ERAS and Opioid-Free Anesthesia

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DANA Fall Anesthesia Meeting

Oct. 16, 2021

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Enhanced Recovery After Surgery

- History:
  - Developed as a result of Fast-Track Programs in the 1990's
  - Goal was to modify physiological and psychological response to major surgery

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What is ERAS?

- Enhanced Recovery After Surgery
- ERAS is multimodal approach to surgery, integrating multiple medical specialties in order to reduce hospital length of stay and expedite recovery to baseline
  - Patient
  - Surgeon
  - Anesthesia
  - Nursing
  - Physical and Occupational Therapist

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Goals of ERAS

- Decreased Length of Stay
- Reduce incidence of Organ Dysfunction
- Early Mobilization
- Elimination of NG Tubes and surgical drains
- Decrease Opioid Use thus leading to decreased:
  - PONV
  - Opioid Dependence leading to increased length of stay.
- Decreased Cost of Medical Centers

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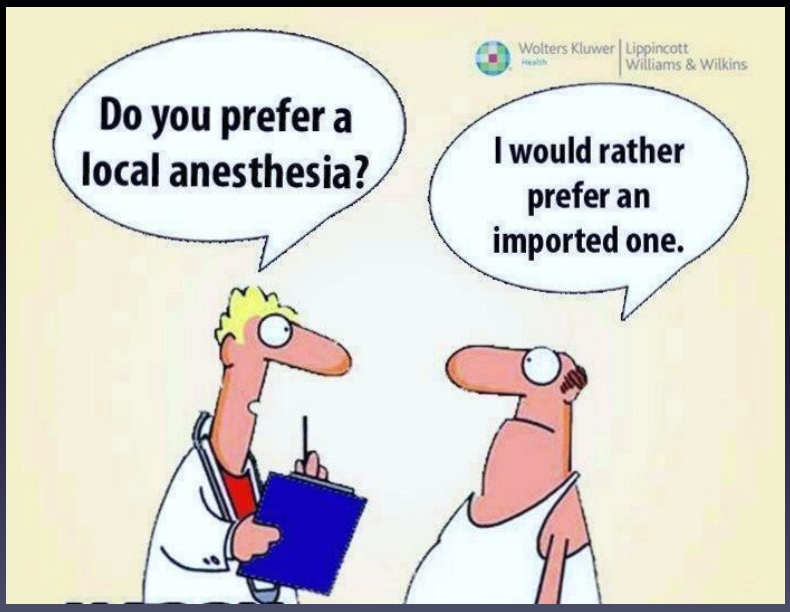

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Pitfalls to Conventional Abdominal Surgery

- Conversion from Laparoscopic to Open
- The Continued need for Parental Analgesia
- GI Tract Dysfunction (No Oral Intake)
- PONV, Dehydration, and the need for IV Fluids
- Respiratory Dysfunction
- Decreased Patient Mobility
- Surgical Site Infection

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Key Elements

- Pre-operative Counselling
- Optimization of Nutrition
- Standardized Analgesic Protocol
- Early Mobilization
- Early Nutrition by Mouth
- Early Discharge

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aser
AMERICAN SOCIETY FOR ENHANCED RECOVERY

ERAS® Society

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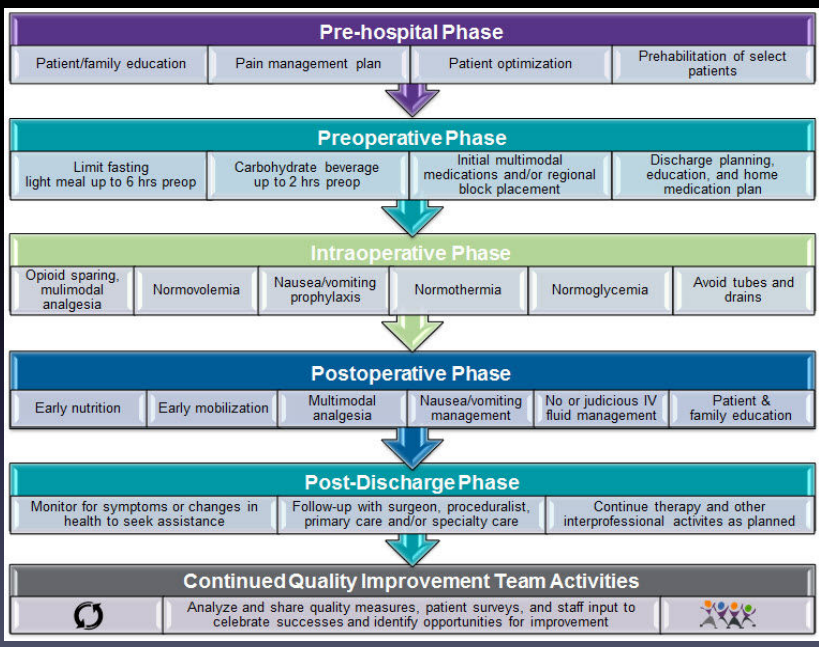

