Enhanced Recovery After Surgery (ERAS)
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Faculty Disclosure Statement
- I have no financial or conflict of interest with the following presentation
- I would love to potentially have a conflict of financial interest if any pharmaceutical or equipment company would like to give me money!
- I hope I properly cited all pictures, tables, and any other visual aids that I have potentially borrowed (stolen if you will) from other sources.
Goals and Objectives

- Background and History of ERAS
- Appreciation and Awareness for the Opiate Crisis/Epidemic
- Multimodal Approach to Pain
- Multidisciplinary Approach to ERAS
- Patient Benefits and Outcomes from ERAS
- Economical Impact of ERAS

"Be careful reading health books. You may die of a misprint."

- Mark Twain
ERAS? Tell Me More

- Multimodal, multidisciplinary approach to the care of the surgical patient
- Evidence-based comprehensive approach to perioperative care of the surgical patient
- Direct focus on patient-centered care with documented positive outcomes
- Directly shown to decrease Healthcare-associated infections (HAIs), length of hospital stay (LOS), healthcare costs, postoperative readmission rates, and most importantly patient morbidity and mortality

Clinical Basis

- Preoperative Patient Education (Psychological Stress Anxiolysis)
- Euvolemia and Nutritional Optimization
- Attenuation of Surgical Stress Response
- Optimal Pain Control
- Multimodal Analgesia
- Expedited Enteral Nutrition
- Ambulation
- Decreased rate of Organ Dysfunction
- Reduced Morbidity
- Enhanced Recovery with decreased length of stay
ERAS Origins

- First introduced by Henry Kehlet, MD, PhD in the mid 1990’s
- Focused on “Fast Tracking” surgery
- Primary emphasis on accelerated recovery through a multimodal/multidisciplinary approach to reducing patient surgical stress
- Dr. Kehlet as a colorectal surgeon proposed and implemented the innovative idea of “Fast Tracking” major abdominal surgery
- The thought process of challenging traditional practice with evidence-based practice begins to emerge
- Luckily, the 1990’s also sparked the wide spread adoption of minimally invasive laparoscopic techniques for surgical procedures
- The development of regional anesthetic techniques for pain control in the 1990’s also showed significant decreases in perioperative opiate requirements

YOU CAN’T CHANGE HOW WE’VE BEEN DOING SURGERY FOR YEARS!
What kind of results did Dr. Kehlet produce?

- Median postoperative hospital stay of two days for open colectomy patients vs the standardly accepted 5-10 days
- Dramatic improvement in postoperative pain control
- Faster return to Patient’s baseline physiological functions
- Vast improvement in Patient satisfaction
- Sparked interest into multimodal analgesia approach to major surgical procedures
- Stimulated evidence-based research into the perioperative approach to a surgical patient
- Improved patient centered outcomes through a transdisciplinary implemented ERAS protocol

ERAS: Not a one trick Pony!

- Colorectal Surgery
- Gynecological Surgery
- Rectal Surgery
- Pelvic Surgery
- Vascular Surgery
- Urological Surgery
- Plastic and Reconstructive Surgery
- Orthopedics
So why is this so important to us as Oklahoma healthcare providers?

Chasing the Dragon

- 4 out of 5 heroin addicts started on prescription opioids
- Most common prescription opioids involved in drug overdose deaths are methadone, oxycodone, and hydrocodone (https://www.cdc.gov/drugoverdose/data/overdose.html)
- High percentage of Heroin addicts turned to Heroin from prescription opiates based on lower cost and easier access
- Women are more likely to have chronic pain, be prescribed higher doses, and use them for longer periods of time. From 1999-2010 there was a 400% increase in female overdose rates. (http://www.cdc.gov/vitalsigns/prescriptionpainkilleroverdoses/index.html)
Chasing the Dragon

- It is estimated that 26.4–36 million people worldwide are addicted to opioids with 2.1 million people in the United States suffering from substance abuse disorder related to prescription opioid use. (Substance Abuse and Mental Health Services Administration. Results from the 2012 National Survey on Drug Use and Health: Summary of National Findings. NSDUH Series H-46. HHS Publication No. (SMA) 13-4795. Rockville, MD: Substance Abuse and Mental Health Services Administration, 2013.)

- In the United States this is particularly problematic, as Americans constitute only 5 percent of the world’s population, yet consume 80 percent of the global opioid supply, and 99 percent of the global hydrocodone supply, as well as two-thirds of the world’s illegal drugs. (Manchikanti L, Singh A. Therapeutic opioids: a ten-year perspective on the complications and consequences of the escalating use, abuse, and nonmedical use of opioids. Pain Physician. 2008 Mar;11(2 Suppl):S63-88.)

