The Role of Nutrition in Perioperative Protocols

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Financial Disclosures

• Nestle
• Abbott

Objectives:

• Discuss the evidence base for nutrition related perioperative practices

• Describe the Roanoke Experience with peri-procedure feeding and the associated health economics

• Identify two practical steps for implementation of peri-operative nutritional protocols

1999
98,000 Lives Lost due to medical errors
What do we do?

What is ERAS?

Netherlands
Scotland
Denmark
Sweden
Norway
What is ERAS?
Enhanced Recovery After Surgery

• A clinical pathway to accelerate recovery
  – Initiated in 1990s by Professor Henrik Kehlet
  – Elective, colonic Surgery in ages 20-80
  – Multi-modal, multi-disciplinary

PRINCIPLES

• AVOID – STRESS, STARVATION, DROWN

• OPTIMIZE – PAIN, GI FUNCTION, MOBILIZATION

PRINCIPLES

• 10 days preoperative evaluation ↓
  • 1 day prior to surgery ↓
  • Day of surgery ↓
  • DISCHARGE

Fearon, Clin Nutr 2005

Sato, JCEM 2010

What is ERAS?
Enhanced Recovery After Surgery

Save Lives
Decrease Infection
Return patient to preop function

FEARON

1000 LIVES
COUNT ME IN!

‘Count me in!’
**PRINCIPLES**

- **Insulin sensitivity/resistance affected:**
  - Nutrition
  - Bedrest
  - Pain

**Entire Perioperative Program**

- Counseling
- No bowel prep
- Fluid-CHO loading
- No fasting
- No NG tubes
- Epidural pain control
- Short-acting pain meds
- DVT prophylaxis
  - Perioperative nutrition

**What is ERAS? - NUTRITION**

- Pre-operative fasting (AVOID)
- Full Bowel Prep (AVOID)
- Peri-operative Nutrition (PROVIDE)

**What is ERAS? - PREOP NUTRITION**

1948: CE Koop and JE Rhoads

5d preop protein (>0.8g/kg) preserved:

- Nitrogen Balance
- Hemodynamics
- Clinical Outcomes
What is **ERAS?** – **PREOP NUTRITION**

- No evidence supports NPO after midnight to avoid aspiration
- Clear liquids up to 2h prior
- Solids up to 6h prior

Erssen, Acta Anaesthesiol Scand 1996
ASA task force, Anesthesiology 1999

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What is **ERAS?** – **PREOP NUTRITION**

- Provision of clear CHO rich beverage (12.5%)
  - 800 cc at midnight (~100g, 400kcal)
  - 400 cc 2 hours prior to surgery (~50g, 200kcal)
- Reduces perioperative thirst, hunger, anxiety, and **insulin resistance**

Noblett, Colorectal Dis 2006
Hausel, Anesth Analg 2001
Yu, Gut 2006
Smith, Br J Surg 2004

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What is **ERAS?** – **PREOP NUTRITION**

**Gatorade equivalent**

- 800 mL
- 6% CHO blend
- ~186 calories

www.gatorade.com

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What is **ERAS?** – **PREOP NUTRITION**

- Cochrane review of 22 RCTs
  - NO INCREASE IN COMPLICATIONS
- Similar gastric emptying
  - Obese
  - Morbidly Obese
  - Uncomplicated Type II DM
  - LEAN

Brady, Cochrane Database Syst Rev 2003
Maltby, Can J Anaesth 2004
Harter, Anest Analg 1998
Breuer, Anest Analg 2006

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**Carb Loading Used Outside the ERAS Bundle**

- 2014 Cochrane Review
  - 27 RCTs (n=1976)
    - No difference in complication rates when compared with fasting or placebo
    - Small reduction in hospital LOS (1/3 of a day)
    - Increased peripheral insulin sensitivity (less insulin resistance)

Smith MD et al. Cochrane Database Review 2014

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What is **ERAS?** – **POST OP NUTRITION**

- Early (4h post op) oral nutrition supplement
  - 400 - 600 mL/day energy dense
- Continue oral supplementation for 3 weeks post op
- Nitrogen equilibrium and less hyperglycemia

Linnen, Arch Surg 2009
Lewis, Br Med J 2001
Buch, Gut 2000
Pearson, Proc Nutr Soc 2003
Sepp, Br J Surg 2004
ERAS pathway meta-analysis

- 6 randomized trials; 452 patients
- Mean of 9 (4-12) ERAS elements used
- Readmission RR 0.80 (0.32-1.98)
- Mortality RR 0.53 (0.09-3.15)

ERAS Audit

- Easy part – protocol creation
- Hard part – audit/compliance
- Hardest part – repeat

ERAS Audit

- Patients with preop CHO
  - 450cc less IVF
  - less wound dehiscence
- Patients with bowel prep – 1L more fluid
  - 16% ↑ symptoms
  - 32% ↑ complications
  - 6x postoperative wound dehiscence

SUMMARY OF PERIOP NUTRITION ERAS PROTOCOL RECOMMENDATIONS

- Preop liquids/CHO (Grade A)
- Postop oral diet (Grade A)
- Oral supplements x 3 wks (Grade A)
ERAS – What is missing?