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Grading Evidence

	Description	*Benefit vs risk and burdens*	*Methodologic quality of supporting evidence*	*Implications*
1A	Strong recommendation, high-quality evidence	Benefits clearly outweigh risk and burdens or vice versa	RCTs without important limitations or overwhelming evidence from observational studies	Strong recommendation, can apply to most patients in most circumstances without reservation
1B	Strong recommendation, moderate-quality evidence	Benefits clearly outweigh risk and burdens or vice versa	RCTs with important limitations (inconsistent results, methodologic flaws, indirect or imprecise) or exceptionally strong evidence from observational studies	Strong recommendation, can apply to most patients in most circumstances without reservation
1C	Strong recommendation, low- or very low-quality evidence	Benefits clearly outweigh risk and burdens or vice versa	Observational studies or case series	Strong recommendation but may change when higher quality evidence becomes available
2A	Weak recommendation, high-quality evidence	Benefits closely balanced with risks and burdens	RCTs without important limitations or overwhelming evidence from observational studies	Weak recommendation, best action may differ depending on circumstances or patients' or societal values
2B	Weak recommendation, moderate-quality evidence	Benefits closely balanced with risks and burdens	RCTs with important limitations (inconsistent results, methodologic flaws, indirect, or imprecise) or exceptionally strong evidence from observational studies	Weak recommendation, best action may differ depending on circumstances or patients' or societal values
2C	Weak recommendation, low- or very low-quality evidence	Uncertainty in the estimates of benefits, risks, and burden; benefits, risks, and burden may be closely balanced	Observational studies or case series	Very weak recommendations; other alternatives may be equally reasonable

Adapted with permission from Chest. 2006;129:174–181.[14]
RCT = randomized controlled trial.

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COMMUNICATION: Key Factor in Engagement

- Stakeholders
  - Surgeon
  - Anesthesia
  - Nurses
  - Patient
- Optimal care is achieved with Engagement and Buy-In by ALL Parties Involved

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Pre-Operative Communication

- Nutritional Status
  - Malnutrition vs Continued Nutrition
  - Labs (albumin, C-Reactive Protien)
- Identify High-Risk Patients
  - Geriatric
  - Non-Compliant
  - Opioid Abuser
- Oral and Written Information regarding the procedure and postoperative course
- The Patient must be a WILLING Participant

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Patient and Communication

- Patient
  - Must have full comprehension
    - Procedure
    - Prehabilitation
    - Post-op expectations
  - Agree to compliance with all aspects
- Family
  - Understand the importance of following pre-op and post-op instructions

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Pre-Operative Elements

- Clear Liquid Diet
  - Electrolytes
  - Carbohydrate Loading
- Benefit
  - Research shows that clear liquids 2-4 hours pre-op results in decreased gastric volume and increased PH of Gastric Contents

Pogatschnik, C et al. "Review of Preoperative Carbohydrate Loading", *Nutritional Clinical Practice.* Oct. 2015 30(05): 660-4.

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Carbohydrate Loading

- Carbohydrate loading 2-4 hours pre-op
  - Incident of Insulin Resistance is significantly less.
  - Reduces initation of catabolic state leading to decrease in glucagon and cortisol
- Studies showed patients that carb-loaded had decreased length of stay compared to NPO>8hr
- Increased muscle strength

Feldheiser, A. et al. "Enhanved Recovery After Surgery(ERAS) for gastrointestinal surgery. Part 2: Consensus Statement for Anesthesia Practice" *ACTA Anaesthesiologica Scandinavica*. Mar. 2016 60(3) pg 289-334.
Scott, MJ et al. "Oral Carbohydrate Preload Drink for Major Surgery-the First Steps from Famine to Feast", Anaesthesia. 69(12) pg 1308-13.