Surgery and Opiate addiction

- Roughly 50 million surgeries each year in the United States
- It’s estimated 5-6 percent of patients not using opioids prior to surgery will still continue to fill prescription opiates well beyond an accepted surgery recovery period
- Pain medications written for pain control following surgery (minor or major) contributes to millions of new chronic opiate dependent/addicted Americans annually.
- Recent studies showing that opiate dependence can take hold in as little to 5-7 days.

Chad Brummett, M.D., director, division of pain research, University of Michigan Medical School, Ann Arbor; Anita Gupta, D.O., PharmD, international affairs fellow, Woodrow Wilson School, Princeton University, New Jersey; April 12, 2017, JAMA Surgery, online
The Foundation for Success

- Transdisciplinary education
- SIMPLE Protocols/Order sets/Algorithms
- Effective communication between all departments with distinct delineation of roles in the ERAS process
  - Pre-admission Testing Staff (Nursing and Anesthesia Providers)
  - Dietitians/Social Workers/Counselors/Chaplains
  - Nursing Staff (Preoperative/Intraoperative/Postoperative/Medical Floor)
  - Anesthesia Providers/Surgeons/Primary Care Providers/Specialists
  - Residents/Interns/Medical Students/Nursing Students

COMMUNICATION

No! No! NO, Nurse!!!!! I said "SLIP" off his SPECTACLES!!!!!
Pre-hospital and Preadmission Testing

- Patient takes active role in the planning phase of their surgery
- Realistic Goals set for pain management and length of stay
- Detailed Patient/Family/Caregiver Education
- Nutritional and Hydration Education
- Patient Optimization and Risk Stratification
- Pre-habilitation of Select Patients
  - Labs
  - Tests (Guided to patient's Co-morbidities and Functional Status)
  - Consultations (Cardiology, Pulmonology, GI, Nephrology, etc)
  - Medication Review and Optimization
  - SMOKING CESSATION
  - Stress Activity

Preoperative

- Thromboprophylaxis - Reduce thromboembolic events
- Abx Prophylaxis - Reduce infection rates
- Nausea and Vomiting Prophylaxis - Minimize PONV, wound dehiscence, and prolonged PACU stay.
- Avoid Mechanical Bowel Prep (not always feasible, commonly selective based on patient, surgery, and surgeon)
- Diet and Carbohydrate loading
  - Reduces Insulin resistance and promotes faster recovery of bowel
  - Patient ceases regular diet at MN (no MBP) and at 6 PM if MBP on night before
  - Patient can continue clear liquids (or carbohydrate drinks) as they wish until 2 hours before surgery
  - 20 ounce carbohydrate drink consumed 2 hours before induction of anesthesia
  - It is safe for patients (including those with diabetes, obesity, and GERD) to drink carbohydrate-rich drinks up to 2 hours before elective surgery

Preoperative Multimodal Analgesia

Multimodal analgesia involves use of multiple, simultaneous mechanisms of pain control acting synergistically to improve analgesic effect and reduce the doses of any single agent to minimize risks of side-effects.


Effective, narcotic-sparing analgesia is a major component of every Enhanced Recovery Protocol (ERP), however, the risk of highly variable responses, poor analgesia and opioid-related side effects (ORADE) remains an issue related to poor outcomes and satisfaction, and is strongly related to the risk of narcotic dependence after surgery.

Multimodal Analgesia

- REGIONAL ANESTHESIA!!!
- Acetaminophen (Oral or IV)
- Gabapentin and Pregabalin
- Local Anesthetics: IV Lidocaine infusion
- NMDA Receptor Antagonists
  - Ketamine (Bolus and/or Infusion)
  - Magnesium Sulfate
  - Memantine
  - Methadone
- NSAIDS (Oral, IV, Topical, or Rectal)
  - Nonselective COX inhibitors: Ketorolac, ASA, Ibuprofen, and Diclofenac
  - Selective COX 2 inhibitors: Celecoxib and Parecoxib

Pre-Holding Cocktail

- Gabapentin – 600mg PO, reduce to 300mg PO if older than 60. Do not give if over 70 unless they are currently on gabapentin or lyrica.
- Tylenol PO vs IV 1000mg if >70kg, 650mg if <70kg.
- Celecoxib 200mg PO (age 18-64)
- Utilize PONV Risk Protocol for use of Scopolamine Transderm Patch
- Entereg (Alvimopan)
  - 12 mg PO in the preop holding area if Surgeon requests
  - Continua 12 mg PO BID until first bowel movement or D/C
  - Selectively binds to mu opiate receptors in the GI tract and prevents the effects of opiates on GI motility
  - Does not have an effect on opioid pain control
Intraoperative Objectives

