ENHANCED RECOVERY AFTER SURGERY : AN ANESTHESIOLOGIST'S PERSPECTIVE

พญ.ณัฐธนภัทร์ เวชการณ์

นายแพทย์ชำนาญการพิเศษ กลุ่มงานวิสัญญี

โรงพยาบาลกำแพงเพชร

ENHANCED RECOVERY AFTER SURGERY

- Is protocolized scientific pathway
- Applied to boost the outcome and enhance the recovery phase after surgery
- Multimodal evidence based strategies

ENHANCED RECOVERY AFTER SURGERY

- Was first pioneered by Dr.Henrik kehlet in last decade of 20th century
- Colorectal surgeries
- Delay in recovery and lengthened hospital stay

(delay in return of bowel function)

ENHANCED RECOVERY AFTER SURGERY

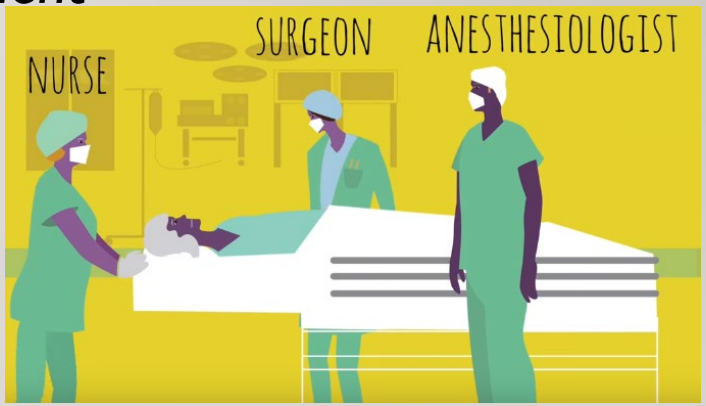
- Between 2001 and 2004 : ERAS study group was formed
- Registered later in the name of *"ERAS society"* (in 2010)
- To develop perioperative care, improve recovery
- First consensus guidelines for ERAS
  - published in 2005
  - colorectal surgeries
- 2013 : The society Guidelines on radical cystectomy were published
- 2016 : ERAS guidelines in gynecological and bariatric surgery were presented

