

Saturday, November 4, 2017
7:30 - 14:00
Breakfast & Lunch Provided**

The Ballantyne Hotel
10000 Ballantyne Commons Parkway
Charlotte, NC 28227



Providence Anesthesiology Associates

2017 Annual Update - *Enhanced Recovery After Surgery - ERAS*

7:30-8:00

Registration / Breakfast

8:00-8:05

Welcome and Announcements

Rick Griggs, MD

Chief, Clinical Practice Committee - PAA

Session 1: ERAS - Principals and Goals

Moderator: Joe Ducey, MD

VP of Business Development, Past President - PAA

8:05-8:45 - ERAS: Past, Present, Future

Julie Thacker, MD

Medical Director, Clinical Research Unit

Associate Professor of Surgery

Duke University School of Medicine

8:45-9:00 - ERAS Protocols at Novant Health: The Path to
Current Protocols, Future Endeavors

Jay Duggins, MD

Chairman, Anesthesiology - SPR

9:00-9:15 - Discussion

9:15-9:30 - Morning Break

Session 2: ERAS Pathways

Moderator: Ian Hasinoff, MD

Anesthesiologist - PAA

9:30-9:50 - ERAS Multimodal Pathways

Rick Griggs, MD

9:50-10:05 - ERAS PONV Pathways: Drug Shortages
and New Successes

Ren Weidman, MD

Anesthesiologist, PAA

10:05-10:25 - ERAS Regional Analgesic Modalities

PJ Fronapfel, MD

Medical Director, Presurgical Services

Chief, Pediatric Anesthesia - PAA

10:25-10:45 - ERAS Goal-Directed Fluid Therapy

Kevin Crosby, MD

Assistant VP, Scheduling - PAA

10:45-11:00 - Colorectal ERAS - Postoperative Floor
Management at PMC

Lillian Stiglitz, RN, BSN, CMSRN

Nurse Manager, 5A Surgical Unit - NHPMC

11:00-11:15 - ERAS - Diet and Nutritional Impact

Elaine Murray, RD, LDN, CNSC

Clinical Dietitian - NHPMC

11:15-11:30 - Discussion

11:30-12:30 - Lunch Break

Session 3: The Triple AIM of ERAS

Moderator: Christopher Gunn, MD

VP of Clinical Operations - PAA

12:10-12:50 - The Economics of ERAS - Can you
afford not to do it?

Thomas Hopkins, MD

Director, Quality Improvement

Assistant Professor of Anesthesiology

Duke University School of Medicine

12:50-13:10 - Colorectal & Bariatric ERAS at PMC -
Comparisons to Historic Controls

Vicki Morton, DNP, MSN, ANP

Clinical Practice and Quality Coordinator - PAA

13:10-13:40 - Surgical Perspectives at NH - From Office
Visit to Hospital Discharge - Lessons Learned

Rob Stevens, MD

David Voellinger, MD

NH Charlotte Colorectal Surgery NH Bariatric Surgery Charlotte

13:40-13:55 - Discussion

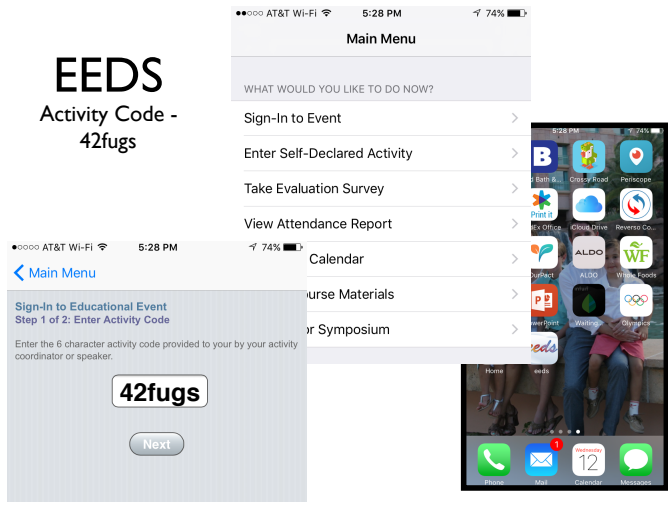
13:55-14:00 - Final Remarks

Jim Benonis, MD

President, PAA

EEDS

Activity Code -
42fugs



Drugs	Dose	Evidence	Timing	Evidence
Aprepitant	40 mg per os	A2 ^{113,115}	At induction	A2 ¹¹³
Gastric acid	150 mg per os	A3 ^{117,118}	At induction	A1 ¹²⁸
Dexamethasone	4-5 mg IV	A1 ¹²¹	At induction	A1 ¹²⁸
Unerhydrated	1 mg/kg IV	A1 ¹⁵²⁻¹⁵⁴	End of surgery; timing may not affect efficacy	A2 ⁸⁵
Dolasetron	12.5 mg IV	A2 ^{84,85}	End of surgery	A1 ¹⁴⁰
Droperidol*	0.625-1.25 mg IV	A1 ^{136,139}	End of surgery	A1 ¹³⁹⁻¹⁴⁰
Ephedrine	0.5 mg/kg IM	A2 ^{223,224}	End of surgery	A1 ¹³⁹⁻¹⁴⁰
Granisetron	0.35-3 mg IV	A1 ⁹¹⁻⁹³	End of surgery	A1 ¹³⁹⁻¹⁴⁰
Haloperidol	0.5-2 mg IM/IV	A1 ¹⁴⁶	End of surgery	A1 ¹³⁹⁻¹⁴⁰
Methylnaloxonium	40 mg IV	A2 ¹³⁷	End of surgery	A1 ¹³⁷
Ondansetron	4 mg IV, 8 mg ODT	A1 ^{174,175}	At induction	A2 ^{158,159}
Pantoprazole	0.075 mg IV	A2 ^{176,178}	At induction	A2 ^{158,159}
Perphenazine	5 mg IV	A1 ¹⁶²	End of surgery	A2 ¹⁶²
Promethazine	6.25-12.5 mg IV	A2 ^{222,286}	End of surgery	A2 ¹⁶²
Ramoxetone	0.3 mg IV	A2 ¹⁶²	End of surgery	A2 ¹⁶²
Rolapitant	70-200 mg per os	A3 ¹¹⁹	End of surgery	A1 ¹⁵⁷
Scopolamine	Transdermal patch	A1 ^{152,158}	Prior evening or 2 h before surgery	A1 ¹⁵⁷
Tropisetron	2 mg IV	A1 ⁹⁷	End of surgery	Expert opinion

These recommendations are evidence-based, and not all the drugs have an FDA indication for PONV. Drugs are listed alphabetically.
*See FDA black box warning.

Common side effects of Zofran Vial:

Chills
Constipation
Diarrhea
Fever
Head Pain

Less common

- Abdominal or stomach pain or cramps
- burning, tingling, or prickling sensations
- drowsiness
- dryness of the mouth
- feeling cold
- itching
- unusual tiredness or weakness



"The immediate challenge to improving the quality of surgical care is not discovering new knowledge, but rather how to integrate what we already know into practice."



Guidelines on the Management of Postoperative Pain
Management of Postoperative Pain: A Clinical Practice Guideline From the American Pain Society, the American Society of Regional Anesthesia and Pain Medicine, and the American Society of Anesthesiologists' Committee on Regional Anesthesia, Executive Committee, and Administrative Council

The Journal of Pain, Vol 17, No 2 (February), 2016; pp 131-157



- PROCEDURES:
- Abdominal Hysterectomy
 - C-Section
 - Colonic Resection
 - Haemorrhoid Surgery
 - Hemorrhoid
 - Laparoscopic Cholecystectomy
 - Update
 - Non-cosmetic Breast Surgery
 - Radical Prostatectomy
 - Thyroidectomy
 - Total Hip Arthroplasty
 - Total Knee Arthroplasty
 - PROSPECT Methodology



Procedure and Topic	Year of Publication
Colonic resection	2012
Rectal resection	2012
Pancreaticoduodenectomy	2012
Cystectomy	2013
Gastric resection	2014
Anesthesia protocols	2015
Anesthesia pathophysiology	2015
Major gynecology (parts 1 and 2)	2015
Bariatric surgery	2016
Liver resection	2016
Head and neck cancer surgery	2016
Breast reconstruction	2017
Hip and knee replacement	Under production
Thoracic noncardiac surgery	Under production
Esophageal resection	Under production

Reduce physiologic derangement and stress response after surgery
Improve recovery
Reduce complication rates
Shorten inpatient hospital stays

ERAS Society Guidelines

Evidence-based, multimodal approach to surgical care
Improve outcomes after major operation
Series of recommendations after review of available evidence by groups of experts
20-22 categories, through all stages (surgical planning to recovery)

ERAS USA
1st ANNUAL CONGRESS 2017
Improving Outcomes, Avoiding Opiates
November 10 - 11, 2017
Intercontinental Dallas
Dallas, Texas



Back to 2017 Program

Colorectal and Bariatric Enhanced Recovery After Surgery in a Non-Academic Institution in Collaboration with a Private Anesthesiology Group

Vicki Morton DNP, AGNP-BC¹, Jessica Puskarich²

¹Providence Anesthesiology Associates, ²Novant Presbyterian Medical Center

As of May 2016, all colorectal surgical patients for two specific surgeons were identified as ERAS when scheduled for surgery. The pathway focused on multiple elements: preoperative patient education beginning in the surgeon's office, more extensive education when seen at the pre-admission testing (PAT) clinic, carb loading to include one 330mL Clearfast drink the night before surgery and one 3 hours before surgery, preoperative Alvimopan, postoperative nausea and vomiting (PONV) protocol, multimodal analgesia to include transversus abdominal plane blocks, reducing or eliminating opioid consumption, intraoperative goal directed fluid therapy utilizing a stroke volume optimization protocol, early PO intake, and early and frequent mobilization. As of February 2017, a bariatric pathway for 3 specific surgeons was implemented. The bariatric protocol includes the same above elements. Results: 270 patients were included in the intervention group with matched retrospective controls. The intervention was associated with reductions in LOS: colorectal 3.54 to 2.48 (p<0.0114), bariatric 2.15 to 1.13 (p<0.002). Readmission rates for both groups have remained unchanged. Both groups showed significant reductions in postoperative opioid consumption. Overall, there has been a reduction in cost per case by 20% in the colorectal intervention cohort. Assessment of bariatric cost savings is currently in progress.

ERAS: Past, Present, Future

Julie Thacker, MD
Associate Professor of Surgery
Duke University School of Medicine

Slides not available
for handout

ERAS Protocols at Novant Health GCM

Annual Update
November 4, 2017



Genesis

PSH Planning and Implementation Group
Value Driven Perioperative Strategies
Surgical Services Leadership
Surgeon Recruitment
PMC ERAS Steering Committee



Successes

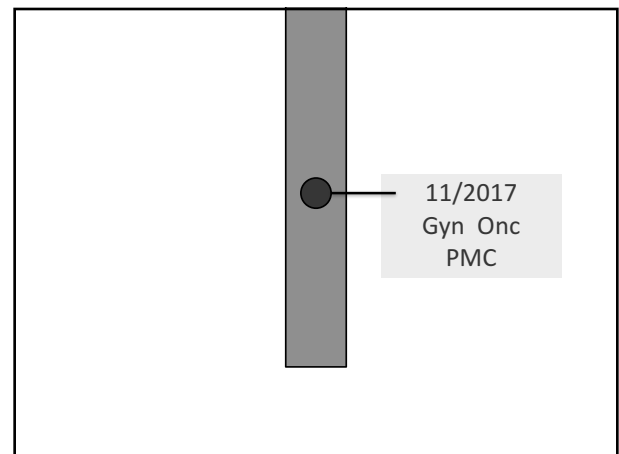
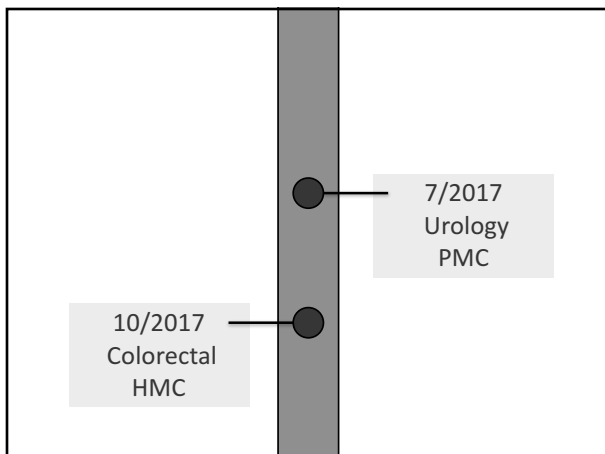
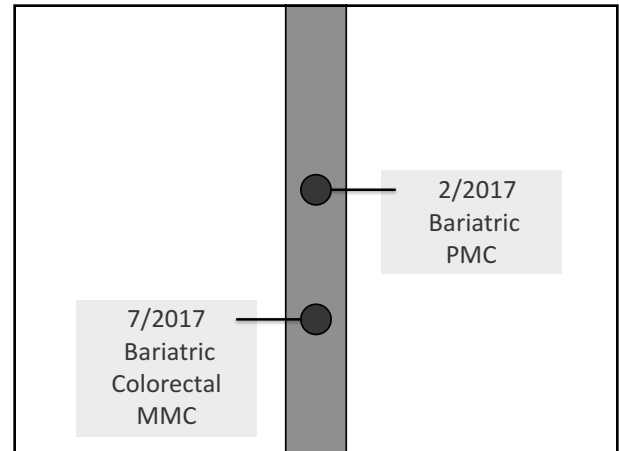
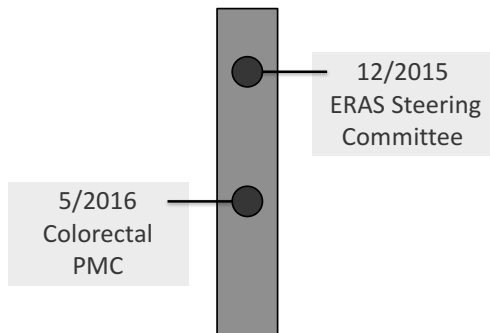
Patient Outcomes
Patient Satisfaction
Perioperative Teamwork – Satisfaction
ASER Leadership Conferences



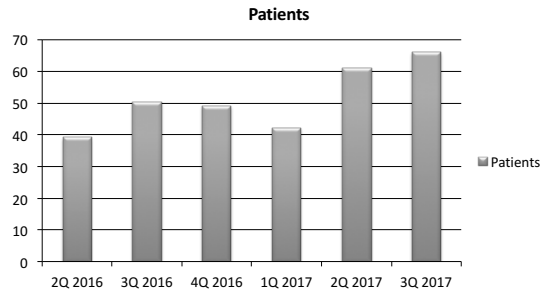
Challenges

Surgeon Interest
ERAS Coordinators
Data Collection
Equipment
Dimensions (Epic)

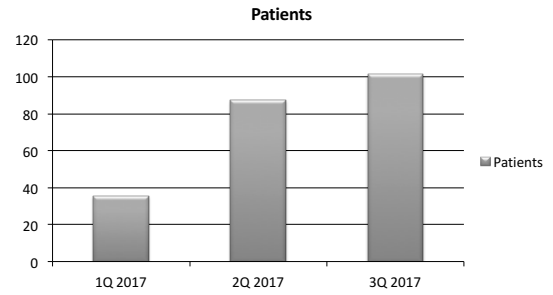
Milestones



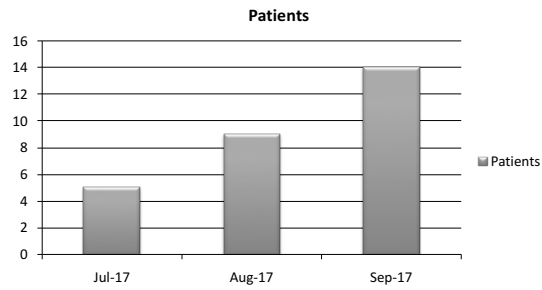
Colorectal PMC



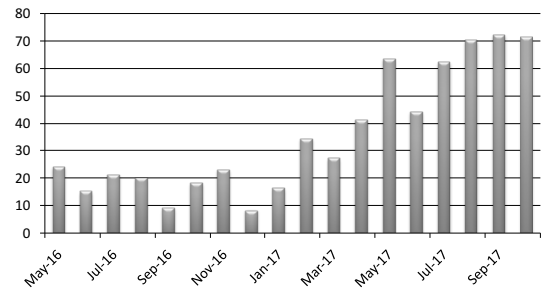
Bariatric PMC



Bariatric MMC



Total Patients = 638



Future Protocols

Gyn-Oncology
 Total Knee Arthroplasty
 Total Hip Arthroplasty
 GYN
 Mastectomy / Breast Reconstruction

ERAS Multi-Modal Pathways

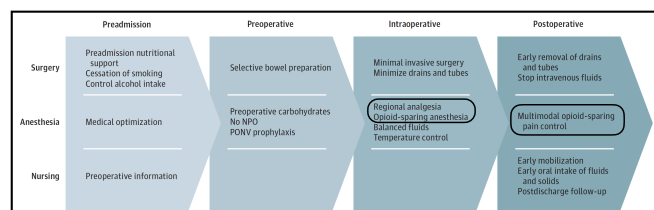
Rick Griggs, MD



Essential Elements of Multimodal Analgesia in Enhanced Recovery After Surgery (ERAS) Guidelines

Anaïr Beverly, MBBS, BSc, MRCP^a, Alan D. Kaye, MD, PhD, DABSA, DABPP^a, Olle Ljungqvist, MD, PhD^a, Richard D. Urman, MD, MBA^{a,b}

Anesthesiology Clin 35 (2017) e115–e143



Opioids

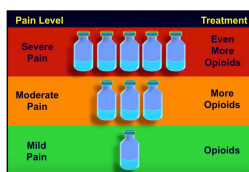
Traditionally the mainstay of therapy
Pain not always relieved by opioids
Adverse effects of opioids

PONV

Constipation

Sedation

Opioid-Induced Hyperalgesia



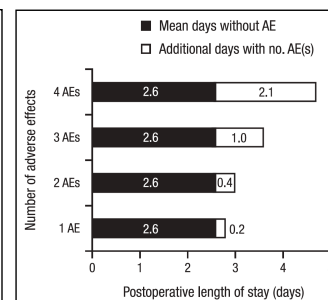
T.J. Gan

Relationship Between Potential Opioid-Related Adverse Effects and Hospital Length of Stay in Patients Receiving Opioids After Orthopedic Surgery

Laura T. Pizzi, Pharm.D., M.P.H., Richard Toner, M.S., Kathleen Foley, Ph.D., Erin Thomson, M.P.H., Wing Chow, Pharm.D., Myoung Kim, Ph.D., Joseph Couto, Pharm.D., Marc Royo, B.S., and Eugene Viscusi, M.D.