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Importance of Prehabilitation

- Surgery increases:
  - energy expenditure
  - Protein synthesis and breakdown
- Important to optimize caloric and protein consumption through minimizing pre-op NPO
- Patient specific plan related to optimal intake
  - Patient may have unintended weight loss
  - Poor Appetite
  - Dysphagia and Nausea

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Prehabilitation

- Enhancement of Patient
  - Peak Exercise Capacity
  - Stabilization of Pre-Existing Conditions
  - Improved Quality of Life including mental wellness

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Glucose Management

- Pre-operative Serum Blood Glucose
  - Preoperative level <180 mg/dl
- Intraoperative Goal
  - Maintain <200 mg/dl
- Important to aim for levels 100- 140 mg/dl in diabetic patients.
- Change noted in the 2018 guidelines

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Antibiotic Regimen

- Preoperative Oral Antiobiotics w/Bowel Prep
  - Decreased Morbidity in colon resection
  - Decreased surgical site infection
- 1gm Invanz 30-60 min before Incision
  - ↓Infection rate 19.3% to 5.7%

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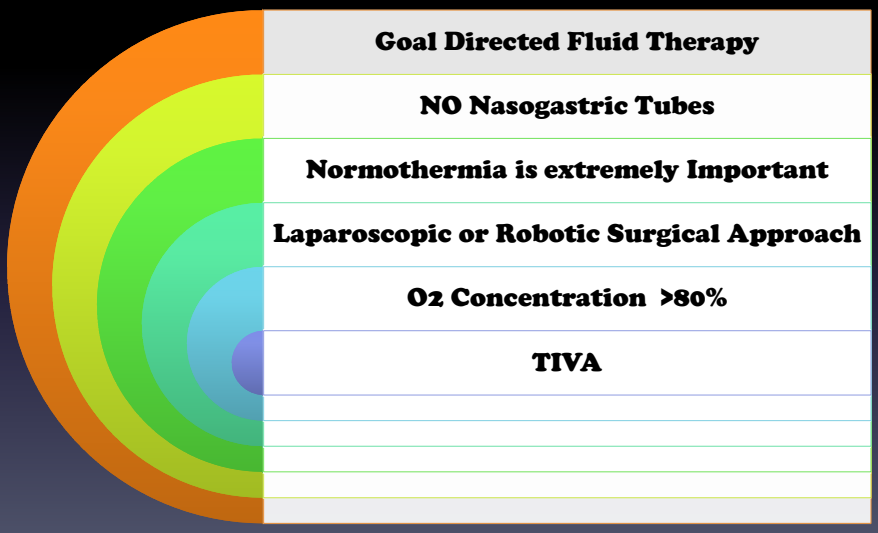
Intraoperative Management



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Opioid-Free Management Plan

- Acetaminophen
- Non-Steroidal Anti-Inflammatory Agents
  - Selective
  - Non-Selective
- Gabapentin
- Ketamine
- α2-Agonist
- Local Anesthetics

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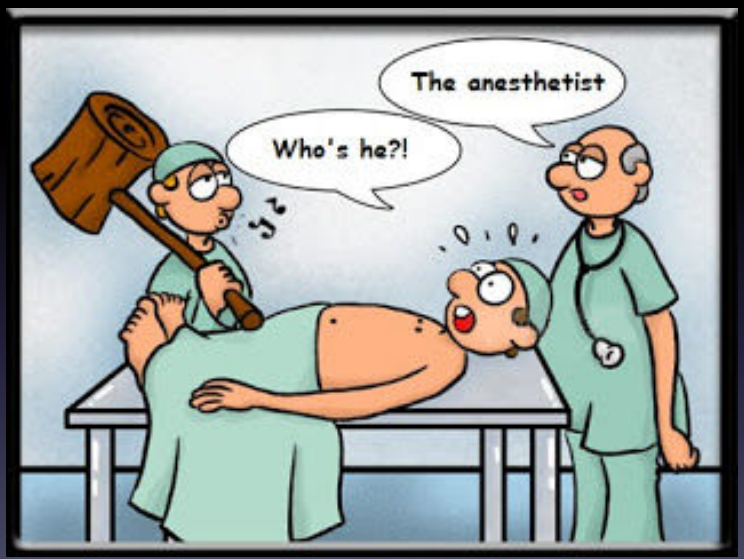

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Basis for Pain Control

- Opioid Free
  - Lidocaine gtt (2.0mg/min)
    - Decreased cytokine levels
  - Ketamine bolus or infusion (4mcg/kg/min)
  - Magnesium (20mg/kg/hr)
    - Decreased sympathetic response
- Regional Anesthesia
  - Epidural for Open Procedures
    - Thoracic
    - Lumbar
  - Transverse-Abdominis Plane Block (TAP)
  - QL Blocks

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Pain Control (cont.)