- Regional Anesthetic Blockade
  - Abdominal wall blocks, Intrathecal Narcotics, or Thoracic/Lumbar Epidurals
  - Short acting opiates, multimodal IV analgesics, and quick acting anesthetics
  - No drains, OG/NG Tubes, or Foley catheters left in patient
  - Patient is closely monitored to maintain normothermia with forced air warmers, warm fluids, and appropriate room temperature.
- Goal Directed Fluid Therapy
  - Guided by a goal-directed algorithm using a pleth variability index
  - Less fluids showing better outcomes compared to traditional “flooding of fluids”
  - Roughly 80% crystalloid distributes into extravascular space
  - Less fluid mean less bowel wall edema, perioperative weight gain, and prolonged ileus
Postoperative Considerations

- Regional anesthesia/analgesia
- No nasogastric tubes
- Prevention of nausea and vomiting
- Goal-directed fluid therapy
- Early removal/avoidance of catheter
- Early oral nutrition
- Non-opioid oral analgesia
- Early mobilization
- Stimulation of gut motility
- Audit of compliance/outcomes
Postoperative Considerations

- Remove all drains, tubes, and catheters if not already done prior to leaving OR/PACU
- Postoperative Glucose control
- Postoperative Analgesia
  - Continue Epidural (open surgery) up to 72 hours
  - Continue Multimodal Analgesia
- AMBULATION ASAP!
  - Most begin the night of surgery
- Diet begins the night of surgery
  - Chewing gum in PACU in Laparoscopic surgeries
  - Clear liquids (no carbonation) on day of surgery and solids by POD #2
  - Saline lock IV POD# 1

Get a MOVE on it

- Mobilization can’t be stressed enough
- Strict Mobilization schedule
  - Out of bed 1-2 times on day of surgery
  - POD#1: 150-180 minutes out of bed
  - POD#2: 240 minutes out of bed
  - POD#3: 360 minutes out of bed and each day following
Discharge Criteria

- Based on Patient’s function and not a set timeline of days
- Functional Criteria:
  - Ambulation at an appropriate level
  - Return of bowel function based on bowel movements and flatulence
  - Ability to tolerate liquid diet
  - Pain controlled by oral medications
  - No signs of surgical site infection or systemic infection

Overall Benefits of ERAS

- ERAS patients in multiple studies regained gastrointestinal function more quickly (from 4–5 days to 2 days) and had a shorter convalescence (shown by clinical outcome measures 6 weeks after surgery). (Jorgensen H, Wetterslev J, Moiniche S, Dahl JB. Epidural local anesthetics versus opioid-based analgesic regimens for postoperative gastrointestinal paralysis, PONV and pain after abdominal surgery. Cochrane Database Syst Rev 2001;(1):CD001893. doi:10.1002/14651858.CD001893.)
- ERAS has been shown to reduce the average length of stay from 8–10 days to 3–4 days. (Müller S, Zanunado M, et al. A fast-track program reduces length of stay after open colorectal surgery. (2010) 136:842-847.)
- Meta-analysis of randomized controlled trials have shown that ERAS programs reduce overall complication rates and LOS, without affecting 30-day readmission rates. (Spanjersberg, W.R., Reinders, J., Meurs, P., Van Baal, M. Fast track surgery versus conventional recovery strategies for colorectal surgery. Cochrane database of systematic reviews. (Online)Volume 2, 2011, Pages CD007635)
Overall Benefits of ERAS

- Direct reduction in Surgical Site Infections (SSIs)
  - Multiple studies showing a lowering up to 10%
- Increase in Patient Satisfaction
  - Improved Press Ganey Scores
  - Improved hospital satisfaction and pain control

Cost Savings

- Multiple studies showing cost savings/patient
  - Mayo Clinic: $1,039/patient
  - University Hospital of Lausanne: $2,084/patient
  - Duke: $1,854/patient
  - University of Virginia: $7,129/patient
- Reduced LOS leads to direct savings in regards to throughput
  - By freeing up hospital space for other admissions a direct increase in cost savings occurs
- The major financial impact is not in the reduced cost associated with shortening LOS (as most hospital costs accrue early in admission), but the increased revenue that accompanies the capacity for additional hospital admission. ([J Am Coll Surg. 2015 Apr;220(4):430-43. doi: 10.1016/j.jamcollsurg.2014.12.042. Epub 2015 Jan 9.])
Questions?