PHARMACOTHERAPY Volume 32, Number 6, 2012

Adverse Effect	No. (%) of Patients
Composite of nausea and vomiting (emesis)	145 (36.1)
Nausea	123 (30.6)
Emesis	50 (12.4)
Dizziness	44 (11.0)
Pruritus	44 (11.0)
Hypoxia	27 (6.7)
Constipation	26 (6.5)
Urinary retention	19 (4.7)
Confusion	15 (3.7)
Respiration rate < 8 breaths/min ^a	10 (2.5)
Any adverse effect	218 (54.2)
No. of adverse effects	
0	184 (45.8)
1	115 (28.6)
2	74 (18.4)
3	21 (5.2)
4	8 (2.0)



The Value of “Multimodal” or “Balanced Analgesia” in Postoperative Pain Treatment

Henrik Kehlet, MD, PhD, and Jørgen B. Dahl, MD

Department of Surgical Gastroenterology and Anesthesiology, Hvidovre University Hospital, Hvidovre, Denmark

Anesth Analg 1993;77:1048–56

The rationale for this strategy is achievement of sufficient analgesia due to additive or synergistic effects between different analgesics, with concomitant reduction of side effects, due to resulting lower doses of analgesics and differences in side-effect profiles.



Essential Elements of Multimodal Analgesia in Enhanced Recovery After Surgery (ERAS) Guidelines

Anaïr Beverly, MBBS, BSc, MRCP^a, Alan D. Kaye, MD, PhD, DABSA, DABPP^a, Olle Ljungqvist, MD, PhD^a, Richard D. Urman, MD, MBA^{a,b}

Anesthesiology Clin 35 (2017) e115–e143

MMA - Significant role emphasized in all ERAS Society Guidelines

Goals:

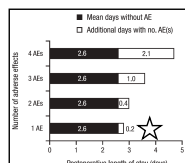
Manage Pain, Limit opioids

Reduce overall neural and hormonal stress responses to surgery

Aid early mobilization, normal respiration, oral nutrition

Anesthesiology Clin 35 (2017) e115–e143

- Avoid opiates (or reduce opiates)
- Reduced opioid-induced side effects
- Improved patient experience and outcome



Anesthesiology Clin 35 (2017) e115–e143

Beta-blockers (esmolol, metoprolol)

Sedation, Hypotension
Bradycardia, Hypotension

PAA
ERAS
Protocols

- **Stability of IV drugs** requires careful attention
 - **Pre-use stability**
 - Patient should drink clear fluid prior to leaving the house
 - If patients have not completed the carbohydrate drink on arrival, the nurse remains NPO according to the protocol and ASA guidelines
 - **POWY**
 - Spontaneous laryngospasm and hypoxia are protocol
 - Succinylcholine Patch for high risk patients
 - **Intravenous Anesthesia**
 - Age > 65: Catecholamine 800 mg IV
 - Fat patients who will not receive ketamine intrac: Celecoxib-Killip IV
 - **GI Motility**
 - Alvimopan 12 mg IV
 - **VTE/OT Prophylaxis Pharmacology** / Mechanical (compression with epidural)
 - Heparin 5000 U SC after epidural placement
 - **ECG** using dual channel
 - **TAP** Modality for laparoscopic cases
 - Placed under ultrasound guidance in OR after induction

Patients identified, education begins in surgeon's office
Cases posted as "ERAS" (Procedure name)
Distribution of Patient Guide to ERAS
Pre-Surgical Services (PSS): All patients identified to be ERAS
use the PSS and the ERAS program
Evidence-Based Round Planning Workshop: Ultimate interdisciplinary
Consulting on anesthesia plan and postop analgesia
Education on ERAS: setting the expectations / distribution of ERAS
Laminated copies of AH Patient Guide to ERAS in patient room
Consulting on smoking cessation (see Smoking Cessation Plan)
Consulting on alcohol intake
Consulting on diet
Evaluation for OGA, Initiation of OGA Orders, OGA referral
Postoperative glycemic control and Order Set as appropriate
Liberalized fluid intake – 2 carbohydrate drinks handled post op
Encouraged to drink 1 prior to bedtime and 1 prior to leaving
Encouraged: severe uncontrolled GERD, abnormal esophageal
Patients should otherwise remain NPO per PAA guidelines

- **Pre op catheter/urine leading**
 - Patient should drink ClearFad prior to leaving the house
 - If patients have not completed the catheter/urine drink at home, they should remain NPO according to PAA and ASA guidelines
- **PCA/PCA ordering and considerations per protocol**
 - Sufentanil/Patch for high risk patients
- **Multimodal Analgesics**
 - Age > 85: Gabapentin 800 mg PO
- **VTG/VTG/VTG**
 - For patients who will receive ketorolac intrasp: ClearFad
 - For patients who will receive ketorolac intrasp: ClearFad
 - Heparin 5000 U/E after epidural placement
- **BE/BE/BE**
 - Use until discharge
- **TAP/BE/BE**
 - Placed for laparoscopic cases
 - Placed until ultrasound positive in OR after induction

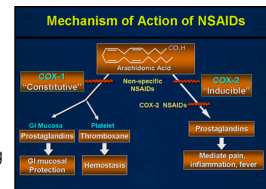
Appendix 1: [Download Appendix 1](#)

Utilize short acting opioids (fentanyl)

Celecoxib
IV Ketorolac

NSAIDs

REVEAL Study (2018) - prospective observational study ongoing



NSAIDs

Recommended postoperatively
Reduced postop ileus
Surgical concerns (bleeding) - discuss intraoperative use with surgeon

Exclusions

NSAID Allergy
Creatinine > 1.4
High risk for GI bleed (known ulcer disease)



	Colorectal	Bariatric	Prostatectomy
Preop	Celecoxib 400mg PO	Celecoxib 400mg PO	Celecoxib 400mg PO
Intraop (End of Case)	Ketorolac 30mg IV < 65 y/o, 15 mg IV ≥ 65 y/o (if no Celecoxib given, CRI) confirm with surgeon	Ketorolac 30mg IV (if no Celecoxib given, bleeding, or CRI)	Ketorolac 30mg IV < 65 y/o, 15 mg IV ≥ 65 y/o (if no Celecoxib given, CRI) confirm with surgeon
Postop Floor	Ketorolac 15/30mg IV q 6 hrs	Ketorolac 30mg IV q 6 hrs	Ketorolac 15/30mg IV q 6 hrs

Acetaminophen

Acetaminophen

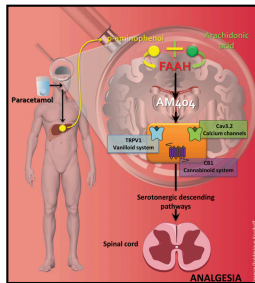
Mechanism of Action -
Incompletely understood

No significant COX-1 or COX-2 inhibition

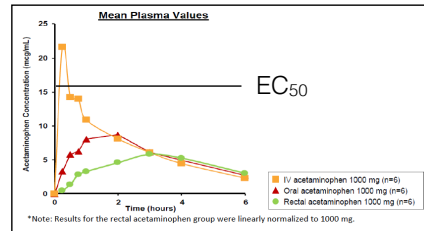
CNS COX inhibitor: Brain & Spinal Cord

Reduces CNS COX enzyme - requires oxidation to function

Endogenous cannabinoid system modulation



Acetaminophen IV or PO?



	Group 1	Group 2
Participants Analyzed [Units: Participants]	28	22
Total Opioid Consumption From Time of First Waking to T24 [Units: Milligrams] Mean (Standard Deviation)		
PACU	13.46 (23.20)	17.41 (17.91)
Home Consumption	36.96 (33.19)	39.56 (37.56)
Total consumption from peration to 24 hrs	153.38 (57.32)	163.86 (78.04)

Acetaminophen

Exclusions

Liver disease or dysfunction
Took acetaminophen within 8 hours
Do not exceed 3000 mg in 24 hours



	Colorectal	Bariatric	Prostatectomy
Intraop	Acetaminophen 1 g IV	Acetaminophen 1 g IV	Acetaminophen 1 g IV
PACU/ACU/Floor	Acetaminophen 1 g IV q8hrs until tolerating PO, then 1 g PO q8hrs	Acetaminophen 1 g IV q8hrs x 3	Acetaminophen 1 g IV q8hrs until tolerating PO, then 1 g PO q8hrs

Gabapentin

Gabapentin

Optimizing pain management to facilitate Enhanced Recovery After Surgery pathways

Mingjuan Tan, BA • Lawrence Shu-Chun Law, BSc •
Tong Joo Gan, MD

Can J Anesth/J Can Anesth (2015) 62:203–218

Anti-epileptic used to treat painful neuropathies
Binding to voltage-gated calcium channels (also NMDA receptors)

Single preop dose: opioid-sparing effect 20-62% (30 mg morphine)

Decreased rates of nausea, vomiting, urinary retention
Increased rates of sedation and dizziness

Gabapentin

Optimizing pain management to facilitate Enhanced Recovery After Surgery pathways

Mingjuan Tan, BA • Lawrence Shu-Chun Law, BSc •
Tong Joo Gan, MD

Can J Anesth/J Can Anesth (2015) 62:203–218

Not included in ERAS Society guidelines (others do recommend)

Exclusions

Allergy/intolerance to Gabapentin

Age > 65

Already on Gabapentin - use usual daily dose



	Colorectal	Bariatric	Prostatectomy
Preop	Gabapentin elixir 600mg PO	Gabapentin elixir 600mg PO	Gabapentin elixir 600mg PO
Floor	Gabapentin 300mg PO qhs starting POD 1	Gabapentin elixir 300mg PO qhs on POD 1	Gabapentin 300mg PO qhs starting POD 1

Ketamine

Ketamine

N-methyl-D-aspartate (NMDA) receptor antagonist

MgSO₄

Modulates central sensory processing of pain

Potent anti-hyperalgesic agent

Counteract opioid-induced hyperalgesia

Prevent development of opioid tolerance

Cancer recurrence risk?

Other uses

Treatment of depression, complex regional pain syndrome (CRPS), cancer pain, alcohol addiction, heroin addiction, asthma exacerbations

Intraoperative Ketamine Reduces Perioperative Opiate Consumption in Opiate-dependent Patients with Chronic Back Pain Undergoing Back Surgery

Randy W. Loftus, M.D.,* Mark P. Yeager, M.D.,† Jeffrey A. Clark, M.D.,* Jeremiah R. Brown, M.S., Ph.D.,‡ William A. Abdu, M.S., M.D.,§ Dilip K. Sengupta, M.D., Ph.D.,|| Michael L. Beach, M.D., Ph.D.†

Anesthesiology 2010; 113:639–46

Randomized, prospective, double-blinded, placebo-controlled

Opiate-dependent patients for Major Lumbar Spine Surgery

n=52 - ketamine 0.5mg/kg IV at induction
0.6mg/kg/hr gtt until wound closure

n=50 - saline placebo

Patients followed for 48 hrs and at 6 weeks

Intraoperative Ketamine Reduces Perioperative Opiate Consumption in Opiate-dependent Patients with Chronic Back Pain Undergoing Back Surgery

Randy W. Loftus, M.D.,* Mark P. Yeager, M.D.,† Jeffrey A. Clark, M.D.,* Jeremiah R. Brown, M.S., Ph.D.,‡ William A. Abdu, M.S., M.D.,§ Dilip K. Sengupta, M.D., Ph.D.,|| Michael L. Beach, M.D., Ph.D.†

Anesthesiology 2010; 113:639–46

	Placebo	Ketamine	P Value
24 hr ME, total mg/24 hr	202 (176)	142 (82)	0.032
48 hr ME, total mg/48 hr	309 (341)	195 (111)	0.029
48 hr ME Adjusted, mg*	323 (347)	203 (109)	0.045
PACU VAS, cm	5.6 (3.0)	4.1 (3.1)	0.033
6-wk ME, mg/hr intravenous morphine	2.8 (6.9)	0.8 (1.1)	0.041
6-wk VAS, cm	4.2 (2.4)	3.1 (2.4)	0.026

	Placebo	Ketamine	P Value	RR (95% CI)
48 hr				
Nausea	22.5	26.9	0.603	1.20 (0.60, 2.38)
Vomiting	12.2	15.4	0.648	1.26 (0.47, 3.36)
Hallucinations	2.0	1.9	0.737	0.94 (0.06, 14.65)
Urinary Retention	2.0	7.7	0.200	3.77 (0.44, 32.56)
6 wk				
Nausea	17.0	11.8	0.458	0.69 (0.26, 1.84)
Vomiting	8.5	9.8	0.552	1.15 (0.33, 4.04)
Hallucinations	23.4	11.8	0.128	0.50 (0.20, 1.25)
Constipation	57.5	45.1	0.222	0.79 (0.53, 1.16)

CI = confidence interval; RR = risk ratio.

Adverse Effects

Usually transient in nature
 Decreased incidence and severity with prophylactic midazolam
 Physical symptoms
 dose-dependent
 lightheadedness, headache, nausea, diplopia, drowsiness, dizziness, nightmares

Ketamine

Optimizing pain management to facilitate Enhanced Recovery After Surgery pathways
 Mingjun Tan, BA · Lawrence Shu-Chun Law, BSoc
 Yong Joo Gan, MD
 Can J Anesth Can Anesth (2015) 62:203–218

Analgesic doses ($\leq 0.5 \text{ mg/kg/hr}$)
 Reduced postop pain
 Reduced opioid requirements

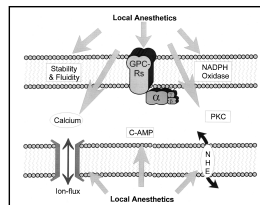
Not included in ERAS Society guidelines
 “May be considered if other recommended strategies are contraindicated”
 Included in Spine ERAS reviews



	Colorectal	Bariatric	Prostatectomy
Intraop		Ketamine 0.2-0.5 mg/kg	

IV Lidocaine

Analgesic
 Anti-hyperalgesic
 Anti-nociceptive
 Anti-inflammatory
 Inhibition of NMDA receptors and leukocyte priming
 Stimulates secretion of anti-inflammatory IL-1 receptor antagonist
 Na⁺ Channel Blockade
 Multiple other sites of action
 G protein-coupled receptors
 NMDA receptors



Lidocaine Infusion - Effects on Ileus

Autonomic nervous system dysfunction
 Decreased sympathetic tone
 Tonic inhibition in mesenteric plexus - contractile stimulation
 Smooth muscle direct effect
 Inflammatory response
 Anti-inflammatory (blunted postop increase in proinflammatory cytokines and complement)
 Anesthetics and opioids
 Reduced opioid consumption
 Inhibition of ectopic impulse discharge at nerve injury sites
 Suppressed secondary hyperalgesia by peripheral mechanisms
 Gastrointestinal hormone disruption

Lidocaine Infusions

Avoids side-effects and complications of epidurals
 Option when epidural or TAP blocks are contra-indicated
 Instead of epidurals? - University of Virginia
 Versus TAP Blocks?

