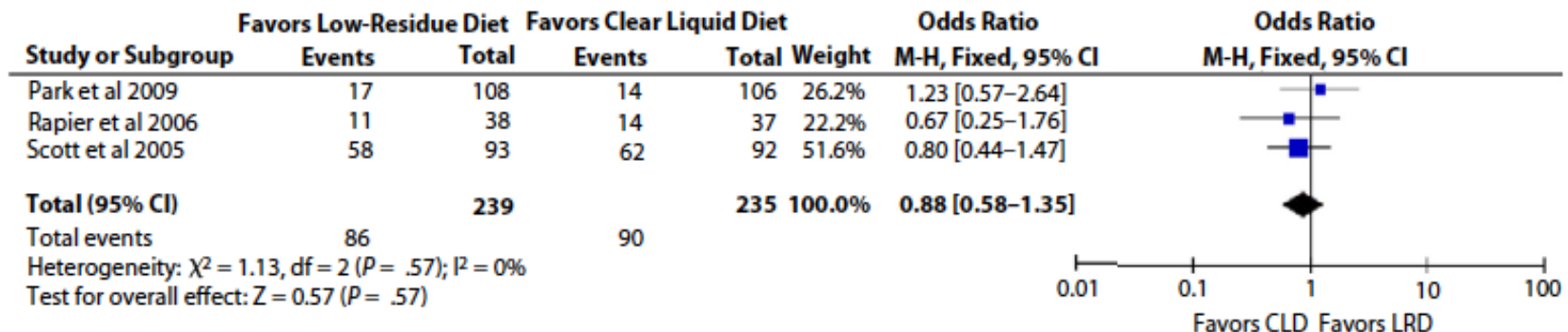


Figure 5. Forest plot comparing patient adverse effects of bowel preparation and diet while on a low-residue diet compared with a clear liquid diet the day before colonoscopy. *CI*, confidence interval; *M-H*, Mantel-Haenszel.

