Anesthesia Practice and ERAS

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No Conflicts of Interest

"What conflict of interest?!
I work here in my spare time."

The year is 2002…

70 year old male with colon cancer presenting for colectomy

- History & Physical
- Make sure patient was “NPO after midnight”

ASA Practice Guidelines for Preoperative Fasting

Ingested Material	Minimum Fasting Period (hours)
Clear Liquids	2
Breast Milk	4
Infant Formula	6
Non-human Milk	6
Light Meal	6
Fried Foods, Fatty Foods, Meat	8

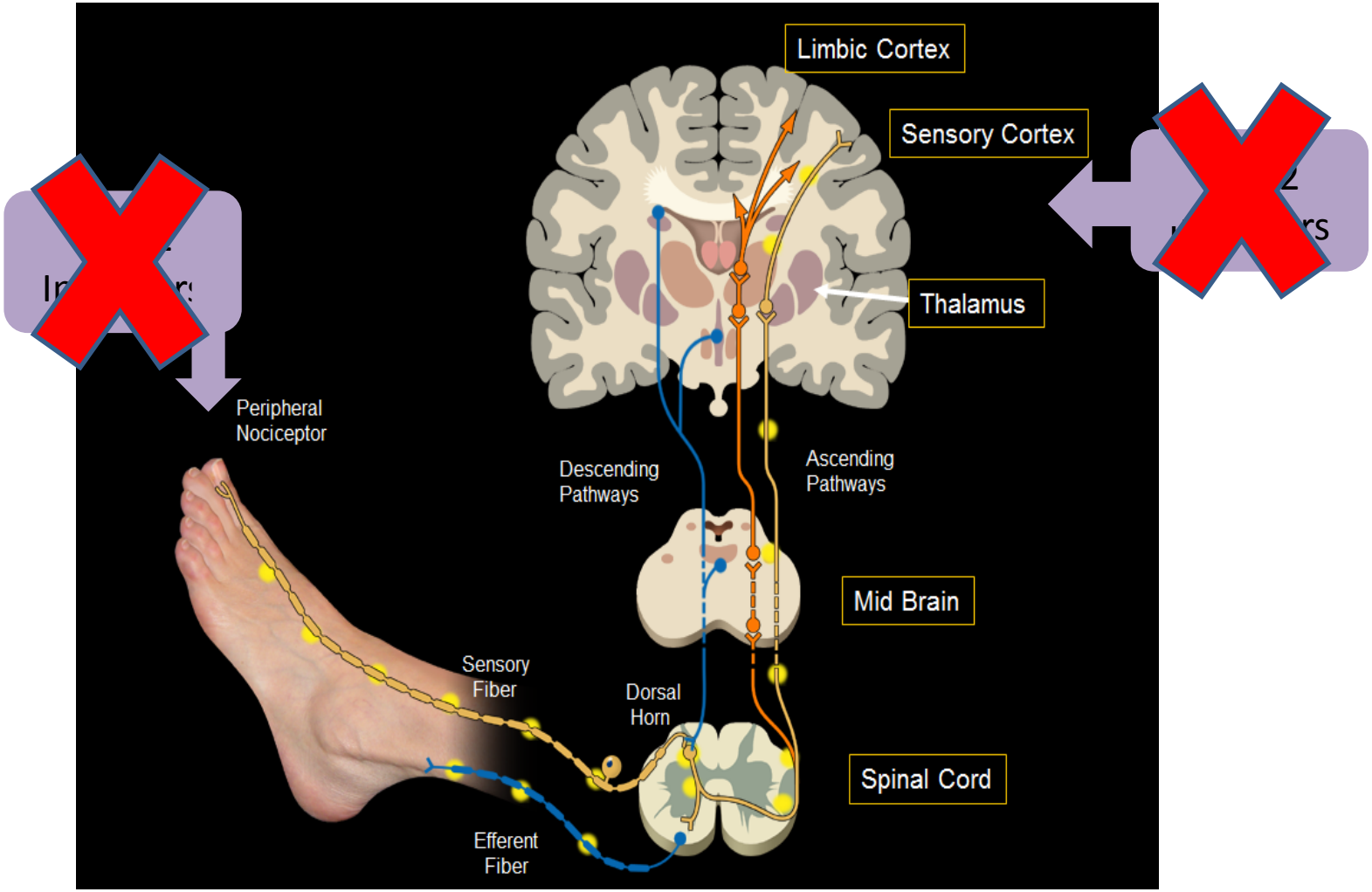
Anesthesiology 2017; 126:37

Preop: Morning of Surgery

- H&P
- Make sure patient was NPO
- Explain general anesthesia and what to expect in the OR
- Expectations for post op recovery/pain control