ERAS Society: Consider in Hysterectomy and Lap Colorectal/Rectal

Proposed regimen
 Bolus 100mg IV
 2 mg/min infusion continued into PACU for up to 8 hours
 Discontinued at time of PACU discharge

Dexamethasone

Dexamethasone

PONV prophylaxis

Anti-Inflammatory

Reduced Stress Response

Meta-Analysis (11 RCTs)

Decrease complications

Decrease LOS

No effect on anastamotic leakage in Colorectal Surgery

Laparoscopic Gastric Bypass

Retrospective analysis (n=2000) - steroid bolus was a predictor of discharge within 24 hours

Monitor for hyperglycemia

Dexamethasone



	Colorectal	Bariatric	Prostatectomy
Intraop -After Induction	Dexamethasone 10mg IV	Dexamethasone 10mg IV	Dexamethasone 10mg IV
Postop Floor		Dexamethasone 4mg IV q6hrs	

Thoracic Epidural

Thoracic Epidural

ERAS Society - Recommended for Open: Colorectal, Rectal, Radical Cystectomy, GYN

Hypotension - treated with vasopressors instead of fluid challenges alone



Bupiv 0.0625% + Hydromorphone 10 mcg/ml

	Colorectal	Bariatric	Prostatectomy
Preop	Epidural Bupiv 0.0625% + Hydromorphone 10mcg/ml (open procedures) - beware of heparin SQ		Epidural Bupiv 0.0625% + Hydromorphone 10mcg/ml (open procedures) - beware of heparin SQ
Intraop	4 Quadrant TAP Blocks 15ml x 4 Bupiv 0.25% with epi 1:400K (laparoscopic)	Subcostal TAP Blocks 20ml x 2 Bupiv 0.25% with epi 1:400K	4 Quadrant TAP Blocks 15ml x 4 Bupiv 0.25% with epi 1:400K (laparoscopic)

Sugammadex

Sugammadex

Guidelines for Perioperative Care in Bariatric Surgery: Enhanced Recovery After Surgery (ERAS) Society Recommendations

A. Thorrell¹ · A. D. McCormick^{2,3} · S. Awad^{4,5} · N. Reynolds⁶ · D. Roulin⁶ · N. Demartines⁶ · M. Vignaud⁷ · A. Alvarez⁸ · P. M. Singh⁹ · D. N. Lobo¹⁰

[World J Surg (2016) 40:2065–2083]

An early systematic review comparing recovery of neuromuscular function with acetylcholine esterase inhibition versus selective cyclodextrin binding (sugammadex) suggested an equivalent side effect profile [136]. The use of binding agents is supported in bariatric surgery [137–140] where predictability of complete neuromuscular recovery within short time is important.

Reversal of rocuronium-induced neuromuscular blockade with sugammadex compared with neostigmine during sevoflurane anaesthesia: results of a randomised, controlled trial

Manfred Blobner, Lars I. Eriksson, Jens Scholz, Johann Motsch, Giorgio Della Rocca and Martine E. Prins

Eur J Anaesthesiol 2010;27:874-881

Time to TOF 0.9

Sug - 1.5 min

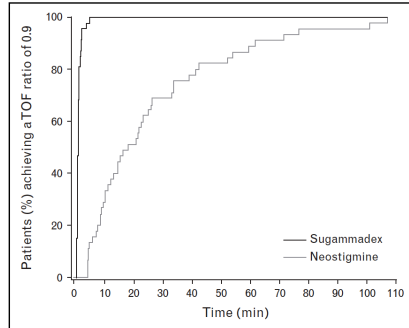
Neo - 17 min

Within 5 min?

Sug - 98%

Neo - 11%

(111 min for 98%)



The Future

Emergency Surgery ERAS

Patient-Specific Groups

Elderly ERAS

Morbid Obesity ERAS

Chronic Opioid-Dependent ERAS

Chronic Postsurgical Pain Prevention

Cancer Recurrence/Survival

Animal studies

Volatile anesthetics, Opioids

Local anesthetic infiltration, NSAIDs

Adherence to the ERAS protocol is Associated with 5-Year Survival After Colorectal Cancer Surgery: A Retrospective Cohort Study

Ulf O. Gustafsson^{1,2} · Henrik Oppelstrup^{2,3} · Anders Thorell^{3,3} · Jonas Nygren^{2,3} · Olle Ljungqvist⁴



World J Surg (2016) 40:1741-1747

Compliance	≥ 70 % (N = 273)	< 70 % (N = 638)	p value
Short-term postoperative outcome			
LOS, days ± SD	7.5 ± 6.3	8.9 ± 7.8	0.008*
Post-op symptoms (N, %)	122 (44.7)	400 (62.7)	<0.001 ^b
Post-op complications (N, %)	86 (31.5)	268 (42.0)	0.003 ^b
CRP day 1, mean ± SD (missing values)	72.0 ± 36.1 (20)	85.2 ± 41.4 (275)	<0.001 ^a
CRP ≥ 80 day 1, mean ± SD (%)	85/253 (33.6)	192/363 (52.1)	<0.001 ^b
Pathology			
R0 resection (N, %)	259 (95.6)	604 (96.0)	
R0 resection (N, %)	6 (2.2)	11 (1.8)	
R0 borderline resection (N, %)	6 (2.2)	14 (2.2)	0.895 ^b
T stage			
0 (N, %)	2 (0.7)	3 (0.5)	
1 (N, %)	20 (7.4)	53 (8.5)	
2 (N, %)	59 (21.8)	124 (19.9)	
3 (N, %)	168 (62.2)	407 (65.4)	
4 (N, %)	21 (7.8)	35 (5.6)	0.602 ^c
N-class			
NX (N, %)	1 (0.4)	25 (4.0)	
N0 (N, %)	163 (59.7)	361 (57.0)	
N1 (N, %)	58 (21.2)	124 (19.6)	
N2 (N, %)	51 (18.7)	123 (19.4)	0.012 ^c
Long-term postoperative outcome (5 years)			
Local recurrence (N, %)	10 (3.7)	36 (5.6)	0.211 ^b
Unspecified 5-year survival (N, %)	214/273 (78.4)	412/638 (64.6)	<0.001 ^b
CRC-specific 5-year survival (N, %)	233 (85.4)	502 (78.7)	0.020 ^b

ERAS PONV Pathways

Drug Shortages and New Successes

J. Ren Weidman, MD
Providence Anesthesia Associates

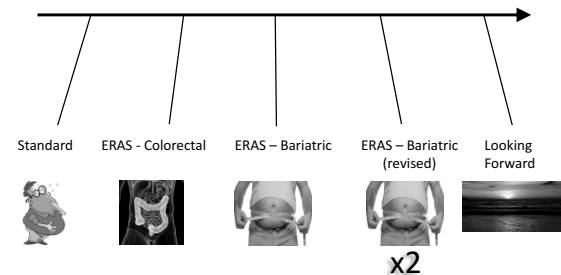
PONV

- Significant post-operative morbidity Gan et al., 2014
 - Affects 25-30% of patients
 - As high as 80% in high risk populations
- Substantial patient dissatisfaction Gan et al., 2014
- Can augment health care costs Apfel et al., 1999
 - Delayed PACU discharge
 - Unexpected readmissions

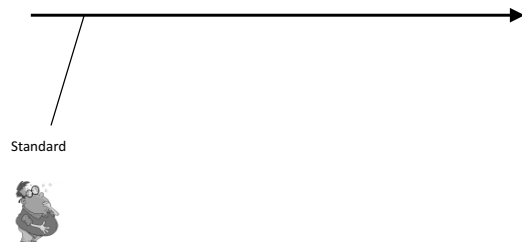
Antiemetics

- Classification
 - Serotonin antagonists (e.g. ondansetron)
 - Butyrophenones (e.g. droperidol)
 - Antihistamines (e.g. dimenhydrinate)
 - Anticholinergics (e.g. scopolamine)
 - Antidopaminergics (e.g. prochlorperazine)
 - Corticosteroids (e.g. dexamethasone)
 - Neurokinin-1 antagonists (e.g. aprepitant)

PONV PROTOCOLS



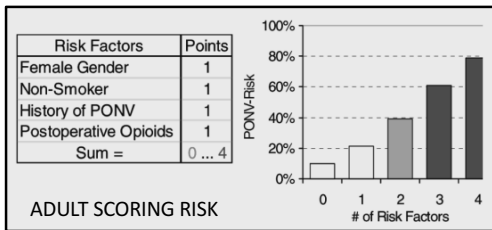
PONV PROTOCOLS



Historic PAA PONV Protocol

- Multiple guidelines available
 - American Society of Anesthesiologists
 - Society for Ambulatory Anesthesia
 - American Society of Perianesthesia Nurses
 - Canadian Journal of Obstetrics and Gynaecology
 - etc.
- Patient Care Initiative
 - Determine individual patient risk
 - Treat based on risk assessment

PAA PONV Protocol



PAA PONV Protocol

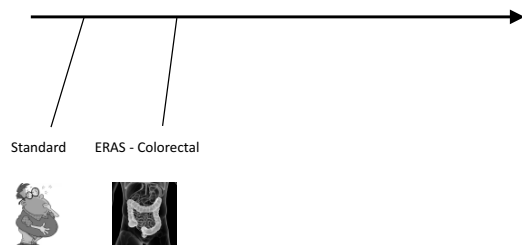


ADULTS	Low-Risk	Moderate-Risk	High-Risk
Preop			Scopolamine Patch (2 h before surgery)
Intraop	Dexamethasone 4mg IV or Ondansetron 4mg IV	Dexamethasone 4-10mg IV + Ondansetron 4mg IV	Dexamethasone 8-10 mg IV + Ondansetron 4mg IV + Consider Risk Reduction Strategies

Risk Reduction Strategies:

- Avoid GA
- TIVA
- Minimize opioids
- Adequate hydration

PONV PROTOCOLS



ERAS and PONV

- Enhanced Recovery After Surgery (ERAS) Society
 - Scoring systems have been proven to be helpful at significantly reducing PONV, however ...
 - “An alternative strategy ... may be to *administer antiemetic prophylaxis to all patients*. This approach is gaining popularity.”

Prophylaxis for all ...

Eur J Anaesthesiol, 2011 Nov;28(11):758-65. doi: 10.1097/EJA.0b013e32834a4e1e.

Possibilities and limitations in the pharmacological management of postoperative nausea and vomiting.

Kordecki P¹, Eberhart LH.

- “Implementation studies have shown that with the intention to withhold [excess] antiemetics from low-risk patients, there is a constant threat that a considerable proportion of moderate-to-high risk patients receive substandard care.”
- “The low cost of most antiemetics and the low incidence of side-effects suggests that a liberal antiemetic prophylaxis regimen is a meaningful option.”

ERAS and PONV

- Enhanced Recovery After Surgery (ERAS) Society
 - Scoring systems have been proven to be helpful at significantly reducing PONV, however ...
 - “An alternative strategy ... may be to *administer antiemetic prophylaxis to all patients*. This approach is gaining popularity.”
 - Consider a multimodal approach that combines non-pharmacologic and pharmacologic antiemetic techniques.”

Multimodal approach

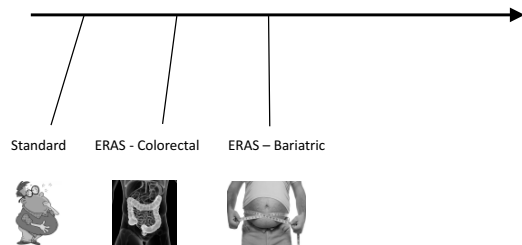
- Non-pharmacologic antiemetic techniques
 - Avoid inhaled anesthetics
 - Narcotic-sparing interventions
 - Regional/neuraxial anesthesia
 - NSAIDs
 - Perioperative fluids
 - Carbohydrate loading Chandrasekaran (2011)
 - Higher intraoperative FiO₂ (questionable) Orhan-Sungur (2008)

ERAS PONV Protocol – Colorectal



- Pre-op:
 - PONV screening
 - Scopolamine patch for high risk patients
- Intra-op:
 - Dexamethasone 10mg (before incision)
 - Ondansetron 4mg (at emergence)
- Multimodal:
 - Carbohydrate loading prior to arrival
 - Narcotic-sparing strategies (TAP blocks, IV Tylenol, etc.)

PONV PROTOCOLS



Bariatric Population and PONV

- Higher risk
 - Female
 - Under 50 years old
 - Non-smoker
- “PONV in bariatric surgery patients was high despite a prophylaxis regime.
These results cast doubt as to the effectiveness of the usual PONV prophylaxis in this patient group.”
Halliday TA et al. 2017

Burns Open Statist Data, 2013 Nov-Dec;9(6):975-80. doi: 10.1016/j.sord.2013.02.003. Epub 2013 Feb 13.

Multimodal analgesia reduces narcotic requirements and antiemetic rescue medication in laparoscopic Roux-en-Y gastric bypass surgery.

Ziemann-Gimmel P¹, Herschel P, Koopman J, Marens R

- “Despite triple antiemetic prophylaxis with dexamethasone, ondansetron and scopolamine, up to 42.7% of patients required antiemetic rescue medication”

ERAS PONV Protocol – Bariatric



- Pre-admission:
 - Aprepitant (Emend) 40mg PO at home DOS
- Pre-op:
 - Scopolamine patch (standard)
- Intraop:
 - Dexamethasone 10mg (before incision)
 - Ondansetron 4mg (at emergence)
- Multimodal:
 - Carbohydrate loading prior to arrival
 - Narcotic-sparing strategies (TAP blocks, IV Tylenol, etc)

Emend

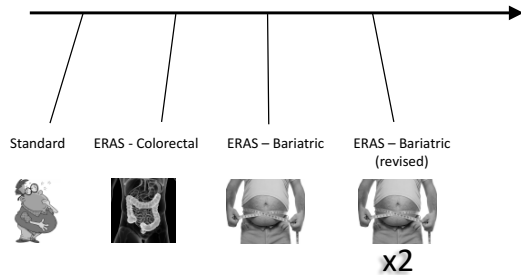
- Substance P antagonist (SPA)
- Blocks neurokinin 1 (NK-1) receptor
- Increases activity of ondansetron and dexamethasone in the brain. Gralia R et al (2005)
- “In morbidly obese patients undergoing laparoscopic bariatric surgery, addition of **aprepitant** to ondansetron can significantly ... lower the incidence of postoperative vomiting.” Sinha AC et al. (2014)

ERAS PONV Protocol Colorectal vs Bariatric



- | | |
|---|---|
| <ul style="list-style-type: none"> • Pre-admission: <ul style="list-style-type: none"> – Nothing • Pre-op: <ul style="list-style-type: none"> – Scopolamine patch – (high risk patients) • Intra-op: <ul style="list-style-type: none"> – Dexamethasone 10mg – Ondansetron 4mg • Multimodal: <ul style="list-style-type: none"> – Carbohydrate loading – Narcotic-sparing strategies | <ul style="list-style-type: none"> • Pre-admission: <ul style="list-style-type: none"> – Emend • Pre-op: <ul style="list-style-type: none"> – Scopolamine patch – (standard) • Intra-op: <ul style="list-style-type: none"> – Dexamethasone 10mg – Ondansetron 4mg • Multimodal: <ul style="list-style-type: none"> – Carbohydrate loading – Narcotic-sparing strategies |
|---|---|

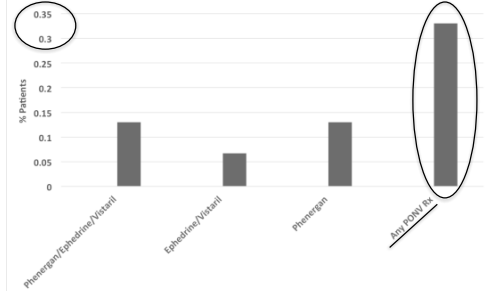
PONV PROTOCOLS



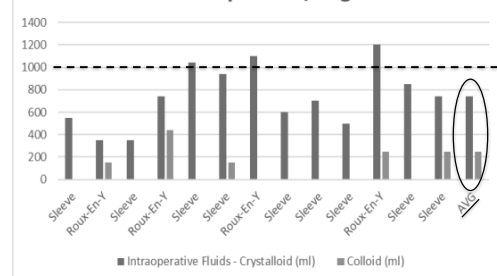
First 2 months



PACU PONV Meds Given



Intraop Fluids/Avg



IV Fluids



Br J Anaesth. 2012 Jun;109(6):893-902. doi: 10.1093/bja/aes138.

Supplemental intravenous crystalloids for the prevention of postoperative nausea and vomiting: quantitative review.

Asfel CC¹, Meyer A, Orhan-Sunur M, Jalota L, Whelan RP, Jularic-Rao S.