Regime: split dose vs day before preparation

- Meta-analysis 47 studies - Quality of bowel prep

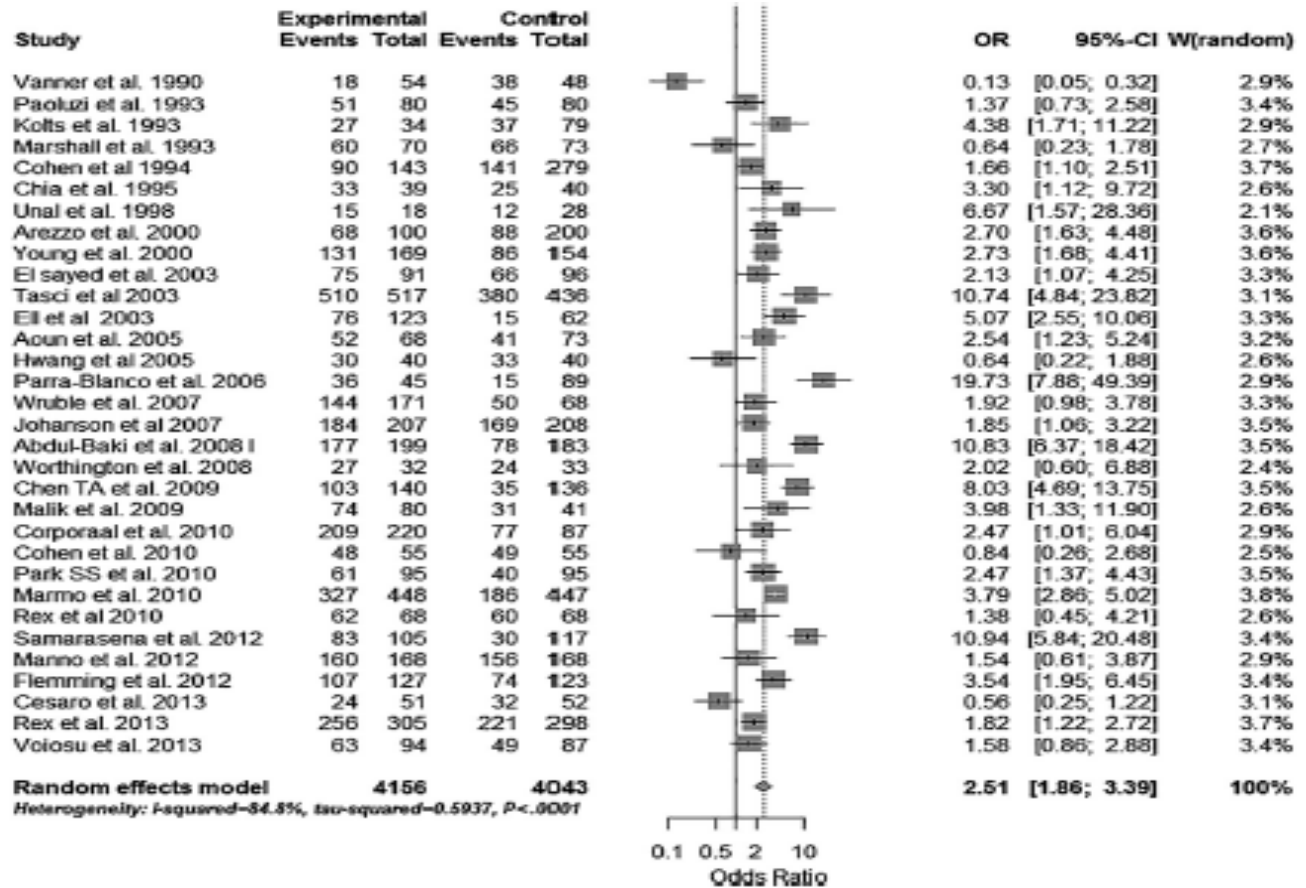


Figure 3. Forest plot. Bowel cleanliness for split-dose of any regimen vs day-before.

Martel et al Gastroenterol 2015 149 79-88

Regime: split dose vs day before preparation

- Meta-analysis 47 studies - Quality of bowel prep

Table 3. Outcomes for Split-Dose of any Product vs Day-Before of any Product

Outcome	Number of trials ^a (number of included patients)	OR (95% CI); heterogeneity (P value, I ²)	Conclusion
Primary outcome: bowel cleanliness (excellent/good)	32 (8199)	2.51 (1.86–3.39); P < .01, 84.8%	Split-dose regimens yield the highest quality of colon cleansing across all types of colonic preparations
Secondary outcome: willingness-to-repeat	14 (4377)	1.90 (1.05–3.46); P < .01, 92.8%	Willingness-to-repeat is enhanced by the use of split-dose vs day-before regimens of any product
Secondary outcome: polyp detection rate	2 (159)	0.93 (0.41–2.13); P < .52, 0.0%	More trials are required to conclude on procedural outcomes
Secondary outcome: adenoma detection rate	2 (213)	1.52 (0.69–3.32); P < .19, 42.2%	
Secondary outcome: side effects and resumption of daily activities	0 to 24 (6434)	See Appendix 2	More uniform definitions across studies are required to conclude on side effects and resumption of daily activities

CI, confidence interval.

^aTrials with analyzable data.

Regime: Same day vs split dose preparation

Table 3. Measures of prep quality (N=115)