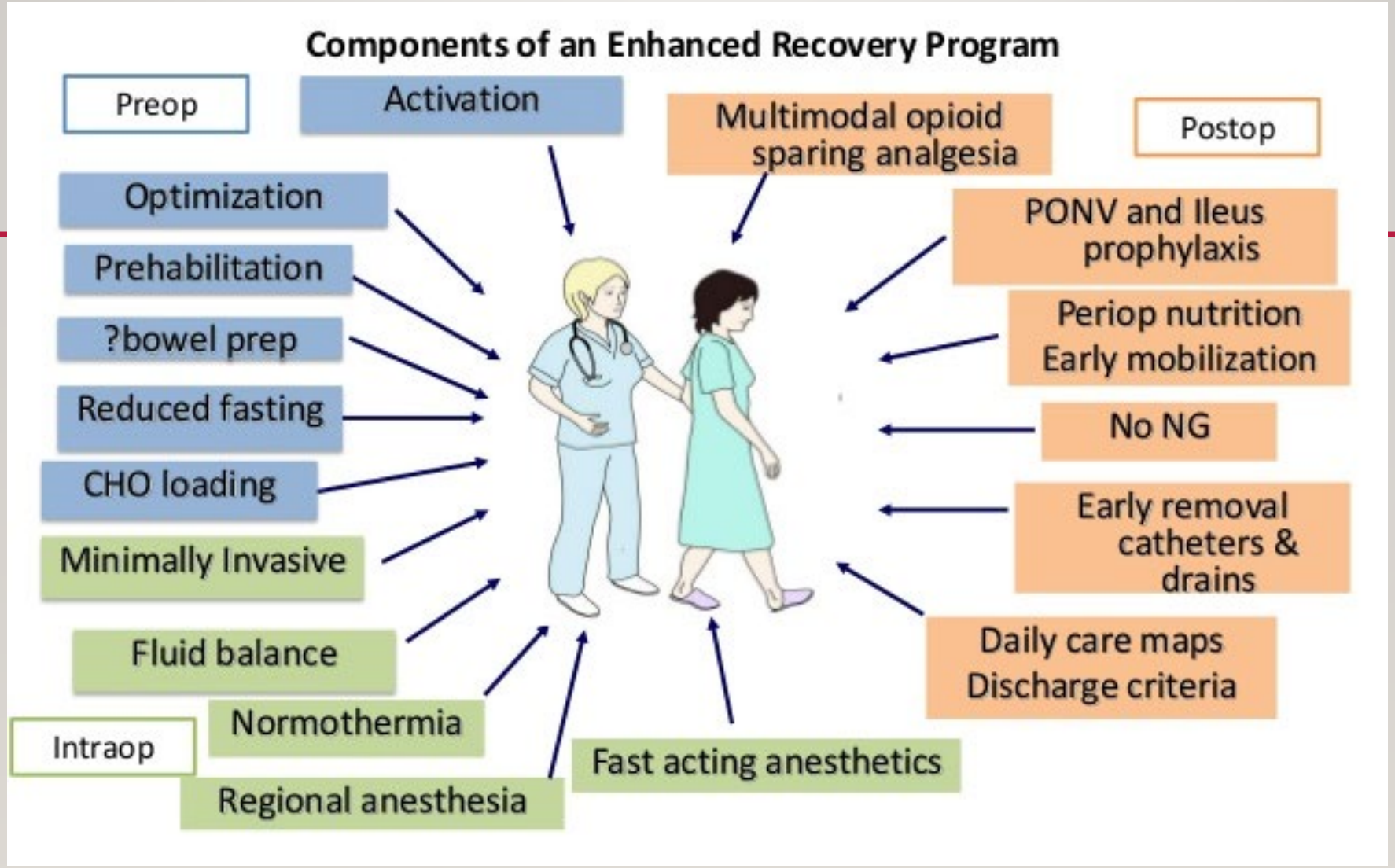
ENHANCED RECOVERY AFTER SURGERY

- ERAS protocols
  - A lot of interest
  - Reduction in complications and hospital stay
  - Improvements in cardiopulmonary function
  - Earlier return of bowel function
  - Earlier resumption of normal activities

ENHANCED RECOVERY AFTER SURGERY

- Requires proper coordination between *the surgeon, the anesthesiologist, the nursing personnel, the patient and the people looking after the patient*
- Role of anesthesiologist
  - Preoperative patient selection and optimization
  - Choice of anesthetic regimen
  - Fluid and pain management
  - Facilitates and bridges the gap between pre- and post-operative care




Components of an Enhanced Recovery Program
Preop
Activation
Multimodal opioid sparing analgesia
Postop
Optimization
Prehabilitation
?bowel prep
Reduced fasting
CHO loading
Minimally Invasive
Fluid balance
Normothermia
Intraop
Regional anesthesia
Fast acting anesthetics
PONV and Ileus prophylaxis
Periop nutrition
Early mobilization
No NG
Early removal catheters & drains
Daily care maps
Discharge criteria

PREOPERATIVE ERAS ELEMENTS

PREOPERATIVE COMPONENTS IN ERAS

- Aims at identifying risk factors and co-morbidities
- Enables choice of surgical technique, choice of anesthetic technique and determination of appropriate postoperative

PREOPERATIVE COMPONENTS IN ERAS

- ***Patient education***
  - Risk factors associated with procedure
  - Length of stay
  - Preop fasting and carbohydrate loading
  - Pain control
  - Early ambulation
  - Postop feeding/ileus
  - Timing of catheter removal