- Meta-analysis, 15 RTCs (n=787 crystalloid; n=783 conservative fluids)
- “Supplemental IV crystalloids reduce overall PONV ... as effectively as many prophylactic antiemetic drugs.”
- Total supplemental IV fluids: median ~2000 cc's



ERAS PONV Protocol – Colorectal vs Bariatric (revised)



- | | |
|--|---|
| <ul style="list-style-type: none"> • Pre-admission:
– Nothing | <ul style="list-style-type: none"> • Pre-admission:
– <i>Emend</i> |
| <ul style="list-style-type: none"> • Pre-op:
– Scopolamine patch (high risk) | <ul style="list-style-type: none"> • Pre-op:
– Scopolamine patch (<i>standard</i>)
– 1L NS fluid bolus |
| <ul style="list-style-type: none"> • Intra-op:
– Dexamethasone 10mg
– Ondansetron 4mg | <ul style="list-style-type: none"> • Intra-op:
– Dexamethasone 10mg
– Ondansetron 4mg
– 1L NS +/- 250cc albumin
– <i>Haldol</i> 2mg IV |
| <ul style="list-style-type: none"> • Multimodal:
– Carbohydrate loading
– Narcotic-sparing strategies | <ul style="list-style-type: none"> • Multimodal:
– Carbohydrate loading
– Narcotic-sparing strategies |

Haldol



Haldol

- Butyrophenone with strong D2 affinity
- Available since 1958
- Primarily used for sedative properties.
- Initially second tier to droperidol.
Looney EA et al. (1979)
- Increased in popularity since 2002 droperidol black box warning.



Review Article | December 2004

Is Low-dose Haloperidol a Useful Antiemetic?: A Meta-analysis of Published and Unpublished Randomized Trials

Michael Büttner, D.M.D.; Bernhard Walder, M.D.; Erik von Elm, M.D., M.Sc.; Martin R. Tramèr, M.D., D.Phil.

Anesthesiology

- “Haloperidol is antiemetic at doses much lower than those used to treat psychiatric disorders.

For PONV, parenteral single doses between 1 and 2 mg are efficacious, with minimal toxicity.”

NNT - PONV

Medication	Number Needed to Treat
Zofran	5
Decadron	7
Scopolamine Patch	6
Reglan	30
Droperidol	5
Haldol	4 – 5

Haldol – Side Effects

"Extrapyramidal symptoms are rare, there is no sedation, and cardiac arrhythmias have not been reported."

- Dose dependent
 - Significant side effects much more common in psychiatric use
- Sedation
 - 1 in 4 experiencing some sedation at 5mg
 - No sedation reported at anti-emetic doses <= 2mg
- Extra-pyramidal symptoms
 - 1 patient in 806 experienced mild puckering of the lips thought due to EPS
- Cardiac arrhythmias
 - None report in anti-emetic studies

But it's droperidol's cousin ...

- Black box warning
 - 10 cases between 1997-2002
 - None could be definitively linked
 - 5 had significant confounding factors
 - If events linked to droperidol, incidence estimated at 1:150,000
- Ondansetron induces a clinically similar QTc prolongation to low dose droperidol. Charbit 8, et al., (2005)

Anesthesiology 2007; 107:531-6

Copyright © 2007, the American Society of Anesthesiologists, Inc. Lippincott Williams & Wilkins, Inc.

Does Low-dose Droperidol Administration Increase the Risk of Drug-induced QT Prolongation and Torsade de Pointes in the General Surgical Population?

Gregory A. Nuttall, M.D.,^{*} Karen M. Eckerman, C.R.N.A., M.N.A.,[†] Kelly A. Jacob, C.R.N.A., M.N.A.,[†] Erin M. Pawlaski, C.R.N.A., M.N.A.,[†] Susan K. Wigenama, C.R.N.A., M.N.A.,[†] Mary E. Shirk Marienau, C.R.N.A., M.S.,[‡] William C. Oliver, M.D.,^{*} Brady J. Nair, M.D.,[§] Michael J. Ackerman, M.D., Ph.D.^{||}

Anesthesiology 2007

- Retrospective study
 - Looked at 3 years before and after FDA warning.
 - Examined incidence of prolonged QTc, VT/TdP, and death.
- No change in the incidence of torsades de points with the use of low dose droperidol vs none

Other Benefits???

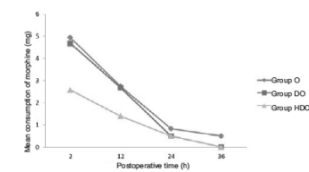


Combination of Haloperidol, Dexamethasone, and Ondansetron Reduces Nausea and Pain Intensity and Morphine Consumption after Laparoscopic Sleeve Gastrectomy

Márcio Luiz Benevides^{a,*}, Sérgio de Souza Oliveira^{a,b}, José Eduardo Aguiar-Nascimento^b

Rev Bras Anestesiol. July 2012

- Confirmed a decrease in PONV with HDO regimen compared to DO or O.
- Lower postoperative narcotic use in haldol group.

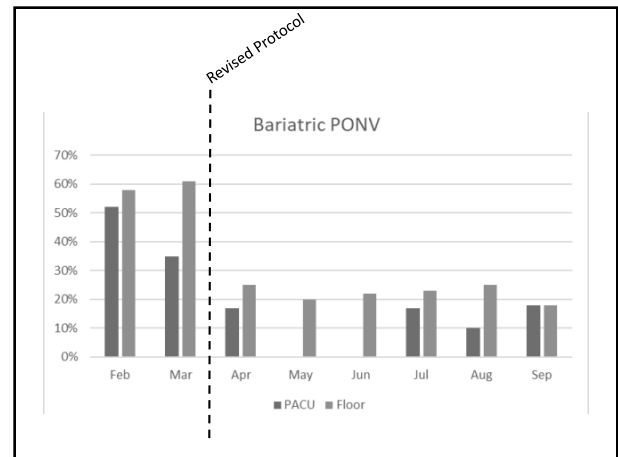




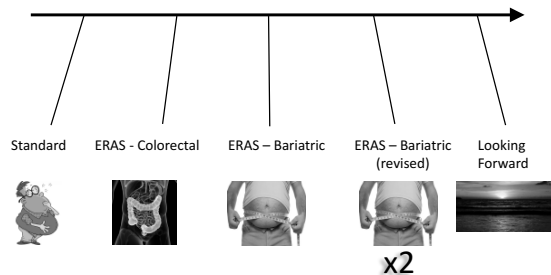
ERAS PONV Protocol – Colorectal vs Bariatric (revised)



- | | |
|---|--|
| <ul style="list-style-type: none"> Pre-admission:
Nothing Pre-op:
– Scopolamine patch (high risk) Intra-op:
– Dexamethasone 10mg
– Ondansetron 4mg Multimodal:
– Carbohydrate loading
– Narcotic-sparing strategies | <ul style="list-style-type: none"> Pre-admission:
– <i>Emend</i> Pre-op:
– Scopolamine patch (<i>standard</i>)
– 1L NS fluid bolus Intra-op:
– Dexamethasone 10mg
– Ondansetron 4mg
– 1L NS +/- 250cc albumin
– Haldol 2mg IV Multimodal:
– Carbohydrate loading
– Narcotic-sparing strategies |
|---|--|



PONV PROTOCOLS



Sugammadex?



Bras J Anesthesiol. 2017 Mar - Apr;67(2):147-152. doi: 10.1016/j.bjane.2015.08.003. Epub 2016 Mar 19.

Comparison of the effects of sugammadex and neostigmine on postoperative nausea and vomiting.

Yagci O¹, Tasa N², Mutlu T², Hano V³.

- Randomized single-blinded study (n=98)
– First hour PONV: Group N 27% vs Group S (8%)
[p=0.0016]
- Earlier small studies (n<10) showed modest, transient benefits. Koyuncu O, et al. (2015)
- Larger RTC in progress assessing high risk patients
https://clinicaltrials.gov/ct2/show/NCT02666014

References

- Gan T, et al. Consensus guidelines for the management of postoperative nausea and vomiting. *Anesth Analg.* 2014; 118(4).
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- Chandrakantan A and Glass PS. Multimodal therapies for post-operative nausea and vomiting, and pain. *Br J Anaesth.* 2011; 107: 127-40
- Orhan-Sungur M, et al. Does supplemental oxygen reduce post-operative nausea and vomiting? A meta-analysis of randomized controlled trials. *Anesth Analg.* 2008; 106: 1733-1738
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- Ziemann-Gimmel I, et al. Opioid-free total intravenous anesthesia reduces postoperative nausea and vomiting in bariatric patients beyond triple prophylaxis. *BJA.* 2014; 112(5): 906-911
- Gralla R, et al. Antiemetic efficacy of the neurokinin-1 antagonist, aprepitant, plus a 5HT3 antagonist and a corticosteroid in patients receiving anthracyclines or cyclophosphamide in addition to high-dose cisplatin: analysis of combined data from two Phase III randomized clinical trials. *Cancer.* 2005; 104(4): 864-8.
- Loeser EA, et al. Comparison of droperidol, haldoperidol, and prochlorperazine as postoperative antiemetics. *Canad Anesth Soc J.* March 1979. Vol 25(2): 115-127
- Charbit B, et al. Prolongation of QTc interval after postoperative nausea and vomiting treatment by droperidol or ondansetron. *Anesthesiology.* 2005. Jun;102(6): 1094-100.
- Koyuncu O, et al. Comparison of sugammadex and conventional reversal on postoperative nausea and vomiting: a randomized blinded trial. *J Clin Anesth.* 2015 Feb;27(1):51-6.

ERAS Regional Analgesic Modalities

Paul J. Fronapfel, M.D.

ERAS Regional Analgesic Modalities

- Overview
 - Basics of Regional Anesthesia and Benefits
 - ERAS Specific Regional Blocks
 - Epidural and Paravertebral Blocks (gold standard)
 - Transversus Abdominis Blocks (TAP)
 - Serratus Plane Blocks (SPB)
 - Pectoralis Blocks (PEC I and PEC II)

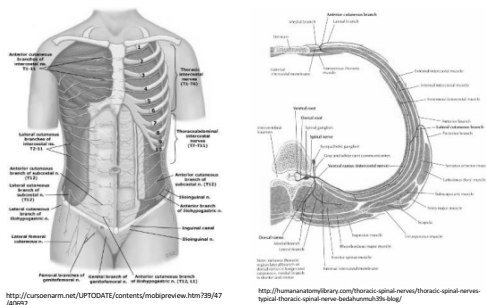
ERAS Regional Analgesic Modalities

- Regional Anesthesia
 - Using local anesthetics +/- adjuvant medications to make a specific location/region of the body insensate
 - Local anesthetics block transmission of nerve signals by impeding sodium ion channels in nerve membranes
 - Adjuvants are medications that can enhance the quality or duration of nerve blockade (dexamethasone, epinephrine, clonidine)

ERAS Regional Analgesic Modalities

- Regional Anesthesia
 - Central nervous system never senses the surgical insult -> reduction in neurohormonal and inflammatory cascades and consequences
 - Reduction in pain – improved attitude, satisfaction, therapy cooperation, appetite, etc.
 - Reduction in opioid consumption and subsequent side effects
 - Possible reductions in chronic pain states

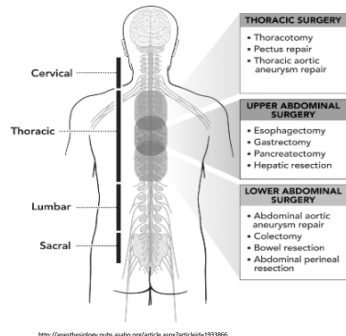
Sensory Innervation



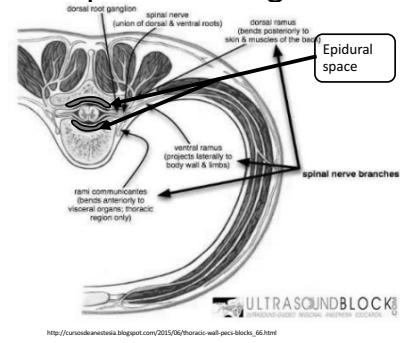
ERAS Regional Analgesic Modalities

- Epidural/Paravertebral Blocks
 - Gold Standard
 - Sympathetic
 - Visceral
 - Somatic

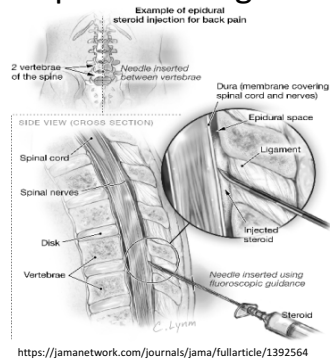
Epidural Analgesia



Epidural Analgesia



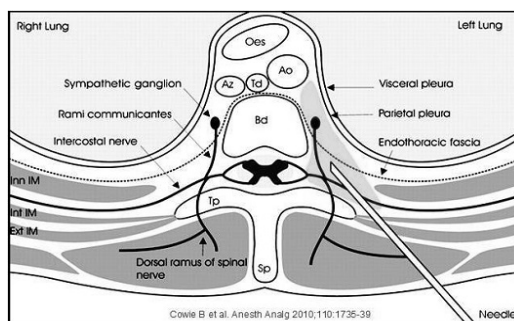
Epidural Analgesia



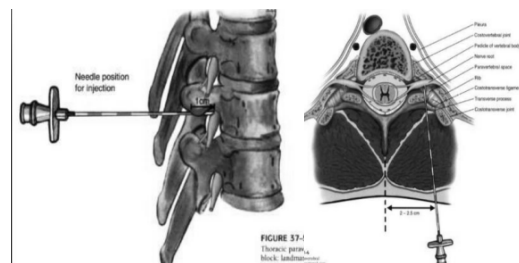
Paravertebral Block (PVB)

- Alternative to Epidural
 - Unilateral
 - Similar quality block
 - Requires multiple injections to get adequate spread
 - More difficult catheter placement/use

Paravertebral Block (PVB)



Paravertebral Block (PVB)



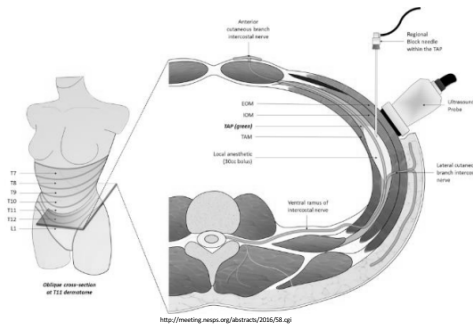
Epidural/Paravertebral Blocks

- Disadvantages
 - Risks/Side Effects
 - Bleeding concerns (heparin, lovenox, etc.)
 - Hypotension
 - Pneumothorax
 - Time consuming
 - Patient Discomfort
- Alternatives:
 - Truncal Blocks
 - Transversus Abdominis Plane (TAP)
 - Serratus Plane (SPB)
 - Pectoralis (PECS I, PECS II)

Transversus Abdominis Plane (TAP)

- Abdominal Dermatomes
- Unilateral Block, so for midline incision, bilateral injections required
- Amenable to catheter placement
- Typical to do supra and infra-umbilical injections as dictated by surgical incisions

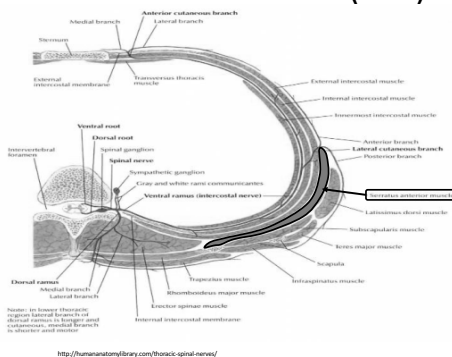
Transversus Abdominis Plane Block (TAP)



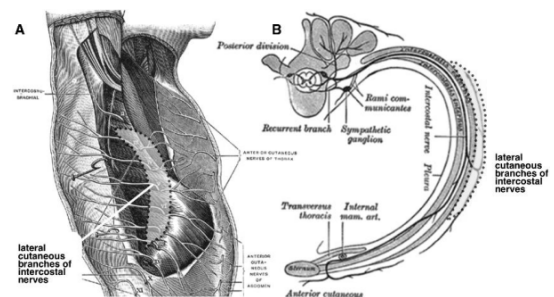
Serratus Plane (SPB) and Pectoralis (PEC I, PEC II) Blocks

- Thoracic Dermatomes
 - Breast surgeries
 - Thoracotomy/oscropy
 - Pacemakers/Defibrillators
 - Rib Fractures
- Unilateral Blocks
- Amenable to catheter placement