- Take patient to the room
  - Premedication – midazolam +/- fentanyl
  - COX-2 inhibitors (Celebrex or Vioxx)
    - Paracoxib – “game changer”

Intraoperative Pain: Pathways



In the OR

- General Anesthesia
- Fluid Management
  - 4-2-1 rule
  - Bowel Prep
  - Evaporative Losses
- PONV prophylaxis
- Pain Management

Predict Fluid Needs and Empirically Replace

- 4-2-1 Rule: 70 kg patient
  - 110 ml/hr

110 ml/hr x 8 hrs =

880 ml fluid deficit from being NP

- What about the bowel prep?
  - Add 2-3 L to fluid deficit

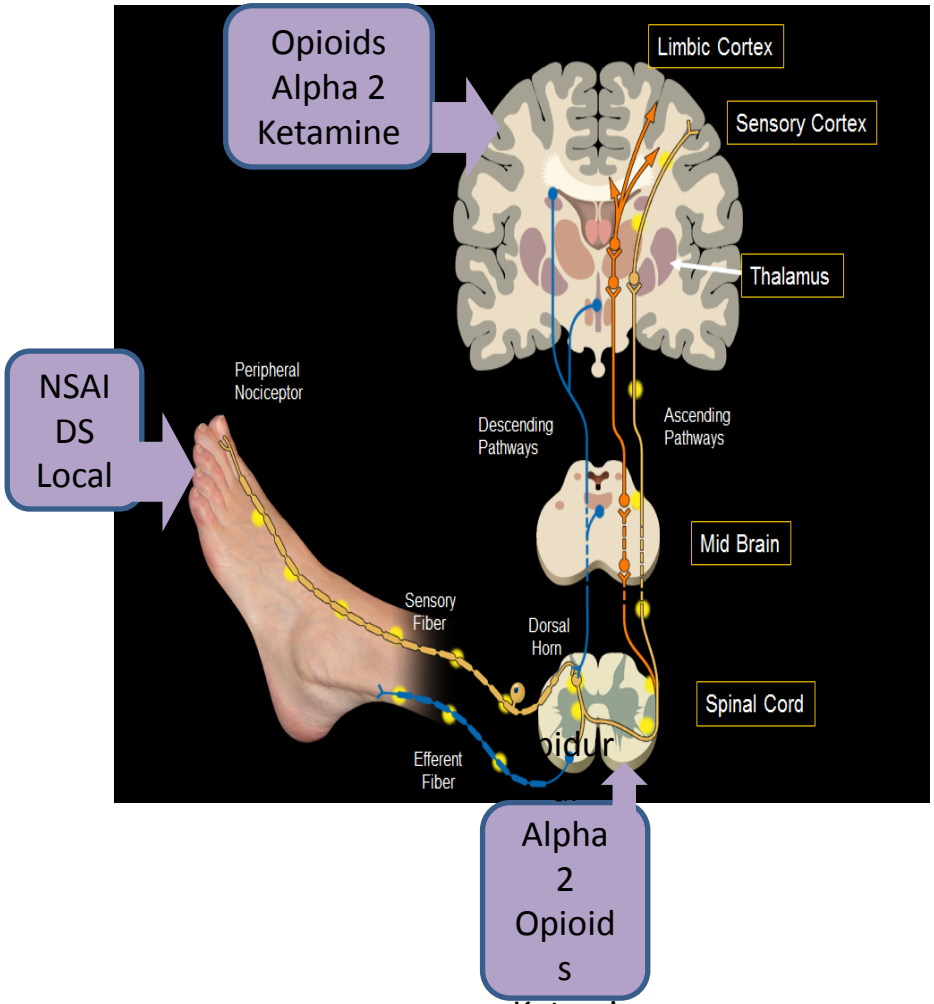
What if patient became hypotensive?