- Preoperative Nutrition assessment
  - Who benefits with aggressive supplementation?
- Preoperative protein/amino acids
  - Arginine, Glutamine...
- Immunonutrition, antioxidants?
  - Fish oil, Vit C, Vit E, Selenium...
- Other types of surgery:
  - Esophagus/Stomach/SB
  - Thoracic/Vascular/Uro
  - Non-elective Surgery

Perioperative Nutrition Therapy:
North American Surgical Nutrition Summit

- Paradigm shift to concept of Prehabilitation
  - Preoperative Nutrition Assessment
    - Type of surgery
    - NRS 2002 score ≥5
    - HbA1c <7.5
    - Achieve wt loss with BMI<35
    - 5-10% wt loss over 1-3 months

- Approach
  - Multidisciplinary
    - Diet
    - Mobility
    - Volume, temp, abx...
    - Pre thru Post

- Implementation
  - Prehabilitation
  - NSQIP
  - SCOAP
  - THE SURGICAL TEAM...

CMS

- CMS contracted with NSQIP to provide outcomes for those hospitals that participate
- 2015 700 hospitals
- Outcomes 20% in 2015
- 30% on 2016
- 40% in 2017
- Withhold of 2% then 4% then 6% in 2019
- You get it back if you are in the top half
THE ROANOKE STORY...

Defining/Analyzing the Problem
NSQIP Colorectal Morbidity 4/1/12-3/31/13
Showed an Odds Ratio of 1.4

What about the Carilion plan?

Preop Kit

- Preoperative Nutrition assessment
  - Diet counseling for “Big Surgery”
  - High in lean protein

- Preoperative supplement
  - Commercial product with arginine, fish oil and nucleotides (TID x 5d)

- Carbohydrate loading
  - ½ bottle 8h prior (25g)
  - ½ bottle 2h prior (25g)
  - If IDDM, add 3u RHI

- 7d -statin
- Mouth/Skin Care
- Exercise/Smoking

Prehabilitation Class

- Classes are one hour and taught biweekly monthly
  - Diet and education

- Patients are taught how they can impact potential surgical complications if they engage in their care

- Nutritional drink 3 times a day for 5 days prior to surgery
  - Water 3 times daily
  - Spirometer 4 times daily
  - Brush 3 times per day

- Smoking cessation, exercise and nutritious diet encouraged

Making Improvements!

- A multidisciplinary team was formed
- Benchmarked with other facilities
- Literature supports ERAS principals but little guidance regarding education of the patient
- An education class that was used for our joint program provided a framework to enhance outcomes

Patients are taught how they can impact potential surgical complications if they engage in their care

- Smoking cessation, exercise and nutritious diet encouraged

- Statins are prescribed for patients over 60 years that are not currently taking them

- Receive packet of information, mouth care kit, nutritional supplements, incentive spirometer and carbohydrate drink
What about the Carillion plan Postop?

- Mobility
  - Recovery
  - DVT
- Wash hands
- Pain management
  - Sleep
  - Movement

• Diet
  - Not standardized
  - Not well understood
  - Poor emphasis

Post-op visits

Nurses and Physicians visit the patients post-op to insure the compliance with principals learned in the class.

Implications

Class attendees have demonstrated increased satisfaction with their surgical experience.

Results

18 months of ERAS - 7/1/2014-12/31/2015
n=559 colorectal patients

<table>
<thead>
<tr>
<th></th>
<th>LOS</th>
<th>Readmissions</th>
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<tbody>
<tr>
<td>304 ERAS</td>
<td>5.43</td>
<td>15.1%</td>
</tr>
<tr>
<td>255 Non-ERAS</td>
<td>8.16</td>
<td>20.0%</td>
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NSQIP Results

- Accurate
- Risk adjusted
- O/E ratios
- Effect on the patient population as a whole
Emergent vs Non-Emergent

- ERP vs Non-ERP
- HLOS: 9.22 vs. 5.67 days (p=0.018)
- Fewer complications with ERP (p=0.05)
- Greater benefit seen with EMERGENT PATIENTS

Submitted NSQIP abstract, Fogel 2016

Potential Profit

Last day of colon DRG $230
Profit per colon and rectal DRG is $10,011/case
Early pre-hab data saves 1.0 days per colon-rectal case

234 cases last year

Savings 234 x $230 = $53,820
Additional income
1.0 days x 234 = 234 days
Avg LOS: 5 days = 67 new cases
47 x $10,011 = $470,017

Total to bottom line = $524,337

Cost $33 per patient x 234 patients = $7,722

NET profit = $516,615 (66x ROI)

Does not include personnel to counsel, doctors fees for added cases, savings from ↓ complications

Further Implications

Include:
- Prehab class for other surgical specialties
- Emergent cases
- Patients with multiple comorbidities

Enhanced Recovery Conclusions

- Those patients that succeed do so spectacularly well!
- Better outcomes for the patients
- Evidence based
- It is coming whether we like it or not,

SO ADOPT IT!!!

QUESTIONS???