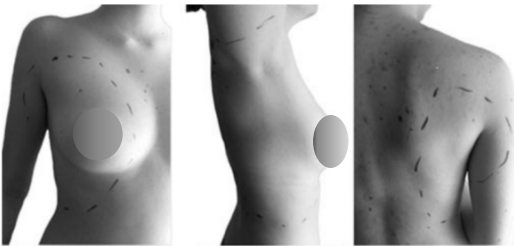
Serratus Plane Block (SPB)



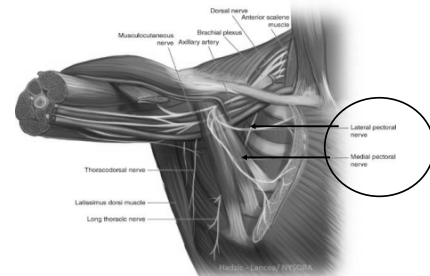
Serratus Plane Block (SPB)



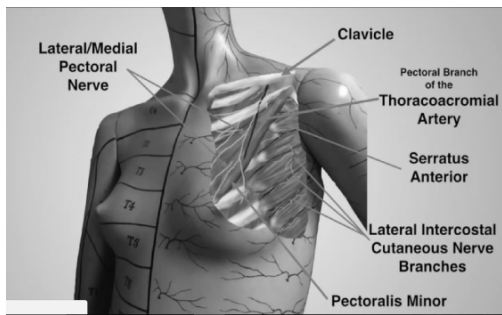
Serratus Plane Block (SPB)



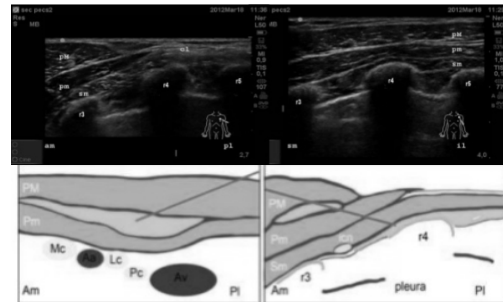
Pectoralis Blocks (PECS I, PECS II)



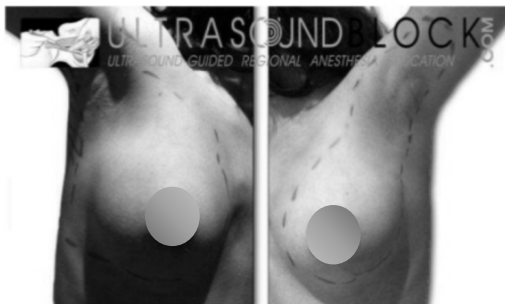
Pectoralis Blocks (PECS I, PECS II)



Pectoralis Blocks (PECS I and PECS II)



Pectoralis Blocks (PECS I and PECS II)



Typical sensory block produced by the PEC II block

Current ERAS Regional Protocols

- Prostatectomy:
 - TAP Blocks: bilateral lower, left upper, 0.25% Bupivacaine with epinephrine
- Bariatric Surgery
 - TAP Blocks: bilateral upper with 0.25% Bupivacaine with epinephrine
- Colorectal Surgery
 - TAP Blocks: 0.25% bupivacaine with epinephrine, locations procedure dependent

Non ERAS Efforts (On the horizon for future ERAS?)

- Serratus Plane and PECS Blocks
 - Breast Cases
 - Mastectomies
 - Reductions
 - Augmentations
 - Thoracotomy/oscopy
 - PM/AICD insertions

ERAS Regional Analgesic Modalities

- Summary
 - Regional Blocks as an adjuvant to multi-modal approach to pain control
 - Reductions in medication/side-effects, inflammatory response
 - Improved satisfaction, wakefulness, appetite, therapy cooperation
 - Shorter LOS

How do we get there?

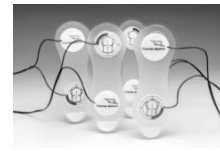
- Routine use of pre-operative carbohydrate drinks
 - Reduces thirst, hunger, anxiety, and post-operative insulin resistance
- Eliminate routine use of a pre-operative bowel prep
 - Does not reduce anastomotic leakage, wound infection, nor mortality



<http://gomerpedia.org/images/thumb/9/99/GoLYTELY.jpg/300px-GoLYTELY.jpg>
https://drinkclearfast.com/wp-content/uploads/2016/12/cf_bottle.jpg

Guiding physiologic principles

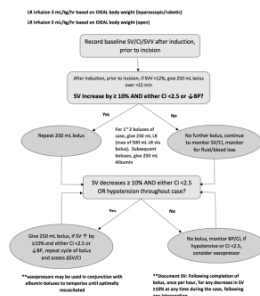
- In the past, surrogate markers for fluid balance have been inadequate:
 - HR/BP, UOP, CVP
- Newer methods utilizing pulse pressure variation and stroke volume variation are better indicators of volume status
 - Our practice uses the Cheetah monitor to monitor SV and SVV



<https://uihijq0pqt8tc2928hv6j.wpengine.netdna-cdn.com/wp-content/uploads/2016/11/Starling-co-background-foot.png>

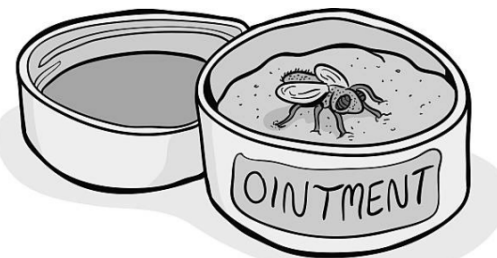
Intraoperatively

- Many variations of GDFT algorithm
- Baseline crystalloid infusion
- Most rely on measuring a response to a fluid bolus (either crystalloid or colloid)



^{**}Diuretics may be used in conjunction with albumin infusions to temperate until optimally resuscitated.

But wait



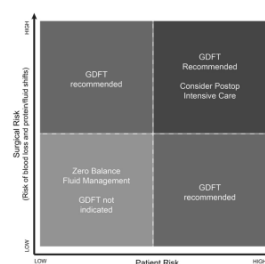
Goal-directed Fluid Therapy Does Not Reduce Primary Postoperative Ileus after Elective Laparoscopic Colorectal Surgery

A Randomized Controlled Trial

- Post-operative ileus rates were the same in the GDFT group as well as the traditional group
- However:
 - All cases were laparoscopic
 - All cases were in the setting of an established ERAS program
- Perhaps the benefits shown for GDFT are curtailed in the setting of an ERAS program/laparoscopic surgery
- Similar results have been shown in multiple studies

[illegible]

Now what?



- For low risk patients undergoing low risk procedures, perhaps GDFT is not indicated
 - ERAS setting
 - Pre-operative carbohydrate drink
 - No bowel prep
 - Zero balance fluid administration

Summary

- Too much fluid is a bad thing, too little fluid is a bad thing (but not quite as bad)
- Fluid therapy practice has been changed with recent developments of monitoring PPV and SVV
 - This has enabled a better picture of volume status
 - Thereby improving post-operative outcomes
- In the setting of a well-established ERAS program and laparoscopic surgery, the positive effects of GDFT are diminished
 - Low risk patients + low risk surgeries might not need GDFT assuming well-established ERAS program

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Colorectal ERAS- Postoperative Floor Management at PMC

Lillian Stiglitz, MHA BSN RN CMSRN

Making healthcare remarkable



Objectives

At the conclusion of this activity, participants will be able to:

- Discuss nursing strategies for postoperative management
- Recognize key learnings for successful ERAS protocols

2

Novant Health: Colorectal ERAS- Postoperative Floor Management at PMC
11/4/2017



NHPMC 5A General Surgery

- NHPMC
 - Not-for-profit hospital
 - 513 beds
 - Magnet health care facility
- 5A
 - Surgery, Trauma, and Medical-Surgical Overflow
 - 36 beds
 - Nursing team of NM, CULs, RNs, ADTs, CNAs, and MURs



3

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11/4/2017



Colorectal ERAS Floor Management

- "DREAM"
 - Drink
 - Eat
 - Mobilize



4

Novant Health: Colorectal ERAS- Postoperative Floor Management at PMC
11/4/2017



Colorectal ERAS Floor Management

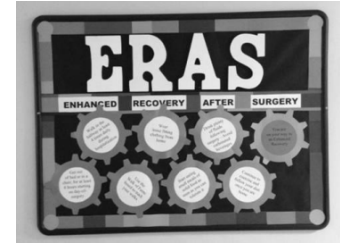
- Multi-Modal Pain Management
- Dress in Street Clothes
- Incentive Spirometry
- Nurse Bedside Report
- Documentation

5
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11/4/2017



Keys to Success

- Nurses at the table
- ERAS Champions
- Continuing Education



6
Novant Health: Colorectal ERAS- Postoperative Floor Management at PMC
11/4/2017



ERAS Poster for Academy Of Medical-Surgical Nurses Conference

Enhanced Recovery After Surgery in the Colorectal Population: A collaborative effort between a non-academic hospital system and a private Anesthesia group

Vicki Morton¹ DNP, MSN, AGNP-BC, Lillian Stigitz² MHA, BSN, RN, CMSRN, Mitch Lynn³ BSN, RN



Introduction

Utilizing an Enhanced Recovery after Surgery (ERAS) pathway has shown to minimize variability in care, avoid costly complications, reduce length of stay (LOS) and improve patient outcomes.

ERAS protocols for elective colorectal surgical patients were implemented in May 2015 at a S44 bed private, non-academic institution. The protocols were developed in collaboration with a private anesthesiology group contracted by the hospital system.

The ERAS protocols were implemented through a partnership of surgeons, anesthesiologists, nurses, pharmacists, nutritionists, and hospital leaders.

Objectives

The purpose of this project was to determine the effect of ERAS protocol implementation for elective colorectal surgical patients in regards to LOS, readmission rates, complication rates and cost per case.

Interventions: ERAS pathway

- Prehabilitation
- Preoperative carbohydrate loading
- Pre-emptive multi-modal post-operative nausea vomiting protocol
- Pre-emptive multi-modal analgesia
- Transversus abdominis plane blocks
- Early PO intake
- Early and frequent mobilization

Pre-implementation n = 163
Post-implementation n = 234

Data Collection: Chart Audit

Patient charts were audited pre implementation and post-implementation of the ERAS protocols. Data were collected monthly regarding LOS, complications, cost per case, and readmission rates.

Data Analysis: Vorge Solutions

Independent sample t-tests were used to compare LOS, complication rate, case cost, and readmission rate means (p < .05).



Average length of stay pre and post ERAS

Outcomes

- Length of stay: reduction from 4.8 days to 2.94 days (p<0.0146)
- Complication rates: 6%
- Cost per case: 20% reduction per case (p=0.032)
- Readmission rates: no change between pre and post-implementation groups

Implications for Nursing

The success of an ERAS program much depends upon the engagement and continued education of the medical surgical unit nursing staff. Consistency of care, encouragement of early and frequent mobilization, and early PO intake along with pre- and intra-operative ERAS protocols lead to fewer complications, shorter lengths of stay, and lower costs for patients and insurance providers.

Additional Information

1. Readmission to hospital within 30 days post-discharge. 2. Readmission to hospital within 90 days post-discharge. 3. Readmission to hospital within 180 days post-discharge. 4. Readmission to hospital within 365 days post-discharge.



7
Novant Health: Colorectal ERAS- Postoperative Floor Management at PMC
11/4/2017



ERAS & DIET

Elaine Goode, RD, LDN, CNSC

Affiliations:
Novant Health
Morrison Healthcare
Compass Group

Contents

- ERAS Pathway & Nutrition
- Post-op Diet
- Patient Education
- Supplementing Intake
- Early Experience
- Other ERAS Surgeries
- Conclusion

ERAS Pathway & Nutrition

"almost all the interventions in ERAS are either directly or indirectly related to the nutrition of the patient"

...

"consultation and evaluation by a nutritionist is preferable"¹

Parrish, C. R. Enhanced Recovery After Surgery: If You Are Not Implementing it, Why Not?
Practical Gastroenterology 2016;151, 46-56

ERAS Pathway & Nutrition

- Pre-Habilitation
- Pre-Operative
- Intra-Operative
- Post-Operative



Mishra R.K., et al. Enhanced recovery after surgery: Neuroanesthetic perspective. J Neuroanesthesia Off J Neuroanesthesia 2017; 4:17-22.
Available from: <http://www.inaajournal.org/text.asp/2017/4/1/17/197432>

ERAS Pathway & Nutrition

Pre-habilitation^{1,3,4}

- Healthy diet
- Reduced alcohol
- Targeted weight changes as needed

Aiming for optimal nutrient stores.
Discourage drastic measures that can lead to nutrient depletion and malnutrition pre-operatively.



ERAS Pathway & Nutrition

Nutrition Screening for Malnutrition (pre-operative)-

- 30-50% in GI surgery patients⁵
- Risk factor for perioperative morbidity and mortality⁶
- Longer hospital stay and increased complications with nutrition risk⁷

Consequences of Malnutrition⁸

- Increased susceptibility to infection
- Poor wound healing
- Increased rate of decubitus ulcers
- Increased morbidity

ERAS Pathway & Nutrition

Nutrition Screening & Support (pre-operative)-

Nutrition Screening to identify and correct undernutrition has been shown to minimize associated complications⁶

Nutrition Support:

- Reduced complications and LOS in surgical patients with colorectal cancer (also gastric and hepato-pancreato-biliary)⁹
- Reduced morbidity by 50% in high risk patients undergoing abdominal surgery³

ERAS Pathway & Nutrition

Pre-habilitation

- Screening Tools
 - MST (Novant Health)
 - MUST
 - MNA (age >65)
 - SGA (long...)
 - PINI (lab based)

MST Screening Tool

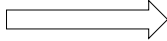
1. Have you lost weight without trying?
 - No (0)
 - 14-23lb (2)
 - Unsure (2)
 - 24-33lb (3)
 - 2-13lb (1)
 - > 33lb (4)
2. Have you been eating less because of poor appetite?
 - Yes (1)
 - No (0)

Total Score of ≥ 2 = RISK OF MALNUTRITION

ERAS Pathway & Nutrition

Pre-Operatively ^{1,3,4,10}

- | | |
|-----------------------------|----------------------------------|
| • Avoid / reduce bowel prep | • Maintains hydration |
| + | + |
| • Reduced fasting | • Reduces insulin resistance |
| + | + |
| • Carbohydrate loading | • Stimulates insulin sensitivity |
| | + |
| | • Reduces anxiety |



Carbohydrate (CHO) Loading

- Promotes an anabolic state / Decreases catabolism ^{1,11,12}
- 50g CHO produces an insulin response similar to a mixed meal ^{11,12}
- 400ml of a 12.5% CHO clear drink recommended ³
- Finish 2 hours prior to surgery ^{1,3}

Carbohydrate (CHO) Loading

- Reduces patient discomfort- thirst, hunger, anxiety, fatigue ^{13,14}
- Apple juice vs commercially available drinks
 - Apple juice comparable re thirst relief, patient satisfaction, gastric emptying¹⁴
 - Cost ratio of 1:7
- Colorectal resection: decreased LOS, faster return of bowel function ¹²

Carbohydrate (CHO) Loading

Commercial drinks available:

Name	Volume	CHO	Protein	Electrolytes	"Wound healing"
ClearFast	355ml	50g	0g	Yes	Yes
Ensure Pre-Surgery	296ml	50g	0g	Yes	Yes
Ensure Clear	237ml	52g	8g	Yes	Yes
Boost Breeze	237ml	54g	9g	Yes	Yes
Gatorade	591ml	35g	0g	Yes	No
Apple Juice	400ml	45g	0g	Yes	No

ERAS Pathway & Nutrition

Intra-Operatively ^{1,3,4}

- Goal directed fluid therapy
- +
- Avoidance of opioids / narcotics
- =>
- Faster return of bowel motility
- =>
- Decreased nutritional insult

ERAS Pathway & Nutrition

Early Post-Op Period ^{1,3,4,13}

- NG removed
- Early d/c of IVF
- PONV prophylaxis
- Sips of water in recovery
- Diet order on Day 0
 - Practices differ
 - Generally eating solids within 24 hours



ERAS Pathway & Nutrition

Post-Op Inpatient Period

- Nutrition screening by RN
- Transitional / GI Soft diet by Day 1 ^{1,3}
- Diet education
- Supplements ^{6,15}
- Mobilization- encourages appetite and return of bowel motility ^{1,3}

Post-op Diet and Evidence

SCCM and ASPEN Guidelines (2016) ¹⁶

- Recommend solids as tolerated post-op
- Clear liquids- more easily aspirated
- No difference in tolerance or PONV
- No difference in mortality or morbidity (given POD#1)
- Early feeding may decrease time to resumed bowel function

Post-op Diet and Evidence

2012 Guidelines for perioperative care in elective colonic surgery: **ERAS recommendations** ¹⁷

- Safe and spontaneous consumption of 1200-1500kcal/day directly post-op
- Early feeding associated with reduced risk of infection
- Early feeding associated with reduced length of stay
- No association with anastomotic dehiscence