- Regional Blocks (cont.)
  - Rectus Sheath Blocks
- Exparel
  - Recommended to be injected at the beginning of the case

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Opioid Replacements

- Ketamine
  - NMDA anatagonist
  - Dissociation
  - Anti-Nociceptive Action
  - Delta opioid Receptor Agonist
- Gabapentin
  - No direct action on GABA Receptors
  - Potent Inhibitory effect in patients with neuropathic pain
  - Acts on a L-System Amino Acid

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Opioid Replacement (cont.)

- Acetaminophen
  - Decreased MSO_4 dosages
- NSAIDS
  - Celebrex
    - Cox-2 Inhibitor
  - In conjuction with Tylenol significant reduction in Pain scores, PONV,
- α2-Agonist
  - Clonidine
  - Dexmetatomodine
  - IV Meloxicam
- Magnesium

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Benefit of Opioid Free Anesthesia

- Studies have shown that Fentanyl and MSO_4 suppress NK cell cytotoxicity which in turn may lead to increased potential for metastasis.
- Decreased incidence of PONV
- Decreased incidence of constipation
- Decreased incidence of Respiratory Depression

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PONV

- Pre-operative
  - Scopolamine
  - Amend
  - Carb Loading
  - Fluids
- Dexamethasone
- Ondansetron
- Barhemsys
- TIVA Anesthesia

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Goal Directed Fluid Therapy

- Avoid Fluid Overload
  - Decreased use of Mechanical Bowel Prep
  - Clear Liquids up to 2 hours before case
- Decreased Chloride Containing Crystalloid
  - Hyperchloremic Metabolic Acidosis
  - Decreased incidence of renal dysfunction
- Colloid to replace EBL
- Treat Hypotension with Vasopressors*

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Discharge

- Criteria:
  - Pt. can tolerate oral intake
  - Return of Bowel Function
  - Adequate Pain Control with oral medication
  - Ability to Mobilize
  - All previous medical condition are controlled (HTN, Diabetes, COPD)
  - Ambulation without Difficulty
- Goal:
  - Decreased incidence of Complication leading to decreased length of hospital stay

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Ideal Surgical Cases

- Colorectal Surgery
- Upper GI Surgery
- Hepatobiliary and Pancreatic Surgery
- Gynecologic Surgery
- Orthopedic Surgery

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Future of ERAs and Opioid-Free Surgery

- Increased Same-Day Surgery
  - Laparoscopic Cholecystectomy and Appendectomy
  - Joint Replacement
- Enhanced use of Regional Anesthesia
- TIVA Anesthesia-Targeted Patient Specific Anesthesia
- Opioid Sparing Anesthesia in conjunction with Increase in Robotic and Laparoscopic Surgery

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What does the Research State:

The ERAS patients presented a significant reduction in overall morbidity. Simultaneously, the Grade I and Grade II–V complications were significantly favorable to the ERAS group. However, the rates of readmission were not statistically significant; thus, the ERAS program can be designated as safe.
Li, L et al. "Enhanced Recovery Program versus Traditional Care After Hepatectomy: A Meta Analysis" *Medicine.* Sept.2017

We found that changes to the RC pathway made dramatic improvements to patient recovery without affecting oncological outcomes. In particular, enhanced recovery use was associated with shorter LOS, lower blood loss and transfusion rates, and fewer readmissions after surgery.
Pang, KH et al. "Prospect Implementation of Enhanced Recovery After Surgery Protocols to Radical Cystectomy" *European Urology*. July 31, 2017

Our institutional ERAS protocol for RC is associated with significantly improved perioperative GI recovery and lower rates of GI complications. This protocol can be tested in multi-institutional studies to reduce GI morbidity associated with RC.
Banzargani, ST et al. "Gastrointestinal Complications Following Radical Cystectomy Using Enhanced Recovery Protocol. *European Urology Focus*. April, 2017.

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Evidence Based Research

- Gustafsson, UO et al. "Guideline for Perioperative Care in Elective Colorectal Surgery: Enhanced Recovery after Surgery (ERAS) Society Recommendations 2018" World Journal of Surgery. March 2019, 43(3) 659-95
- Mitra, S et al. "New Advances in Acute Pain Management" Current Pain Headache Reports. April 4, 2018, 22(5)

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ERAS Results

- Decreases Complications after Abdominal Surgery by 40%
- Decreases Hospital Stay by 30%
- Decreased Readmission Rate
- Increased PROFITS

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QUESTIONS?

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