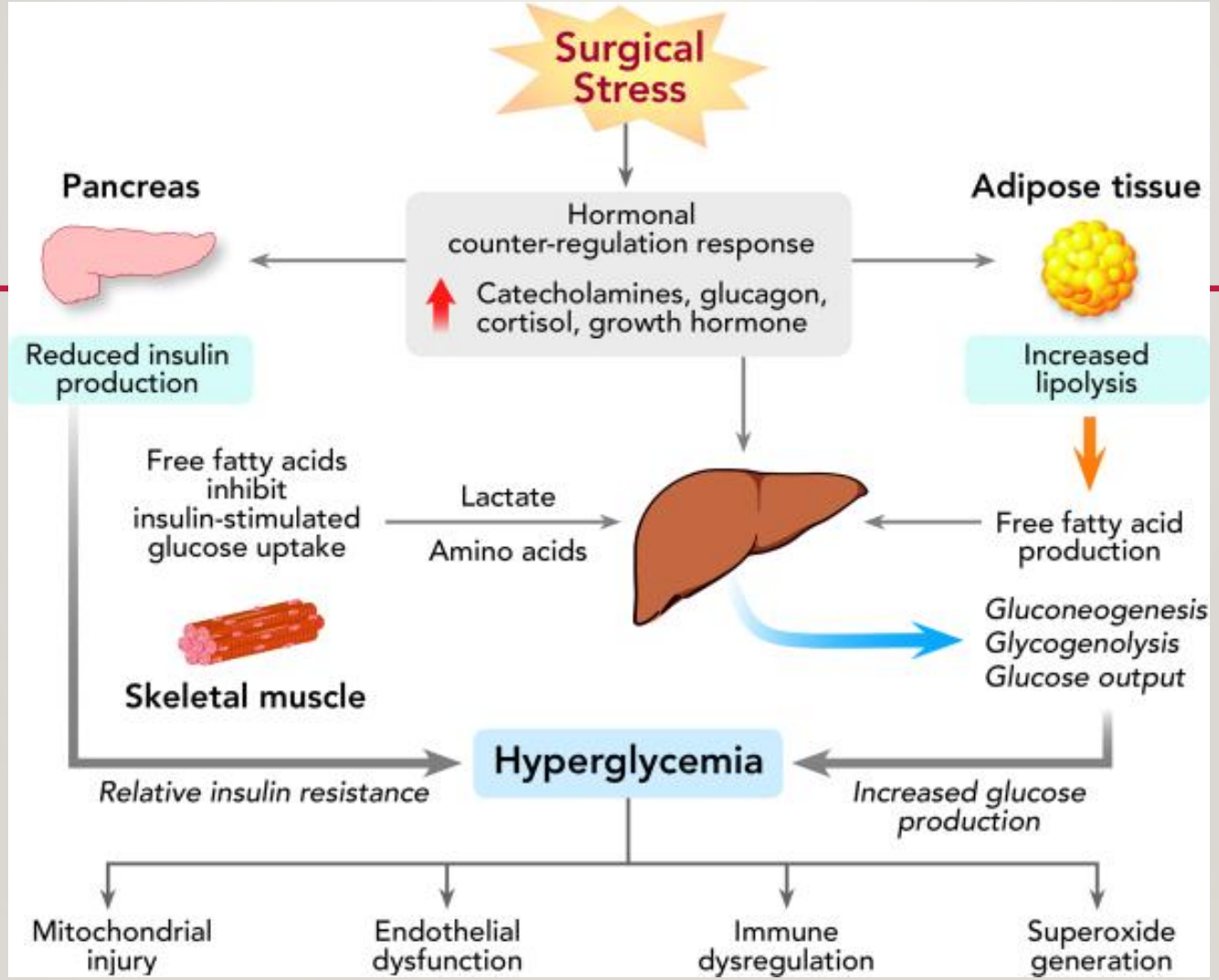
PREOPERATIVE COMPONENTS IN ERAS

- ***Nutritional deficiency*** → strong predictor of 90 days mortality and poor overall survival

- Correction of these nutritional deficiency is an important part of preparation for early recovery

PREOPERATIVE COMPONENTS IN ERAS

- Primary aims of ERAS protocol→ ***To blunt the body's stress response (catabolic effect)***
- **Catecholamines**→ Insulin resistance→Hyperglycemia
  - Length of stay
  - Poor wound healing
  - Increased risk of postop complications


Surgical Stress
Pancreas
Hormonal counter-regulation response
Catecholamines, glucagon, cortisol, growth hormone
Adipose tissue
Reduced insulin production
Increased lipolysis
Free fatty acids inhibit insulin-stimulated glucose uptake
Lactate
Amino acids
Free fatty acid production
Gluconeogenesis
Glycogenolysis
Glucose output
Skeletal muscle
Hyperglycemia
Relative insulin resistance
Increased glucose production
Mitochondrial injury
Endothelial dysfunction
Immune dysregulation
Superoxide generation