Post-op Diet and Evidence

ASER 2016 Enhanced Recovery Implementation Guide ¹³

- PO fluids ASAP
- Build up to a full diet, usually POD#0, as tolerated
- Add "energy drinks" to supplement
- Access to snacks

Rationale for the GI Soft Diet

Kawamura et al. 2009, **Patient's appetite** is a good indicator for **postoperative feeding** ¹⁸

- 27% tolerated solids POD#1
- 81% tolerated solids POD#2
- >97% tolerated solids POD#3
- Patient choices aligned most closely with GI soft diet (toast, crackers, potatoes, sandwiches, fruit juice, broth, coffee/tea, ice-cream, yogurt, pudding and eggs)

Diet Education- Breads & Grains

Choose

- White/ plain breads
- White pasta/ rice / noodles
- Mashed potato / sweet potato
- English muffin
- Plain cereals e.g. corn flakes, rice puffs, cream of wheat
- Plain crackers

Do Not Choose

- Wholegrain breads
- Breads with seeds, nuts, raisins
- Wholemeal pasta / brown rice
- Highly seasoned crackers
- Bran cereals
- Oatmeal
- Cereals containing seeds, nuts, raisins

Diet Education- Vegetables

Choose

- Canned or well-cooked: soft asparagus, beets, carrots, green beans, wax beans, green peas, mushrooms, potatoes, spinach, summer squash, tomatoes (no seeds/ skin), winter squash
- Tomato juice

Do Not Choose

- Raw vegetables
- Salads
- All-other cooked vegetables
- Fried vegetables
- Corn
- Other beans

Diet Education- Fruits

Choose

- Fruit juice (no pulp)
- Avocado
- Banana
- Baked, peeled apple
- Apple sauce
- Canned apricots, orange segments, pears, peaches
- Peels, ripe pears, peaches

Do Not Choose

- Fruit juice with pulp
- Dried fruits
- Fruit with edible seeds or tough skins
- All other raw fruits

Diet Education- Meats

Choose

- Tender meats, not fried or heavily seasoned
- Poultry, not fried or heavily seasoned
- Fish, not fried or heavily seasoned
- Eggs, not fried
- Smooth peanut butter
- Tofu

Do Not Choose

- Fried meats, fish and poultry
- Heavily seasoned or spiced meats or cold cuts
- Fried eggs
- Chunky peanut butter

Diet Education- Dairy

Choose

- 1% or 2% milk
- Yogurt (no nuts, seeds, dried fruit)
- Cheese
- Milk alternatives e.g. soy milk, almond milk, rice milk
- Small amounts of butter, cream, sour cream

Do Not Choose

- Yogurts with berries, fruits, granola, seeds

Diet Education- Sweets

Choose

- Plain cake
- Sugar cookies
- Ice cream
- Custard
- Sherbet
- Gelatin
- Fruit whips

Do Not Choose

- Pastries
- Pies
- Desserts containing nuts, seeds, dried fruit
- Fruit with seeds or tough skins

Diet Education- Miscellaneous

Choose

- Salt
- Vinegar
- Ketchup
- Mayonnaise
- Herbs
- Flavor extracts
- Ginger, cumin, paprika, cinnamon

Do Not Choose

- Olives
- Pepper
- Horseradish
- Mustard
- Pickles
- Popcorn
- Potato chips

GI Soft Diet Education

Sample Menu

Breakfast	Lunch	Dinner
Orange juice	Cream of Tomato Soup	Lean roast beef
Rice Krispies	Turkey sandwich on white bread	Parslied potatoes
White toast	Mayonnaise	Spinach
Margarine	Angel food cake	Dinner roll
Jelly	Fruit cocktail	Banana
2% milk	2% milk	Low-fat frozen yogurt
Coffee		2% milk

GI Soft Diet Education

Reintroducing fiber

- It is important to reintroduce fiber when the time comes, and to do so gradually
- Suggest adding fiber to one meal per day to allow your body to readjust.
- E.g. choose oatmeal for breakfast the first day and switch to brown pasta at lunch-time the next day
- Soluble fibers recommended

Emphasis on Hydration

• Fluid !

• Caffeinated drinks and alcohol:

- Tea, coffee, soda and alcohol can be dehydrating
- Limit caffeinated beverages to 1 cup per day
- Ask provider before drinking alcohol

Emphasis on Hydration

• Risk of dehydration: poor appetite, nausea or fatigue

- **Signs of dehydration:** thirst, dry skin and lips, constipation, infrequent urination (less than 5 times a day), dark colored urine, weakness, fatigue, headache

• Stoma output:

- Changes in volume
- When to contact provider

Supplementing PO Intake

- PO intake may be assumed to be low immediately post-op ^{3,6}

Suggested criteria:³

- Immediate supplementation in the malnourished
- Inadequate PO intake for 7-14 days
- Suspected inadequate PO intake for 7-14 days

Supplementing PO Intake

- No consensus on timing
- Prolonged fasting associated with loss of gut integrity, atrophy of microvilli and decrease in GALT tissue ³
- PO intake safe 4 hours post-op ³
- Early EN associated with lower post-op complications ³
- Increased risk of vomiting but no increase in PNA³

Supplementing PO Intake

Suitable **general supplements** post-op:

- Vast majority are **lactose free** and **gluten free**
- **"Compact"** – low volume, no fiber, micronutrients
 - e.g. Ensure Compact, Boost Compact
- **Avoid Fiber**-containing supplements – 3g fiber per carton
 - e.g. Boost Plus / Ensure Plus / Premier Protein

Supplementing PO Intake

Specific Supplements:

- **Clear liquid** – fiber-free e.g. Boost Breeze, Ensure Clear
 - Diabetishield (if needed for blood glucose control)
- **Renal**- low volume, high protein, fiber-free
 - e.g. Nepro, Novasource Renal
- **Very low carb / high protein**- not appropriate
 - Unless bariatric

Supplementing PO Intake

- Suggest consulting a Dietitian
- Suggest a **general multivitamin** daily
- Other supplements?

Specialized Supplementation

- **Immunonutrition**-
 - Arginine
 - Nucleotides
 - Omega 3 fatty acids

Specialized Supplementation

Immunonutrition- *Colorectal / Upper & Lower GI*

- Reduced LOS ^{19, 20}
- Reduced post-op complications ^{15, 20}
- Reduced post-op infections ^{15, 20}
- Fewer antibiotic therapy days in those with infection ²⁰
- Reduced wound infections vs standard supplementation¹⁵

Specialized Supplementation

Immunonutrition-

- Beware of bias, conflict of interest ²¹
- Recommended:
 - 2-3 cartons for 5-7 days pre-op
 - 2-3 cartons for 5-10 days post-op

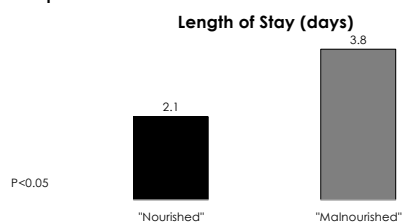
Early Experience

- 47 patients during an early 3-month period
- 98% screened on admission- MST
- 11% identified as "at risk"
- <21% seen by an RD

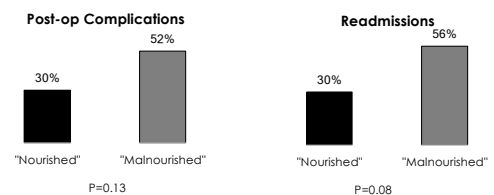
Early Experience

- 57% had significant / severe weight loss within 90 days of surgery
- 89% progressed to GI soft diet on POD# 1
- Intake records limited

Early Experience



Early Experience



Other ERAS Surgeries and Nutrition

- Pathway remains the same
- Certain groups may have lesser / greater nutrition risk and nutrition needs
- Suggest many discharge on Regular diets

Other ERAS Surgeries and Nutrition

Bariatric Diet

- Little change from previous protocol
- POD#0 : Bariatric clear liquids, lactose free
 - 30 mL/hour 6 hours post-op
 - 60 mL/hour 8 hours post-op
 - 60 mL/hour & 30 mL liquid protein 10 hours post-op
- POD#1: Bariatric full liquids 60 mL + bariatric clears 60 ML every hour maximum

Other ERAS Surgeries and Nutrition

Bariatric Diet

- Bariatric Full liquid diet for 2 weeks post-op (60g protein)
- Pureed diet for 2 weeks (>60g protein)
- Mechanical soft, limited sugar for 2 weeks (>80g protein)
- Regular diet by 6-8 weeks post-op
- Prioritize protein!
- 64oz fluid per day
- **Supplements:** high in protein (>20g), low in total carbohydrates (<10g) low in sugar (<5)

Conclusion

- Nutrition is important throughout
- Malnutrition is a great risk and affects outcomes
- Nutrition screening and support warranted pre-operatively
- Large role for supplementation

ERAS Pathway & Nutrition

"almost all the interventions in ERAS are either directly or indirectly related to the nutrition of the patient"

...

"consultation and evaluation by a nutritionist is preferable"

Parrish, C. R. Enhanced Recovery After Surgery: If You Are Not Implementing it, Why Not? *Practical Gastroenterology* 2016;151, 46-56

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The Economics of ERAS – Can you afford not to do it?

Thomas Hopkins, MD
Director of Quality Improvement
Department of Anesthesiology
Duke University Hospital

Associate Medical Director for Care Redesign
Office of the Vice President for Medical Affairs and Chief Medical Officer
Duke University Health System

Outline

- Value in a Post-Health Care Reform Environment
- Maximizing Value in the Perioperative Space through ERAS
 - Do Enhanced Recovery Programs (ERPs) save money?
 - How do I get the most out of my investment?
- Conclusions
- Recommendations for Success



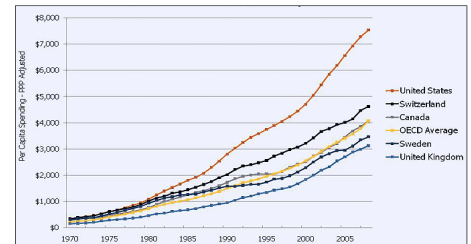
Value in a Post-Health Care Reform Environment

COUNTRY RANKINGS												
Top 10*												
Bottom 10*												
	USA	UK	GER	FRA	ITA	ESP	CHN	IND	BRA	ARG	PER	THA
OVERALL RANKING (2012)	4	10	9	5	5	7	7	3	2	1	11	11
Quality Care	2	9	9	7	5	4	11	10	3	1	9	9
Effective Care	4	7	9	6	5	2	11	10	6	1	9	9
Safe Care	7	10	2	6	7	9	11	2	4	1	7	7
Coordinated Care	4	8	9	10	5	2	7	11	3	1	9	9
Patient-Centered Care	5	8	10	7	3	6	11	9	2	1	4	4
Access	8	9	11	2	4	7	6	4	2	1	9	9
Cost-Related Problems	9	5	10	4	8	6	3	1	7	1	11	11
Treatment of Care	6	11	10	4	2	7	6	3	1	1	9	9
Efficiency	4	10	8	9	7	2	4	2	4	1	11	11
Equity	5	9	7	4	8	10	6	1	3	2	11	11
Healthy Lives	4	8	1	7	5	9	6	2	3	10	11	11
Health Expenditure/Capita, 2011**	\$3,800	\$4,522	\$4,118	\$4,495	\$5,099	\$3,182	\$5,609	\$3,925	\$5,643	\$3,405	\$8,500	\$8,500

*Ranks are based on 2012 PPP (purchasing power parity) adjusted GDP per capita. **Expenditure shown in 2011 PPP (purchasing power parity) adjusted GDP per capita. Source: Calculated by the Commonwealth Fund based on 2012 International Health Policy Survey of Primary Care Physicians, 2012 International Health Policy Survey, Commonwealth Fund National Survey (2012), World Health Organization, and Organization for Economic Cooperation and Development, 2012 Health Data, 2012 (Paris, 2012), Nov. 2013.

Value in a Post-Health Care Reform Environment

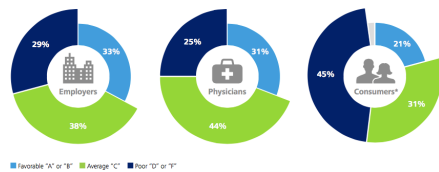
Exhibit 3
Growth in Total Health Expenditure Per Capita, U.S. and Selected Countries, 1970-2008



Value in a Post-Health Care Reform Environment

Figure 1. Overall performance of the U.S. health care system*

Using a typical report card scale with grades of A, B, C, D, and F, with A being excellent and F being failing, how would you grade the overall performance of the U.S. health care system?



Value in a Post-Health Care Reform Environment



Value in a Post-Health Care Reform Environment



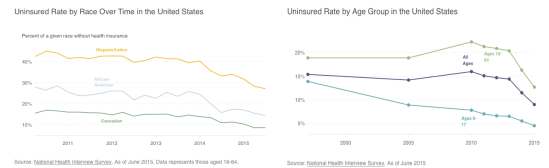
Value in a Post-Health Care Reform Environment

- Improve Outcomes
 - Reduce Costs
 - Enhance Efficiency
- Enrich Overall Quality

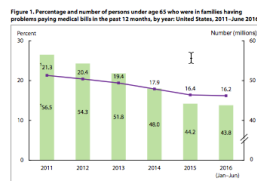
Value in a Post-Health Care Reform Environment

- 20% of uninsured adults go without needed medical care due to cost
- Studies repeatedly demonstrate that the uninsured are less likely than those with insurance to receive preventative care and services for major health conditions and chronic disease
- 53% of uninsured have problems paying medical bills

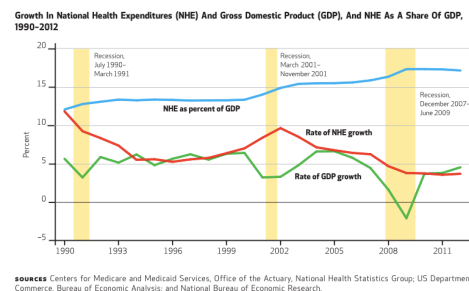
Value in a Post-Health Care Reform Environment



Value in a Post-Health Care Reform Environment



Value in a Post-Health Care Reform Environment

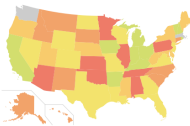


Value in a Post-Health Care Reform Environment

Changes in Insurance Premiums for Obamacare Marketplace Plans From 2016 to 2017

Benchmark Silver marketplace premiums (2nd lowest before tax credit) were calculated using the rates for a 40-year-old non-smoker making \$30,000 per year. The average increase for 2017 benchmark premiums for all healthcare.gov states is 25%.

Percent Change in Monthly Silver Premiums from 2016 to 2017



Sources: Kaiser Family Foundation and Department of Health and Human Services. Slide 003032.c

Value in a Post-Health Care Reform Environment

US healthcare: Senate 'skinny repeal' bill fails

28 July 2017 | US & Canada

Facebook Twitter Email Share

By David Finkelstein

WASHINGTON — U.S. Senate Majority Leader Mitch McConnell (R-Ky.) announced on Tuesday that his party's "skinny repeal" bill, which would repeal the individual mandate and the federal subsidies for health insurance, has failed to pass the Senate.

The bill, which was introduced by Sen. Tom Cotton (R-Ark.), was defeated by a vote of 51-49.

The vote was a narrow one, and McConnell said he was disappointed.

He said he would continue to work on the bill, but he was not optimistic.

The bill was expected to pass the Senate, but it fell short.

The bill was a major disappointment for the GOP.

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#POLITICS JULY 19, 2017 / 6:03 AM / 25 DAYS AGO

GOP RELEASES SENATE DRAFT OF H DEEP CUTS FOR

Republicans meet late into night as Trump demands new U.S. healthcare plan

Republicans meet late into night as Trump demands new U.S. healthcare plan

Emotions Of Chuck Norris



Maximizing Perioperative Value

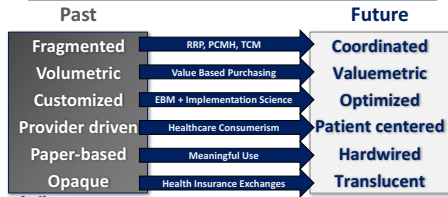
$$V = \frac{Q + S}{\$}$$

(VALUE) (QUALITY) (SERVICE) (COST)

http://HealthBusinessLab.edu/chucknorris201705_journeys_value.php#18122017a1018

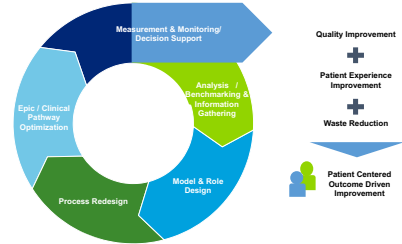
Maximizing Perioperative Value

Updating traditional approaches to care delivery



Page 19

Maximizing Perioperative Value

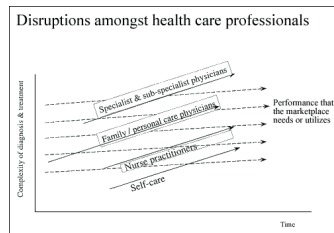


Maximizing Perioperative Value

Factors Which Nurtured Accretive Innovation	Factors that Can Increase Disruptive Innovation	Patients	Providers	Payers
Low price sensitivity	Higher patient cost sharing	X	X	X
Fee for service payment	Bundled payments and "accountable care"		X	
Provider profit incentives	Decline in physician private practice		X	
Guild-style regulations	Decreasing influence of professional societies		X	
Non-transparency	More transparency	X	X	X

Source: Zimlichman and Levin-Scherz, JGIM, 2013

Maximizing Perioperative Value



- Hospitals
- Outpatient clinics and focused care centers
- In-office Care
- In-home Care

Enhanced Recovery Pathway

Words in the cloud include: Surgery, Normothermia, optimize, Preoperative, Education, Intraoperative, Postoperative, Team, Communication, Multidisciplinary, Patient, Satisfaction, Collaboration, Length of Stay, Cost Reduction, Fluid Management, and Resuscitation.