	PM/AM (N=54)	AM-only (N=61 ^a)	P (non- inferiority)
<i>Prep quality: whole colon, n (%)</i>			
Adequate (excellent/good)	51 (94)	56 (92)	0.013
Inadequate (fair/poor)	3 (6)	5 (8)	
<i>Prep quality: whole colon, n (%)</i>			
Excellent	23 (43)	25 (41)	0.003
Good	28 (52)	31 (51)	
Fair	3 (6)	1 (2)	
Poor	0	4 (7)	
<i>Prep quality: right colon,^b n (%)</i>			
Adequate (excellent/good)	49 (92)	56 (93)	0.003
Inadequate (fair/poor)	4 (8)	4 (7)	
<i>Prep quality: right colon,^a n (%)</i>			
Excellent	17 (32)	29 (48)	0.001
Good	32 (60)	27 (45)	
Fair	3 (6)	3 (5)	
Poor	1 (2)	1 (2)	
<i>Flush needed, n (%)</i>			
None	26 (48)	35 (57)	0.001
Any	28 (52)	26 (43)	
<i>Flush needed, n (%)</i>			
None	26 (48)	35 (57)	0.001
< 50 ml	14 (26)	13 (21)	
50–100 ml	4 (7)	8 (13)	
> 100 ml	10 (19)	5 (8)	

^aPrep quality not assessed for a single patient who did not undergo colonoscopy.
^bData not available for two patients (one in each group).

- Randomised prospective single centre study
- 2L PEG-ELS, split dose vs same day for PM procedure
- Quality of bowel prep equivalent
- Less interference with sleep and work activity

Matro et al Am J Gastroenterol 2010 105
1954-1961

Safety: timing of last dose prior to procedure

- Prospective observational study, gastric residual volumes in inpatients after split dose and previous evening prep - last dose 2-3 hours prior to procedure