PREOPERATIVE COMPONENTS IN ERAS

- Prolonged preoperative fasting increases the metabolic stress, hyperglycemia and insulin resistance
- Methods for reduce insulin resistance
  - **Preoperative fasting**
  - **Carbohydrate loading**

PREOPERATIVE COMPONENTS IN ERAS

- **Fasting guideline (NPO time)**
  - **Solid food** : up to ***6 hours*** before induction of anesthesia (AMN)
  - **Clear liquid** : up to ***2 hours*** before induction of anesthesia

PREOPERATIVE COMPONENTS IN ERAS

- **Carbohydrate loading**
- Oral complex carbohydrates **(maltodextrin)** with high concentration **(12.5%)**
  - 100 gm (800 ml) administered the night before surgery
  - 50 gm (400 ml) 2-3 hours before induction of anesthesia

PREOPERATIVE COMPONENTS IN ERAS

- Selective mechanical bowel preparation also helps in ERAS
- Open or laparoscopic colorectal ***do not require*** mechanical bowel preparation (*except* anastomosis planned is left-sided)
- Mechanical bowel preparation
  - Dehydration
  - Electrolyte disturbances
  - Unpleasant for the patient

PREOPERATIVE COMPONENTS IN ERAS

- Cessation of smoking at least 1 month

  Reduce the incidence of postoperative pulmonary complication

- Cessation of alcohol intake at least 1 month

Reduce postoperative complications (Bleeding, wound infection,..)

PREOPERATIVE COMPONENTS IN ERAS

- Preoperative anemia : predictor of mortality and postop complication
- Hb→ oxygen delivery
- Evidence is lacking
- Preop blood transfusion could be used in
  - Severely anemic patients
  - Patients undergoing surgery with expected profound blood loss

PREOPERATIVE COMPONENTS IN ERAS

- Deep vein thrombosis : significant morbidity and mortality
- The recommended prophylaxis included
  - Mechanical devices : *compressive stocking, intermittent pneumatic compression devices*
  - Anticoagulants : *LMWH, unfragmented heparin*

PREOPERATIVE COMPONENTS IN ERAS

- Premedication is not mandatory
- Ideal agent
  - Reducing the surgical stress response
  - Without any sedative properties (or short acting)

PREOPERATIVE COMPONENTS IN ERAS

- Long-acting anxiolytic and opioids should be avoided
- Short-acting BZP should be avoided in older patients (>60 yrs)
- Use of paracetamol, NSAIDs or dexamethasone is effective as a primer in reducing the intraop opioid requirement

INTRAOPERATIVE ERAS ELEMENTS

INTRAOPERATIVE COMPONENTS IN ERAS

- **Surgical techniques**
- *Laparoscopic* surgery give superior recovery compared to *Open* surgery
- Laparoscopic surgery *with ERAS protocol* give superior recovery compared to Laparoscopic surgery *with standard care*
- Minimally invasive approachs including endoscopy
  - Decreased blood loss
  - Decreased pain intensity
  - Early ambulation
  - Cosmetic gains

INTRAOPERATIVE COMPONENTS IN ERAS

- **Antibiotic prophylaxis**
- A single dose of antibiotic covering both aerobes and anaerobes is recommended for infection prophylaxis
- Is administered just *before the surgical incision*
- A *second dose* is administered for procedures *lasting* > *4 hrs* or *blood loss* > *1500 ml*

INTRAOPERATIVE COMPONENTS IN ERAS

- **PONV prophylaxis** is very important
- **APFEL score** :

  - female gender
  - Hx of motion sickness or PONV
  - non-smoking
  - use of postop opioids

** *2 risk factors considered moderate risk, ≥ 3 risk factors considered high risk*

INTRAOPERATIVE COMPONENTS IN ERAS

The ASA guidelines (2014) :

- Reduction of baseline risks (e.g. adequate hydration, intraop use of propofol and demedetomidine etc)
- Combination antiemetic therapy using a $5HT_3$ antagonist with droperidol or dexamethasone

The ERAS group :

- Use of dexamethasone at induction ***or*** $5HT_3$ antagonist at the end of surgery (moderate risk)
- Use of dexamethasone at induction ***and*** $5HT_3$ antagonist or metoclopramide near the end of surgery (high risk)