Maximizing Perioperative Value through ERAS

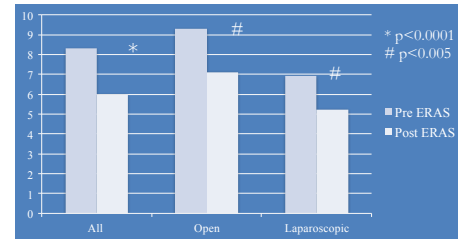
- Common Expectations
- Reduce Narcotics
- Standardize Volume Resuscitation Algorithm

Maximizing Perioperative Value through ERAS

Preoperative	Intraoperative	Postoperative
Identify patients	Thoracic epidural	Early feeding
Educate about program	Goal Directed Fluid Therapy	Early mobilization
Screen for malnutrition	Multimodal Analgesia	Optimize fluid regimen
Selective bowel preparation	Antibiotics before incision	Optimize analgesic regimen
Carbohydrate drink	Thromboprophylaxis	No NG tube or urinary catheter

Miller, T., et al. An Enhanced Recovery after Surgery (ERAS) Program Reduces Length of Stay and Complications after Colorectal Surgery. Abstract presented at Anesthesia Society of America, October 15, 2011.

Maximizing Perioperative Value through ERAS



Miller, T., et al. An Enhanced Recovery after Surgery (ERAS) Program Reduces Length of Stay and Complications after Colorectal Surgery. Abstract presented at Anesthesia Society of America, October 15, 2011.

Maximizing Perioperative Value through ERAS

	Pre ERAS	Post ERAS	P values
Intraoperative			
Crystalloid (ml)	3170 ± 1621	2261 ± 1282	<0.0001
Colloid (ml)	716 ± 519	1072 ± 530	<0.0001
Estimated blood loss (ml)	319 ± 314	246 ± 430	0.0003
Postoperative			
POD to first oral liquid	1.8 ± 1.9	0.5 ± 1	<0.0001
POD to first stool	3.4 ± 1.7	2.4 ± 1.6	0.0001
Urinary Tract Infection (%)	24.2%	13.4%	0.03
Readmission (%)	20.2%	9.8%	0.02
Death (%)	1%	0%	0.41

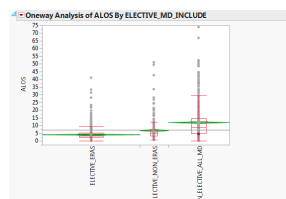
Miller, T., et al. An Enhanced Recovery after Surgery (ERAS) Program Reduces Length of Stay and Complications after Colorectal Surgery. Abstract presented at Anesthesia Society of America, October 15, 2011.

Maximizing Perioperative Value through ERAS

	Pre ERAS	Post ERAS	P values
Total Hospitalization Cost	\$22,984 (22,116)	\$19,344 (11,706)	0.138
Laboratory Costs	\$1,172 (1,083)	\$856 (656)	0.011
Chest X-ray Costs	\$262 (522)	\$135 (404)	0.046

Miller, T., et al. An Enhanced Recovery after Surgery (ERAS) Program Reduces Length of Stay and Complications after Colorectal Surgery. Abstract presented at Anesthesia Society of America, October 15, 2011.

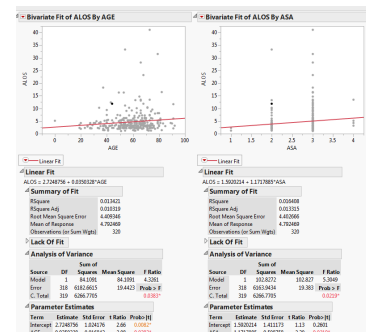
Maximizing Perioperative Value through ERAS



At DUHS, ERAS MDs have a ~2.5 day lower LOS and a decreased readmission rate compared to the elective non ERAS MDs

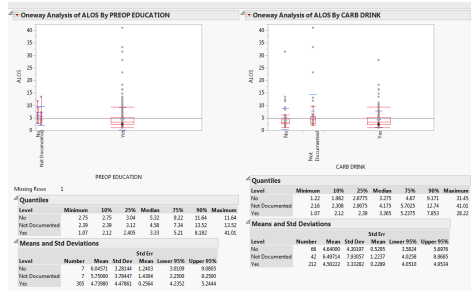
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Age and ASA



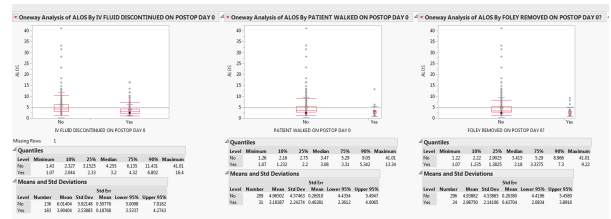
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LOS – Preop Education and Carb Drink



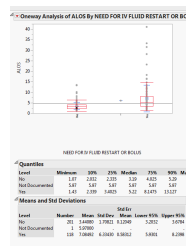
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LOS – Fluids, Walked, Foley Removal



32

LOS – IV Fluid Restart



33

Maximizing Perioperative Value through ERAS

Perioperative Fluid Utilization Variability and Association With Outcomes: Considerations for Enhanced Recovery Efforts in Sample US Surgical Populations.

Tricker JK¹, Mountford WK, Emel FB, Kulkarni MR, Mythen MM.

- Premier database
- Over 100,000 patients
- Low < 1.7L DOS fluids
- High > 5L DOS fluids



CONCLUSIONS: According to results from this review of current practice in US hospitals, fluid optimization would likely lead to decreased variability and improved outcomes.

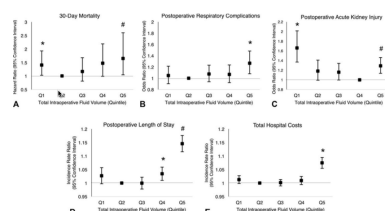
Maximizing Perioperative Value through ERAS

Effects of Intraoperative Fluid Management on Postoperative Outcomes

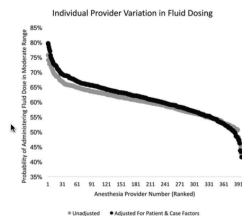
A Hospital Registry Study

Christina H. Shin, MD,* Dustin R. Long, MD,* Duncan McLean, MBChB,*†
 Stephanie D. Grabitz, Cand. Med.‡ Karim Luthra, MD, MSc.‡ Fanny P. Tinn, Cand. Med.*
 Tharusan Thevathasan, Cand. Med.* Alberto Pieretti, MD,§ Cristina Ferrone, MD,§
 Andreas Hoeft, MD, PhD,¶ Thomas W. L. Scheeren, MD, PhD,|| Boyd Taylor Thompson, MD,**
 Tobias Kurth, MD, ScD,††† and Matthias Eikermann, MD, PhD*

Maximizing Perioperative Value through ERAS



Maximizing Perioperative Value through ERAS

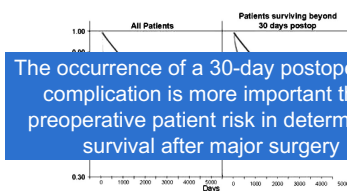


Maximizing Perioperative Value through ERAS

Determinants of Long-Term Survival After Major Surgery and the Adverse Effect of Postoperative Complications

Shukri F. Khuri, MD,*† William G. Henderson, PhD,§ Ralph G. DePalma, MD,¶
Cecilia Mosca, MSPH,§ Nancy A. Healey, BS,* Dharam J. Kumbhani, MD, SM,* and the Participants
in the VA National Surgical Quality Improvement Program

Maximizing Perioperative Value through ERAS



- 69% decrease in median survival if ≥1 30-day complication
- 105,951 patients

Khuri, Ann Surg 2005;242: 326-343

Maximizing Perioperative Value through ERAS

A Systematic Review and Meta-Analysis on the Use of Preemptive Hemodynamic Intervention to Improve Postoperative Outcomes in Moderate and High-Risk Surgical Patients

Mark A. Hamilton, MRCP, FRCA, Maurizio Cecconi, MD, and Andrew Rhodes, FRCP, FRCA

Maximizing Perioperative Value through ERAS

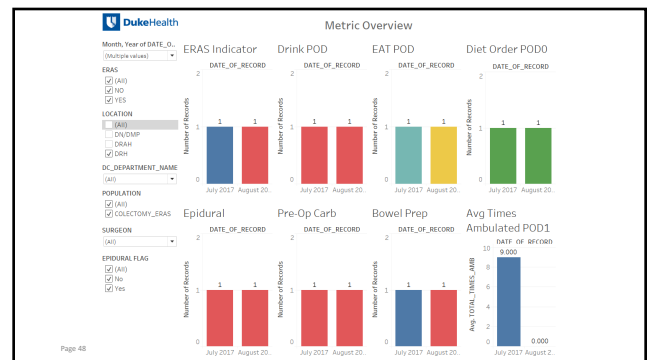
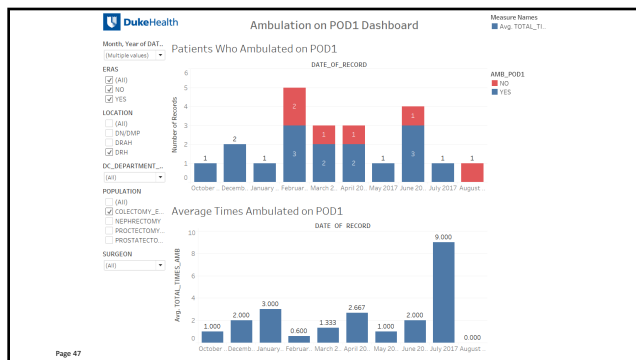
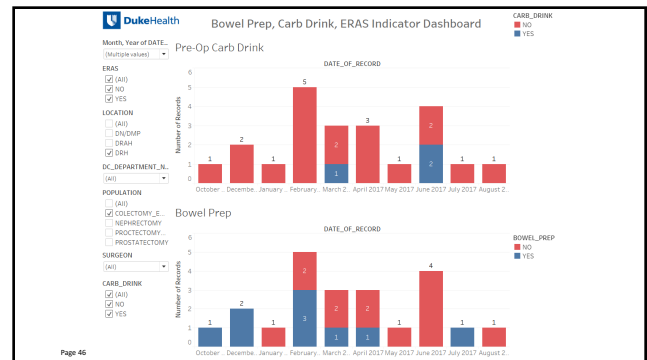
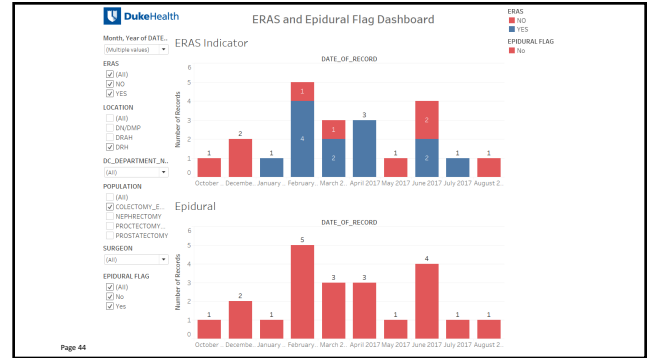
Study or Subgroup	Protocol		Control		Odds Ratio		Odds Ratio	
	Events	Total	Events	Total	Weight	M-H, Random, 95% CI	M-H, Random, 95% CI	
Bender 1997 (32)	11	68	21	4.1%	0.26 (0.10, 0.76)			
Berkson 1991 (31)	7	50	28	5.6%	0.48 (0.12, 1.92)			
Bonczak 2002 (29)	15	80	82	9.3%	0.45 (0.22, 0.92)			
Chen 2007 (26)	9	29	9	3.3%	0.48 (0.12, 1.92)			
Combes 2002 (29)	6	50	20	6.1%	0.31 (0.13, 0.77)			
Cost 2002 (23)	6	50	0	0.0%	0.07 (0.00, 1.24)			
Laba 2000 (22)	6	19	12	2.7%	0.23 (0.06, 0.91)			
Laba 2006 (22)	14	25	17	3.8%	0.60 (0.19, 1.80)			
Laba 2007 (20)	7	17	12	2.3%	0.23 (0.05, 1.02)			
Maheshwari 2008 (19)	1	15	1	0.8%	0.28 (0.01, 1.12)			
Mokendry 2004 (18)	17	89	26	9.9%	0.54 (0.27, 1.08)			
Mohr 1995 (27)	6	30	6	0.6%	0.66 (0.06, 1.15)			
Nahata 2008 (16)	1	51	8	1.1%	0.13 (0.01, 0.91)			
Pavone 2000 (15)	27	62	41	8.9%	0.38 (0.17, 0.79)			
Pratt 2008 (14)	2	198	11	2.2%	0.17 (0.04, 0.68)			
Schulz 1985 (12)	25	3	35	1.5%	0.65 (0.10, 4.13)			
Shenkar 1988 (11)	8	28	36	5.4%	0.40 (0.15, 1.01)			
Ueno 1994 (9)	4	18	5	1.8%	0.87 (0.19, 4.01)			
Valentine 1998 (8)	15	60	30	6.3%	1.87 (0.84, 4.08)			
Vera 2002 (7)	7	30	14	2.9%	0.33 (0.11, 1.08)			
Waldman 2005 (6)	24	67	58	10.0%	0.43 (0.22, 0.82)			
Wilson 1999 (5)	38	92	28	4.6%	0.45 (0.22, 0.93)			
Total (95% CI)	1228	347	1164	100.0%	0.44 (0.35, 0.55)			
Total events	221	322	1228	P = 0.41; I² = 2%				
Heterogeneity: Tau² = 0.61; Chi² = 22.52, df = 22 (P = 0.43); I² = 2%								
Test for overall effect: Z = 2.14 (P = 0.033)								

Anesth Analg 2011;112:1392-402



Maximizing Perioperative Value through ERAS

Metric	Status
Epidural (yes/no)	Complete
Pre-op Bowel Prep	Complete
Pre-op Carbohydrate Drink	Complete
Total IV fluid in OR	In progress
Type and amount of narcotics in OR (IV bolus)	In progress
Ambulation on POD0, 1?	Complete
# of times ambulated on POD1+	Complete
Distance of ambulation on POD1+	Complete
Ate on POD0? If not, what day?	Complete
Drank on POD0? If not, what day?	Complete
Foley removed on day 1	In progress
Discontinue IV fluid by day 1	In progress



Maximizing Perioperative Value through ERAS

WAVE	BUNDLE	HOSPITAL	Total Direct Cost per Case				Adj. Total Direct Cost per Case				Adj. % Change
			Mean 2014	Mean 2017	Target	CR-adjusted direct cost per case	Mean 2014	Mean 2017	Target	CR-adjusted direct cost per case	
TOP WAVE 5	COLECTOMY (ERAS)	DRHM									12.7%
		DRH									31.6%
		DRH									-3.0%
	PROCTECTOMY (ERAS)	DRHM									5.0%
		DRH									-45.5%
		DRH									-2.1%

Maximizing Perioperative Value through ERAS

Enhanced recovery pathways optimize health outcomes and resource utilization: A meta-analysis of randomized controlled trials in colorectal surgery

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Table II. Randomized, controlled trials comparing ERPs to traditional care

	Length of stay		Readmission rate total hospital stay		Morbidity	
	ERP	Traditional	ERP	Traditional	ERP	Traditional
Anderson et al ²⁶	3 Md	7 Md*	0%	0%	28.6%	45.5%
UK, 2003	5.96 mn	6.99 mn*				
11 TC/14 ERP						
Delaney et al ⁷	5.2 mn	5.8 mn	9.7%	18.2%	22%	30%
USA, 2005						
88 TC/51 ERP						
Gatt et al ¹	5 Md	7.5 Md***	5.3%	20%	47.4%	75%
UK, 2005	6.6 mn	9 mn	N/A	N/A		
20 TC/19 ERP						
Khoo et al ⁷	5 Md	7 Md****	9%	3%	25.7%	51.4%
UK, 2007	5 mn	7 mn	5 Md	7 Md****		
35 TC/35 ERP						
Sevelius et al ²⁷	7 Md	9 Md****	0%	0%	21.6%	48.1%****
CZ, 2009	7.4 mn	10.4 mn****				
52 TC/51 ERP						
Muller et al ²⁷	5 Md	9 Md*****	3.9%	2.6%	21.1%	49.3%****
CH, 2009	6.7 mn	10.3*****	N/A	N/A		
75 TC/76 ERP						

Includes low rectum.