- Insensible losses
  - 4-8 ml/kg/hr = 280 – 560 ml/hr

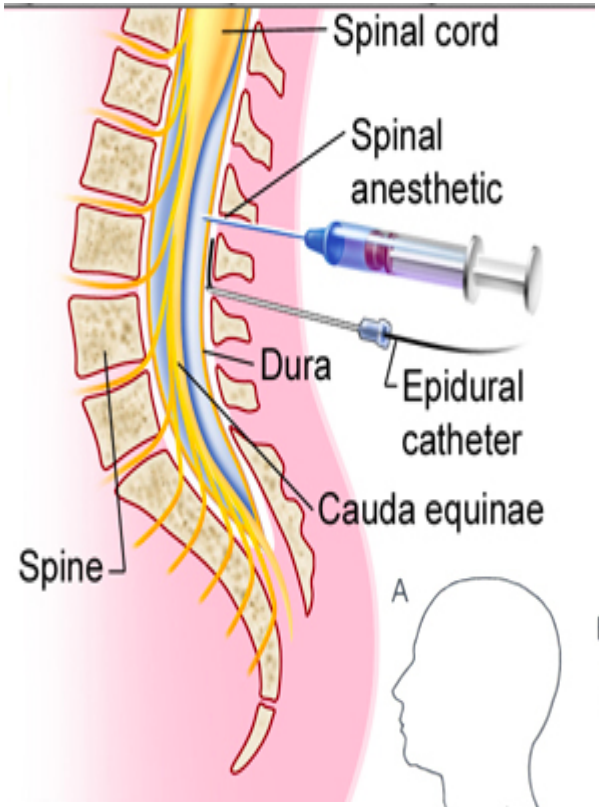
- Blood loss
  - 3 ml crystalloid for every 1 ml blood

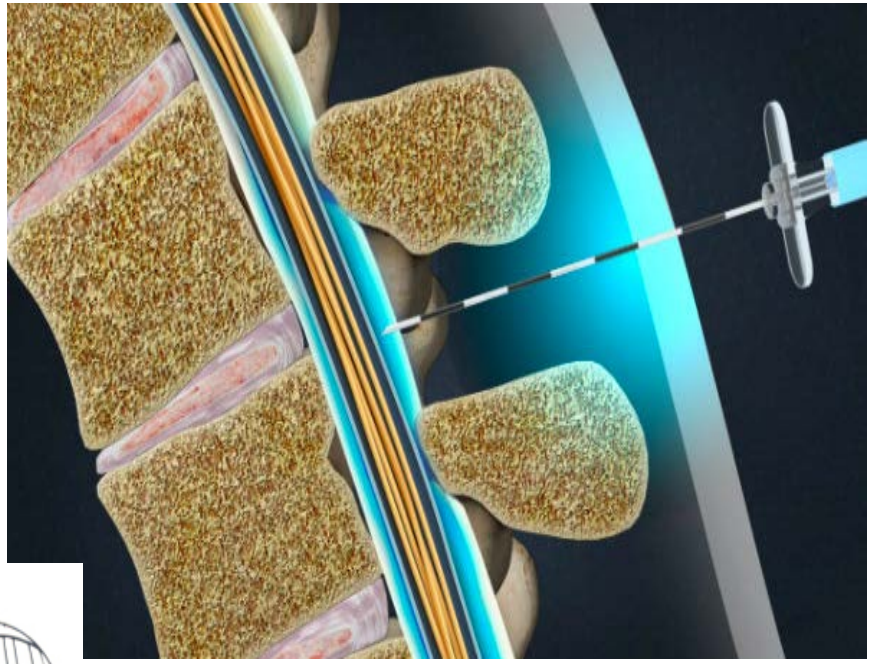
Why so much volume?