INTRAOPERATIVE COMPONENTS IN ERAS

- ***Intraoperative hypothermia*** should be avoided
- Use of active warming devices in all cases lasting > 30 mins
  - Forced air warming systems
  - Warmed IV solution, Warmed irrigated solution

- Core temperature of 35.5-36.0˚C before emergence from anesthesia
- Avoid shivering by using pethidine 0.25-0.5 mg/kg

INTRAOPERATIVE COMPONENTS IN ERAS

- **Perioperative fluid management**
- The goal of intraop fluid management is **to *maintain central euvolemia*** and ***minimize salt and water excess***
- Excess fluid administration→ interstitial edema → prolonged postoperative ileus [should be avoided]

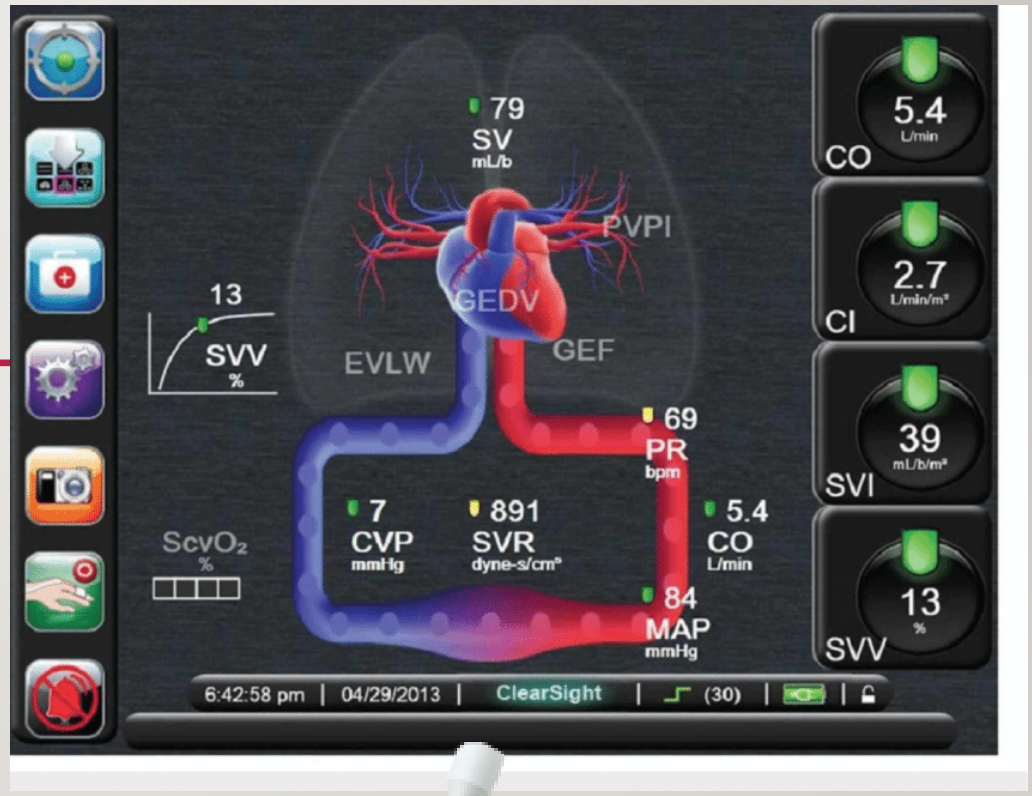
INTRAOPERATIVE COMPONENTS IN ERAS

- **Zero-balance fluid therapy** : *1-3 ml/kg/hr* of balanced salt solution

→Low risk patient undergoing low risk surgery

- **Goal-directed fluid therapy (GDFT)** : using minimally invasive cardiac output monitor ,optimize stroke volume→ High risk patient, patient undergoing surgery with large intravascular volume loss