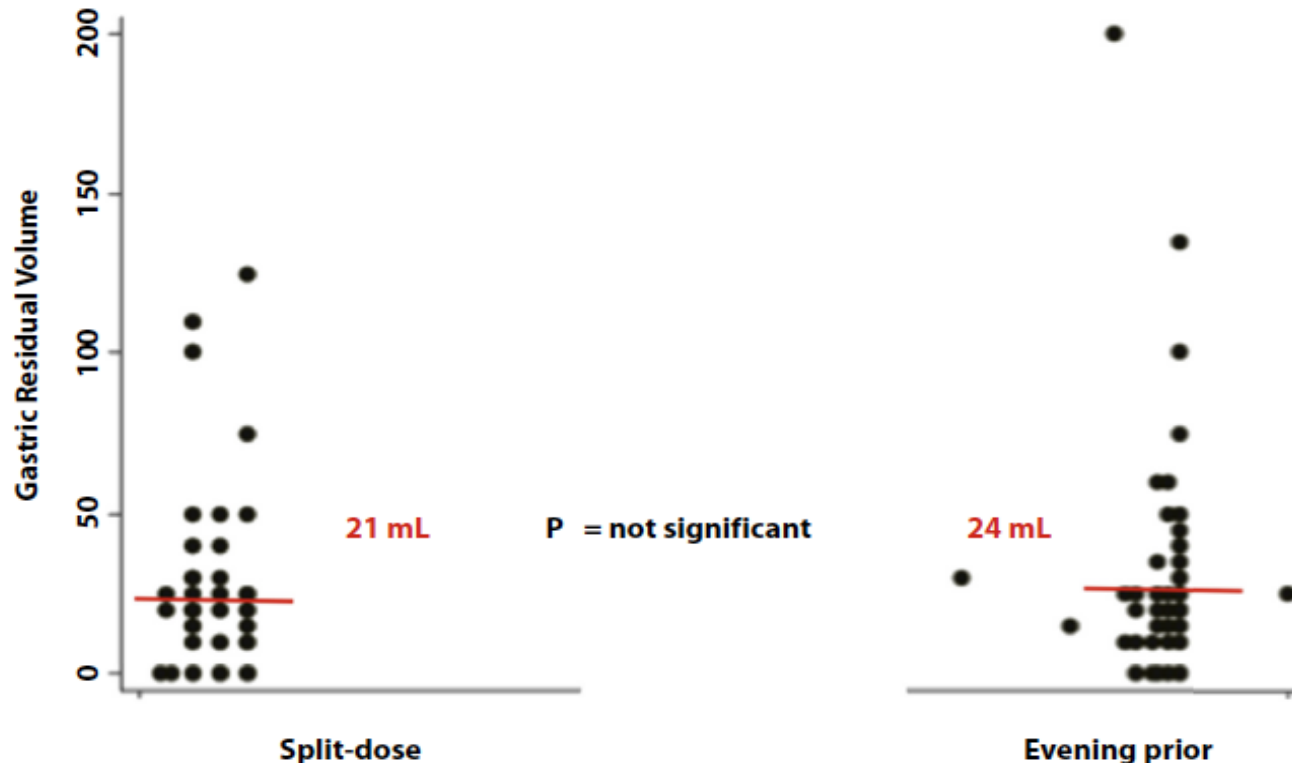


Figure 1. Gastric residual volume in patients receiving split-dose bowel preparations and those receiving bowel preparations the evening before. The horizontal lines indicate the mean gastric residual volume.

Choice of agent

Osmotic	Iso				Hypo	Hyper		
Generic name	PEG-ELS	SF-PEG-ELS	PEG-ELS-AA	PEG-ELS	PEG-3350-SD	NaSO ₄	NaSO ₄ -PEG-ELS	NaPS-Mg-Citrate
Trade name	Golytely Colyte Peglyte Kleanprep	Nulytely Trilyte	Moviprep	Bipeglyte minus Bisacodyl	Miralax	Suprep	Suclear	Picoflo Picosalax Purg-Odan
Volume	4L	4L	2L (+1L)	2L (+1L)	2L+2L SD	2.5L	2L+1.25L	2L
Volume status	Neutral				Fluid retention	Fluid depletion		
Avoid Caution			G6PD		Cardiac, renal, hepatic disease Pediatric, Elderly			Cardiac, renal, hepatic disease, Pediatric, Elderly
Cost	\$35	\$23-37	\$54	\$32	\$14			\$16-35

PEG-ELS - PEG electrolyte solution, SF–Sulphate free, AA-Ascorbic Acid, SD-Sports drink, NaPS-Na Picosulphate, G6PD-G6PD Deficiency, Bisac-Biscodyl

Adjunct agent

- Bisacodyl
 - +2L PEG-ELS achieves = 4L PEG-ELS
 - Reports of ischemic colitis with doses ≥ 10 mg

Table 3 Cases of bisacodyl-induced colonic ischaemia (CI)

Age	Sex	PMH	Symptoms	Colonoscopy findings	Pathology	Treatment	Outcome
33	F	Depression	Abdominal pain, diarrhoea, haematochezia	Oedema, patchy ulceration, descending and sigmoid colon	Compatible with CI	Intravenous fluids, antibiotics	Resolved ⁵
19	M	Constipation, anal fissure	Abdominal pain, fever, diarrhoea, haematochezia	Patchy haemorrhage and inflammation at the splenic flexure	Compatible with CI	Intravenous fluids, antibiotics	Resolved ⁵
68	M	Colon polyps	Abdominal pain, haematochezia	Oedema and segmental colitis at the splenic flexure	Compatible with CI	Intravenous fluids antibiotics	Had recurrence of CI 2 years later associated with bisacodyl. No CI during traditional prep on most recent scope ⁶
54	F	Total hip replacement, on HRT	Abdominal pain, diarrhoea, haematochezia	Descending colitis	Compatible with CI	Intravenous fluids, pain medicines, antibiotics	Resolved with 1 month follow-up scope normal

Ajani et al BMJ Case Rep 2012 25 12 2011 5451

PEG Adverse events

- Inability to tolerate in 5-15%
- Minor
 - Palatability
 - Volume – bloating, colic
- Major
 - Vomiting (M-W/Boerhaave's, Aspiration)
 - Electrolyte disturbance
 - Allergy
 - Other - Pancreatitis, colitis (ischemic)