Differences are not statistically significant, unless indicated: *P < .002; **P < .02; ***P < .025; ****P < .001; *****P < .0001. CH, Switzerland; CZ, Czech Republic; ERP, enhanced recovery pathway; Md, median; mn, mean; N/A, not available; TC, traditional care; UK, United Kingdom; USA, United States of America.



source: <http://blog.skillhippo.com/>

Conclusions

- Healthcare reform is driving a paradigm shift in our definition of perioperative value
 - We must reevaluate our value proposition in a reformed environment
 - Integrated innovation is critical to success
- ERAS can be effectively leveraged to improve value of care in the OR
 - Improve patient ownership / empowerment
 - Reduce variability => reduced LOS, perioperative morbidity and long-term mortality

Recommendations For Success

- Essential elements will be similar, but ERAS protocols must be customized to each site
 - Standardize practices
 - Improve care processes
- Scope
 - Patient education / expectation management
 - Reduce complications
 - Hypoperfusion
 - Opioids
 - Infection
- Core Informatics Infrastructure (Data Acquisition and Analytics)
- Multidisciplinary Care Team focused on Effective Implementation

Recommendations For Success

“The immediate challenge to improving the quality of surgical care is not discovering new knowledge, but rather how to integrate what we already know into practice.”

—David Urbach

References

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Colorectal and Bariatric ERAS: Then and Now

Vicki Morton DNP, MSN, AGNP-BC
Clinical and Quality Outcomes Coordinator
- PAA

Back to the Past

- Prolonged fasting
- Mechanical bowel prep
 - Prevent intraoperative contamination
- Nasogastric tube
 - Prevent early passage of bowel content through an anastomotic suture line while healing
- Drains were considered essential
- Prolonged bedrest

Evidence always trumps dogma!



Multimodal approach to control postoperative pathophysiology and rehabilitation.

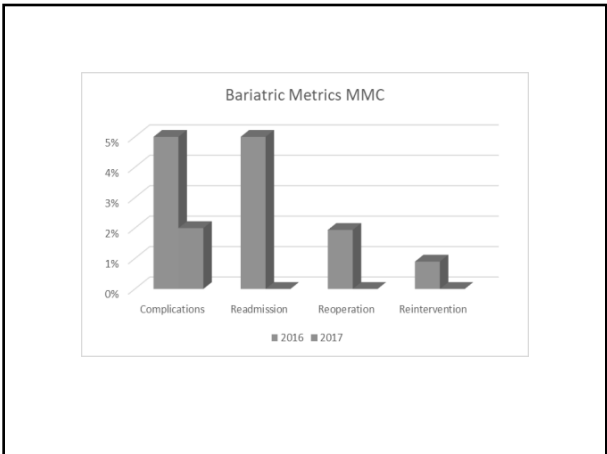
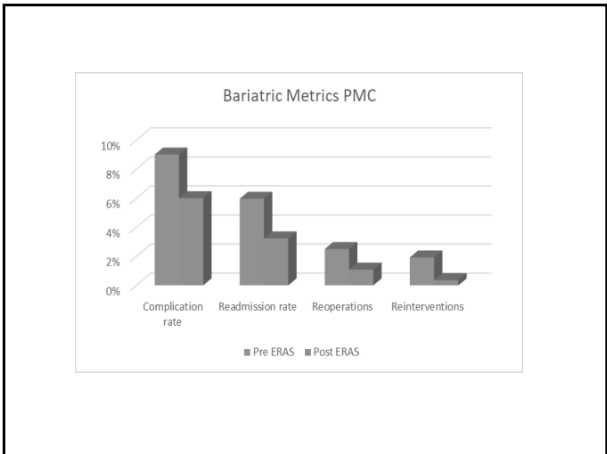
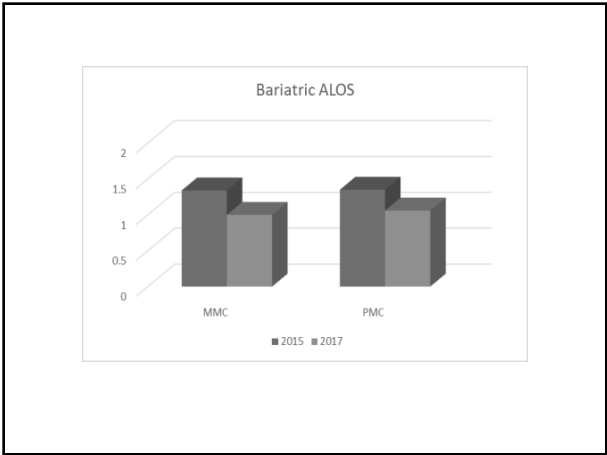
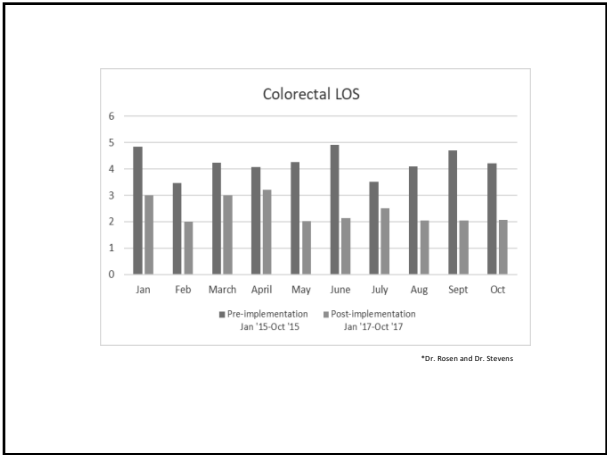
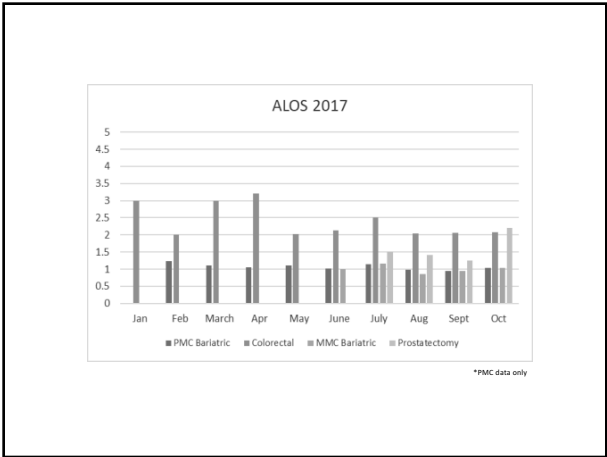
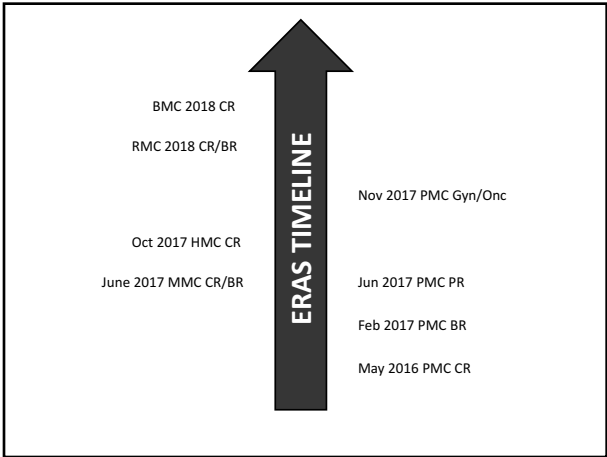
Kehlet, H., 1997. Multimodal approach to control postoperative pathophysiology and rehabilitation. Br J Anaesth, Br J Anaesth 78, 606-17.

“Modern anesthesia and surgical technique have failed to prevent complications and delayed recovery. Surgery reliably produces altered organ function throughout the body, referred to as the ‘surgical stress response’...”

Consensus Review of Optimal Perioperative Care in Breast

Recovery After Surgery (ERAS) Society
Guidelines for Perioperative Care in Bariatric Surgery: Enhanced Recovery After Surgery (ERAS) Society Recommendations
Guidelines for perioperative care after radical cystectomy for bladder cancer: Enhanced Recovery After Surgery (ERAS) Society Recommendations
Enhanced Recovery After Surgery (ERAS) for gastrointestinal surgery, part 1: pathophysiological considerations
Guidelines for postoperative care in gynecologic/oncology surgery: Enhanced Recovery After Surgery (ERAS®) Society Recommendations
Guidelines for pre- and intra-operative care in gynecologic/oncology surgery: Enhanced Recovery After Surgery (ERAS®) Society Recommendations
Consensus guidelines for enhanced recovery after gastrectomy
Guidelines for Perioperative Care for Liver Surgery: Enhanced Recovery After Surgery (ERAS) Society Recommendations
Guidelines for Perioperative Care for Pancreaticoduodenectomy: Enhanced Recovery After Surgery (ERAS®) Society Recommendations
 Kristoffer Lauen - Marielle M. E. Coenen - Karen Slim - Francesco Carli - José E. de Aguiar-Nascimento - Markus Schäfer - Rowan W. Parks - Kenneth C. H. Fearon - Hilary N. Lobo - Nicolas Demartines - Marco Braga - Ole Ljungqvist - Cornelis H. C. Dejong

- Pre-habilitation
- Carb loading
- PONV prevention
- Multimodal analgesia
- Minimally invasive
- Goal directed fluid therapy
- Reduce/eliminate opioid consumption
- Early PO intake
- Early/frequent ambulation



From Office Visit to Hospital Discharge—

Rob Stevens MD FACS FASCRS
Novant Health Charlotte Colon & Rectal Surgery
Co-Chair Novant Health ERAS Steering Committee



Office

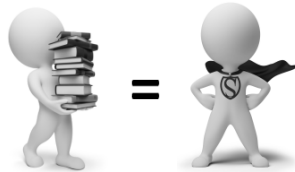
- Introduction to Enhanced Recovery
- Identify patient as appropriate for ERAS



= ERAS

Office

- Introduction to Enhanced Recovery
- Identify patient as appropriate for ERAS
- Knowledge is power



Office

- Introduction to Enhanced Recovery
- Identify patient as appropriate for ERAS
- Knowledge is power
- Engage in pre-habilitation



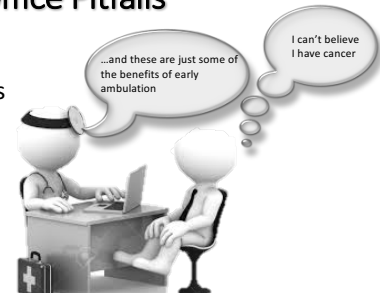
Office Pitfalls

- Time is scarce



Office Pitfalls

- Time is scarce
- Attention & Focus



Office Pitfalls

- Time is scarce
- Attention & Focus
- Personal Experience and historical bias



Pre-Surgical Services

- Optimizing available resources
 - ERAS teaching
 - Pre-anesthesia screening
 - Ostomy teaching & marking
 - Dispensing Carbohydrate beverage
 - Coordinating with pre-operative visit (when feasible)

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 - ERAS teaching
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 - Ostomy teaching & marking
 - Dispensing Carbohydrate beverage
 - Coordinating with pre-operative visit (when feasible)
- Present consistent information between office and PSS

Pre-Op Holding

- Standardized pre-op order set



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- Coordination of Multi-modal analgesia
 - TAP block
 - Epidural catheters



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- Reinforce expectations for the day



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- Reinforce discharge criteria



Intra-Op

- Parallel processing to reduce room turnover time



Intra-Op

- Parallel processing to reduce room turnover time
- Communication regarding patient-specific deviations from protocol



PACU

- Allowing oral intake
- Defaulting to oral analgesia
- Ambulation



Floor

- Let old habits die



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- Re-engage the families



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Floor

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- Re-engage the families
- Reinforce discharge criteria
- Portray the VIP status
- Engage the nursing staff to embrace the paradigm shift
- Anticipate need for re-education
- Daily assessment of milestones and compliance on rounds



Discharge

- Set realistic expectations



Discharge

- Set realistic expectations
- Modify prescribing behaviors that parallel paradigm shift



Future Directions

- Refined and streamlined patient education
 - Brochures
 - Videos



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 - Brochures
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- Opioid-free OR and recovery
- Improved EMR metrics for data tracking and compliance
- Patient Satisfaction Surveys



Enhanced Recovery after Surgery





Surgical Perspectives at Novant Health: From Office Visit to Hospital Stay— Lessons Learned in Bariatrics

Novant Health Bariatric Solutions

David C. Voellinger, Medical Director Novant Health Bariatric Center

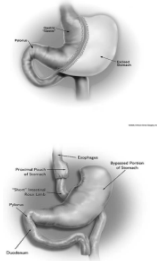
Charlotte, NC

Making healthcare remarkable



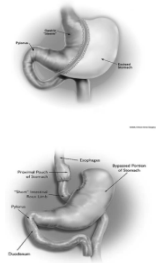
Why ERAS for Bariatrics (con)?

- 99.9% laparoscopic
- Typical LOS for sleeve gastrectomy is 1 day, for gastric bypass 2 days
- High incidence of chronic pain with opioid use
- Morbid obesity challenging for TAP blocks
- Already using Emend
- UGI surgery response different from LGI response—ileus uncommon
- Already had established patient education and hospital protocols



Why ERAS for Bariatrics (pro)?

- Increased pain from stomach extraction site, port removal site, EEA insertion site
- Potentially decrease LOS for gastric bypasses
- High incidence of sleep apnea, atelectasis and respiratory depression in morbidly obese
- High incidence of PONV (particularly with sleeve gastrectomy) with potentially severe complications
- Limited, but positive, published data



Protocol changes

Before ERAS:

1. Morphine PCA with toradol for breakthrough
2. Emend morning of, Zofran prn, Phenergan prn breakthrough for PONV
3. NPO after MN
4. Foley catheter for gastric bypass
5. Marcaine for local anesthesia
6. Pneumoperitoneum at 20
7. No Valsalva as trocars removed

After ERAS:

1. Tylenol, Toradol and Neurontin scheduled
2. Emend morning of, Decadron, Scopolamine, Zofran prn, no phenergan for PONV
3. Clearfast night before and morning of
4. No Foley catheters
5. TAP block and Marcaine
6. Pneumoperitoneum at 15
7. Valsalva as trocars removed



Protocol changes cont.

Before ERAS:

1. NPO except ice chips POD 0, Bariatric clears POD 1, Bariatric fulls POD 2
2. No Colace in post-op regimen

After ERAS:

1. NPO except ice chips until 6 hours post-op then Bariatric clears, then start Bariatric fulls in 4 hours
2. Added Colace to post-op regimen



Protocol revisions

1. Still noted significant PONV, particularly with sleeves—added Haldol and liter bolus preop
2. Noted some elevated creatinine and decreased urine output—added preop bolus and standard intraop IVF regimen, removed goal-directed therapy and decreased Toradol from 30mg to 15mg



Objective Improvements

- Decreased use of narcotics
- Decreased PONV
- Decreased LOS for gastric bypass



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Subjective Observations

- Patients more alert
- Patients more mobile
- Patients ready to go home POD #1
- Many patients have little to no pain or nausea (including sleeves)
- Patients are telling other patients about the ERAS protocol



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Keys to Implementation

- ERAS education in pre-op class by Navigators
- Patient education brochure
- Teamwork between office, ACU, OR, PACU, floor, dietary, pharmacy with ongoing education
- Aggressive mobilization on floor
- ERAS patient identifier
- Anesthesia ERAS Navigator
- Treat patient as partner

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Future Areas to Study

- **Efficiency**
 - ?TAP blocks in ACU
 - ?Parallel processing to decrease turnover time
 - As part of global initiative to improve OR efficiencies
- **PONV**
 - Study cohort with PONV on ERAS protocol
- **Exparel**
 - Study to compare Exparel with and without TAP blocks
- **Case Cost**
 - Determine economic advantages/disadvantages of ERAS protocol
- **Patient Volume Status**
 - ?Re-visit goal-directed therapy
- **Surgical pre-optimization**

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Novant Health Bariatric Solutions:
A comprehensive program for
weight management



Making healthcare remarkable

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