7.0
SpHb g/dL
20
PVi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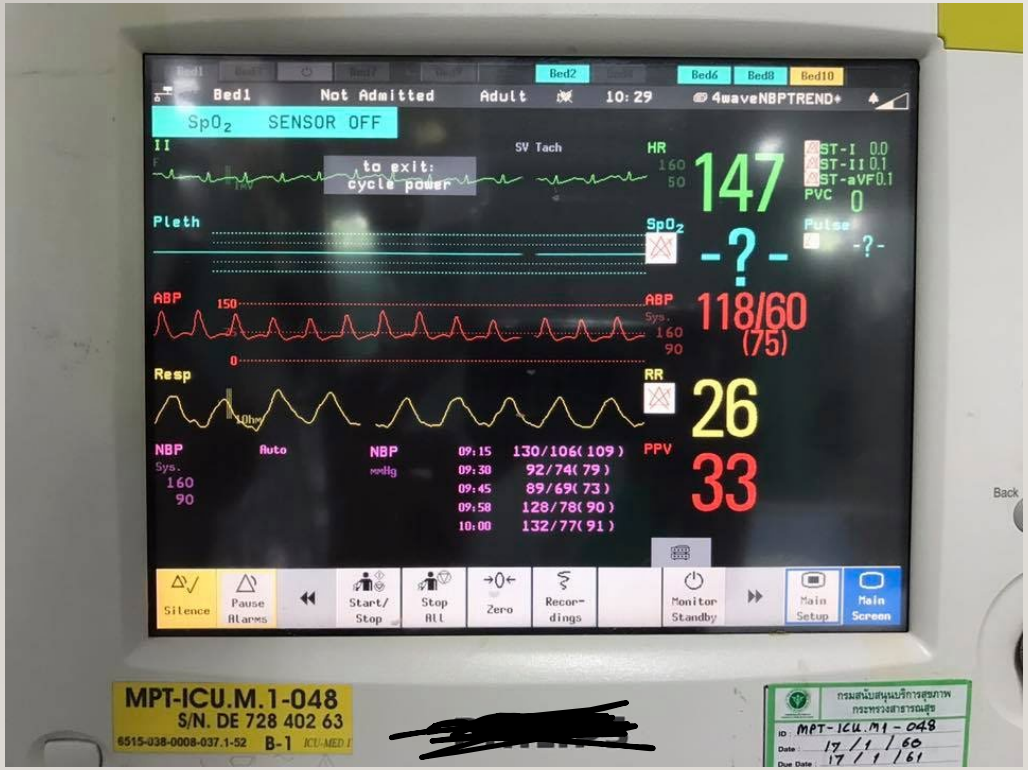
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INTRAOPERATIVE COMPONENTS IN ERAS

- **Balanced crystalloids vs 0.9% saline**
- 0.9% saline should be avoided
- Balanced crystalloids used in perioperative period

INTRAOPERATIVE COMPONENTS IN ERAS

- Prophylactic use of ***NG tubes*** is **not** recommended for elective colorectal surgery
- ***Surgical drains*** may also slow the recovery of bowel function and make pain control difficult

INTRAOPERATIVE COMPONENTS IN ERAS

- **Anesthetic regimen**
  - Minimal postoperative hangover
  - Minimal effects on GI motility
- Short-acting agent is preferred
- Regional anesthetic techniques to support intraop and postop pain relief can be used (TEA,IT,TAP)
  - Reduce the dose of the general anesthetic agent
  - Reduce the stress response to surgery
  - Reduce the incidence of postop ileus

INTRAOPERATIVE COMPONENTS IN ERAS

- **Thoracic epidural analgesia (TEA)**
- TEA (T6-T11) : gold standard for post-op pain control in patients undergoing open abdominal surgery
- Decreases need for anesthetic agents, opioid, muscle relaxant
- Provides better analgesia for first 72 hr
- Hypotension, urinary retention ,pruritus, motor blockade are common side effects

POSTOPERATIVE ERAS ELEMENTS

POSTOPERATIVE COMPONENTS IN ERAS

- **Early feeding**→ decreases the incidence of ileus, nagates the need for postop IV administration
- **Adequate nutrition**→ enhance wound healing, reducing infection, maintain muscle strength for mobilization
- **Early mobilization**→ reduce skeletal muscle loss, improve respiratory function and O2 delivery to tissue
  - Sit out of bed for 2 hrs on the day of surgery and 6 hrs a day until D/C
  - Physiotherapy and rehabilitation is vital to help