PEG - Adverse events

- FDA Reports and Published Case Reports 1950-2007
- 27 cases
 - Vomiting: 9 M-W Tear, 1 Boerhaave's Syndrome, 5 Aspiration pneumonia
 - Electrolyte disturbance: 5 SIADH, 2 Pulmonary/peripheral edema
 - Allergy 3
 - Other
 - 1 Perforated Diverticular Disease
 - 1 Pancreatitis

Belsey et al Aliment Pharmacol Ther 2008 29 15-28

Table 1 | Reported cases of severe symptomatic hyponatremia following bowel cleansing with large volumes of polyethylene glycol (PEG)

Authors Year	Patient(s) characteristics	Prescription drugs	Type of preparation	Clinical presentation	Therapy	Outcome
Schröppel et al. 2001 [†]	Female, 59 years old Hysterectomy Oophorectomy	Estradiol Aspirin	3 L PEG-ELS together with 4 L light tea	Confusion Slurred speech Unsteady gait	Normal saline	Complete neurological recovery
Ayus et al. 2003 [‡]	Male, 51 years old Diabetes, EKD	Amlodipine Atenolol Furosemide Calcium acetate Omeprazole	4 L PEG-ELS	Vomiting Ictioventricular rhythm Cardiac arrest	None	Death
	Female, 62 years old Hypertension Hyperlipidemia	Thiazide diuretic	4 L PEG-ELS	Seizures	Hypertonic (3%) saline	Complete neurological recovery
Hsu et al. 2005 [‡]	Female, 54 years old	NA	4.5 L PEG†	Bizarre behaviour	Hypertonic (3%) saline	Complete neurological recovery
Nagler et al. 2006 [‡]	Female, 73 years old Hypothyroidism Depression	Levothyroxine Citalopram	64 ounces Gatorade™ (PepsiCo, New York, USA) mixed with 255 g of PEG 3350	Tangential mentation Seizures	Hypertonic (2%) saline, followed by NaCl tablets and fluid restriction	Correction of hyponatremia and regain of normal mental status
Lewis et al. 2011 ^{†*}	Female >70 years old	Diuretics	64 ounces Gatorade™ (PepsiCo) mixed with 238 g of PEG 3350	Supraventricular tachycardia	Correction of serum sodium	Complete recovery
	Male, 73 years old		64 ounces Gatorade™ (PepsiCo) mixed with 238 g of PEG 3350	Syncope Seizures	Correction of serum sodium	Complete neurological recovery
Baag et al. 2013 [‡]	Female, 65 years old Hypertension Osteoporosis Stenosis of internal carotid artery	Amlodipine Ibandronic acid Clopidogrel	4 L PEG† and 3 L of clear water	Seizures	Hypertonic (3%) saline	Correction of hyponatremia and complete neurological recovery
	Female, 70 years old Breast cancer Thyroidectomy	¹³¹ Iodine therapy Levothyroxine	4 L PEG†	Seizures	Normal saline	Correction of hyponatremia and complete neurological recovery

EKD, end-stage kidney disease.

* Data (abstract form) from FDA Adverse Event Reporting System.

† Whether the PEG solution contained a balanced electrolyte mixture was not specified.

- PEG - SIADH
- Editorial - 9 cases from 5 countries over 12 years of severe hyponatraemia
- Author's reply - In US alone 150 million colonoscopies performed

Scarpagnito Aliment Pharmacol Ther
2014 40 1110-1118

Adverse events

- Health Canada Adverse Reaction Database 1/1/2002-31/3/2017
- None – Miralax (PEG3350-SD), Suprep (NaSO₄), Suclear (NaSO₄-PEG-ELS) Picoflo (NaPS-MgCit), Moviprep (PEG-ELS-AA), Kleanprep (PEG-ELS)
- (2002 - 523,000 colonoscopies in Canada) - 2002-2017 - >7.8 million Canada