POSTOPERATIVE COMPONENTS IN ERAS

- Maintainance of hydration
  - encouraging discontinuation of IV fluid
  - Early commencement of fluid intake including carbohydrate drinks
- Avoidance of postop fluid overload

POSTOPERATIVE COMPONENTS IN ERAS

- Multimodal analgesia : combination of
  - Acetaminophen
  - NSAIDs (unless contraindicated)
  - Local wound infiltration
  - Regional block
  - Epidural opioids
  - PCA,PCEA

POSTOPERATIVE COMPONENTS IN ERAS

- Postoperative optimum pain relief facilitates
  - Early mobilization
  - Early feeding
  - Reduces stress related complications
- Avoid excessive IV opioids
  - Increased sedation
  - Increased incidence of ileus
  - Increased respiratory complications

POSTOPERATIVE COMPONENTS IN ERAS

- **Urinary catheters** are to be removed as early as possible
  - Lower abdominal-pelvic surgeries : within 72 hrs of surgery
  - Most of the other surgeries : within 24 hrs

POSTOPERATIVE COMPONENTS IN ERAS

- Gut motility enhancer such as ***chewing gum*** have been extensively studied
- Reduction in incidence of postoperative ileus
- The use of chewing gum should be encouraged starting on PO day 1 and each patient should **chew *1 stick of gum for at least 5 min*** $\geq$ ***3 times a day***

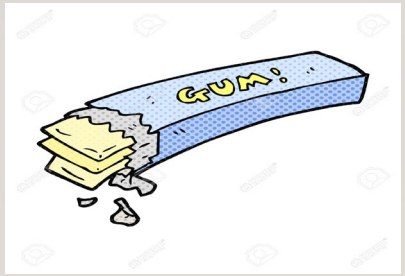

Table 1: Evidence-based ERAS elements with recommendations as per various guidelines

ERAS elements	Level of evidence	Recommendations
Patient education	Low	Strong
Preoperative optimization	Low	
Cessation of smoking - 1 month	Moderate	Strong
Alcohol abstinence - 1 month	Low	Strong
Preoperative fasting		
Liquids	High	Strong
Solids	Low	
Carbohydrate loading	Low	Strong
Premedication	Moderate	Weak
Avoid long acting sedative agents		
Prophylaxis for thromboembolism	High	Strong
Mechanical bowel preparation (abdominal surgery)	Moderate	Strong
Intra- and post-operative elements		
Antibiotic prophylaxis and skin preparation	High	Strong
Anesthetic protocol	Low to high	Strong
Multimodal analgesia		
Regional blocks like epidurals, TAP block, etc.	Low to high Low to moderate	Strong Weak
PONV prophylaxis	Low	Strong
Minimally invasive approach	Low to high	Strong
Prevention of intraoperative hypothermia	High	Strong
Perioperative fluid management		
Zero fluid balance	High	Strong
Goal-directed therapy	Moderate	Strong
Use of balanced crystalloids	Moderate	Strong
Use of drainage catheters like nasogastric drains, biliary drainage, and surgical drains-minimal usage or avoided	Moderate to high	Strong
Perioperative nutritional care		
Screening of patients; high risk patients-active nutritional support Curtailed fasting duration Early feeding in the postoperative period	Low to high	Strong recommendation (for feeding)
Perioperative glycemic control		Weak to strong
Early mobilization		Strong
Early bowel movement		
Use of chewing gum	Low	Weak to strong
Postoperative laxatives and prokinetics	Low	Weak
Audit	Low	Strong

ERAS = Enhanced recovery after surgery, PONV = Postoperative nausea and vomiting

BENEFITS OF ERAS

- Reduction in median length of hospital stay
- Reduction in hospital costs
- Reduce complications
- Improve hospital's health care quality
- Patient satisfaction

SUMMARY

- ERAS protocols are multimodal perioperative care protocols
- To reduce length of hospital stay and perioperative complications
- Preoperative, Intraoperative, Postoperative management

SUMMARY

- **Anesthesiologist role**
  - Preanesthetic area for premedication, fasting guideline&carbohydrate loading and optimization of risk factors
  - Choice in anesthesia and anesthetic drugs, multimodal analgesia, fluid management, prevent of hypothermia and avoidance of PONV
  - Early feeding, early mobilization and pain management

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THANK YOU FOR YOUR ATTENTION