	Peglyte PEG-ELS	Colyte PEG-ELS	Golytely PEG-ELS	Bipeglyte PEG-ELS	Purg-Odan NaPS-MgCit	Pico-Salax NaPS-MgCit
Total	17	32	11	25	10	151
Allergy	3	3	2			8
ED	1 Confusion 1 VT	3 Seizure 1 Confusion 1 Ascites	1 SIADH 1 Seizure	2 Seizure 2 LOC 1 Edema	1 LOC 1 HypoNa 1 Fluid depletion	21 Seizure 11 AKI 4 RD 13 HypoNa 9 Confusion
Vomiting		3	3	3	3	15
Other	2 Anemia			2 IC		3 IC 5 Ileal ulcer

ED-Electrolyte disturbance, VT-Ventricular tachycardia, LOC-Loss of consciousness,
 HypoNa-Hyponatremia, RD-Rhythm disturbance, AKI-Acute Kidney injury,
 IC-Ischemic colitis (Hilsden et al C J Gas 2007 21(12) 843-46)

www.screeningbc.ca

Society recommendations: bowel preparation

	Individualise choice	Patient Education	Diet	Split dose	Same day	PEG-ELS	Last dose	Adjunct laxative	Cautions
ESGE 2013	✓	✓	LR	✓	✓	✓	4 hr	✗	MgCit – RF, NRRU NaP – RF, NRRU
AGA 2014	✓	✓	L or LR	✓	✓	✓ 4L or 2L in healthy non-constipated	2-4 hr	✗	MgCit – RF NaP - Pediatric, Elderly, IBD
ASGE 2015	✓	✓	LR	✓	✓	✓	3-8 hr	✗	NaPS+MgCit - RF MgCit – RF, NRRU NaP – RF, NRRU PEG-ELS-AA – G6PD

L-Liquid, LR-Low residue, MgCit-Mg Citrate, NaP-Na Phosphate, RF-Renal failure

NRRU-Not recommended for routine use, AA-Ascorbic Acid, G6PD-G6PD Deficiency

Bowel Prep Quality

	2015 Bowel Prep Quality %			
Health Authority	Excellent	Good	Fair	Poor
IHA	22.95	57.87	15.77	3.41
FHA	8.35	70.12	19.11	2.42
VCH	35.41	51.26	9.64	3.69
VIHA	28.17	61.61	8.73	1.48
NHA	NO DATA AVAILABLE			
BC Averages*	21.71	61.47	14.18	2.64

*Excludes NHA

Poor preparation groups

- Education, counsel
 - Barriers – language, literacy, understanding, motivation
- Use high volume regime
 - Previous poor preparation
 - Diverticular disease, constipation
 - Severe obesity
 - Surgery – colonic, multiple
 - Drugs – opiates, TCAs, sedatives
 - Neurological – CVA, Parkinson's, Dementia, mobility
- Hydrate
 - Inpatients



Colon Screening Program

Bowel Preparation Algorithm

Bowel Preparation

High Volume (4L PEG)

Consider for:

- Constipation
- Previous poor preparation
- Narcotic use
- Poor mobility
- Morbid obesity

Examples:

- CoLyte
- GoLYTELY
- PegLyte

Low Volume (2L PEG)

Examples:

- Bi-PegLyte (do not take Bisacodyl)
- MoviPrep

Low Volume (Hyperosmolar)

Examples:

- PicoFlo
- PicoSalax
- Purg-Odan

Split-dose regimens are preferred.

PEG-based regimens are the preferred preparation for:

- Age > 65 years
- Diuretic use
- Renal insufficiency (GFR < 60)
- Diabetes
- Congestive heart disease
- Liver cirrhosis or ascites

Adjuncts (bisacodyl, magnesium citrate, enemas) are not recommended for standard bowel preparations.

Non-standard preparation strategies may be recommended by the colonoscopist following a poor preparation.

References:

Optimizing adequacy of bowel cleansing for colonoscopy: recommendations from the US Multi-Society Task Force on Colorectal Cancer. *Gastrointestinal Endoscopy* 2014;80:543-562.