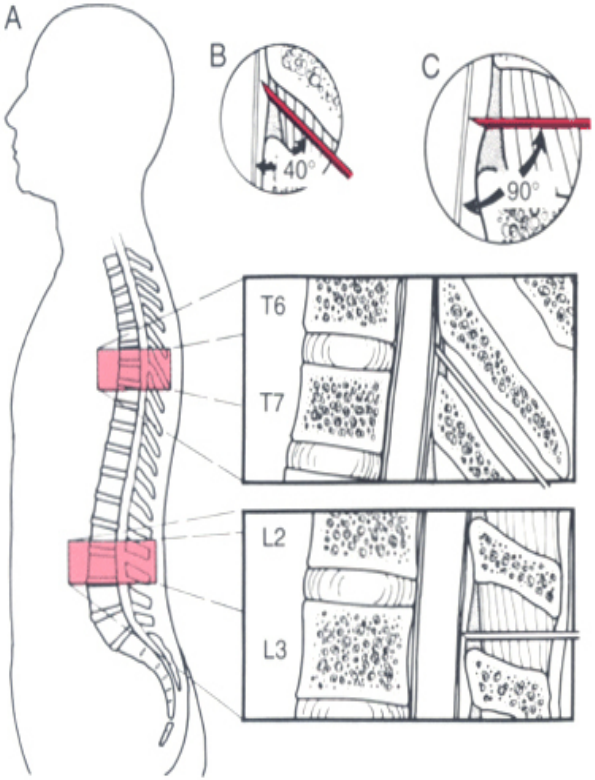
Intraoperative Pain Management



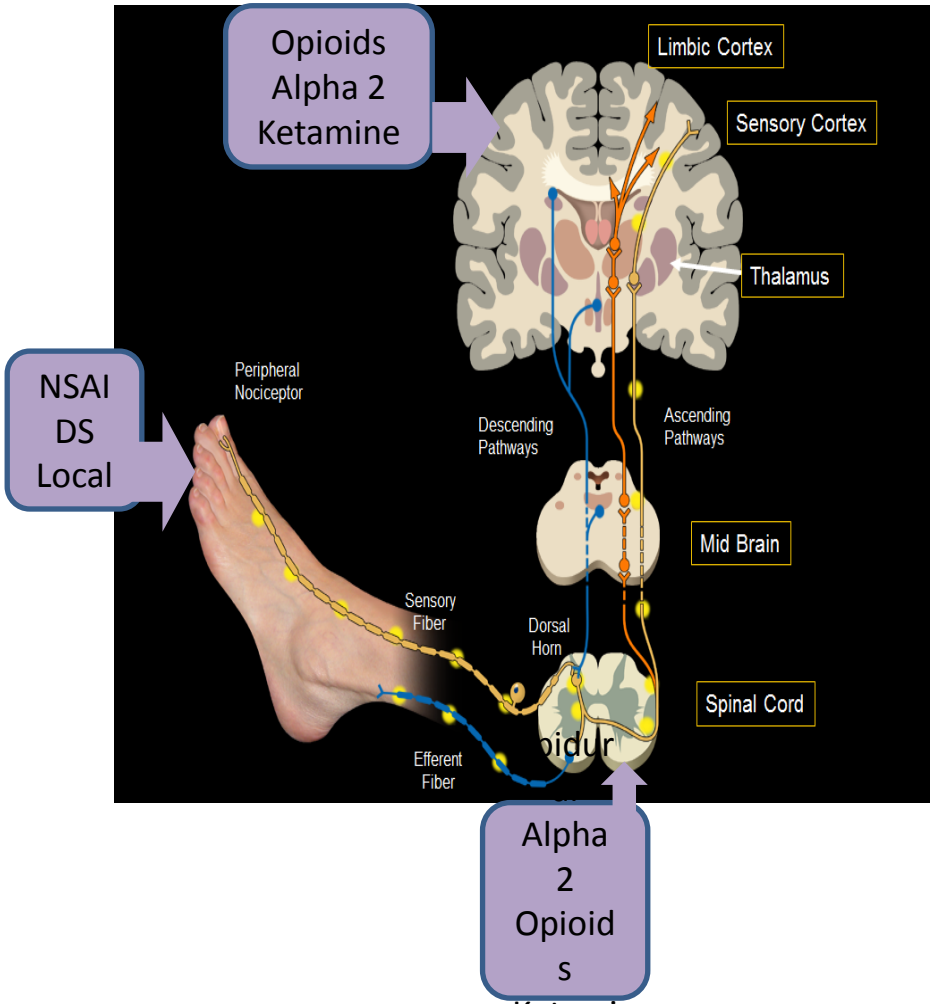
- Opiods, Opiods, Opiods
  - Cardiovascular Stability!
- Local infiltration by surgeon
- Epidural – very unlikely for this procedure
  - Lack of outcomes data
  - Difficulty in placing
  - High failure rate


Spinal cord
Spinal anesthetic
Dura
Epidural catheter
Cauda equinae
Spine




A
B
40°
C
90°
T6
T7
L2
L3

Intraoperative Pain Management



- Opiods, Opiods, Opiods
  - Cardiovascular Stability!
- Local infiltration by surgeon
- Epidural – very unlikely for this procedure
  - Lack of outcomes data
  - Difficulty in placing
  - High failure rate
- Ketorolac – reduced opioid requirement
  - Bleeding
  - Kidney injury
- Dexmedetomidine
- Ketamine

Additional Intraoperative Management

- NGT suction per surgeon's request
- Appropriate antibiotics prior to incision
- Keep the patient warm
- PONV prophylaxis

Female gender	Non-smoker	Young age
Duration of anesthesia	Postoperative opioid use	History of PONV or motion

PONV Prophylaxis

Table 2 Ranking and relative value of anesthesia outcomes

Outcome	Rank	Relative value[a]
Vomiting	2.56±0.13	18.05±1.09
Gagging on endotracheal tube	2.97±0.15	17.86±1.43
Pain	3.46±0.20	16.96±1.59
Nausea	4.02±0.17	11.82±0.87
Recall without pain	4.85±0.26	13.82±1.58
Residual weakness	5.34±0.17	7.99±0.8
Shivering	5.36±0.20	7.60±0.6
Sore throat	8.02±0.11	3.04±0.26
Somnolence	8.28±0.11	2.69±0.25
Normal	10.00	0

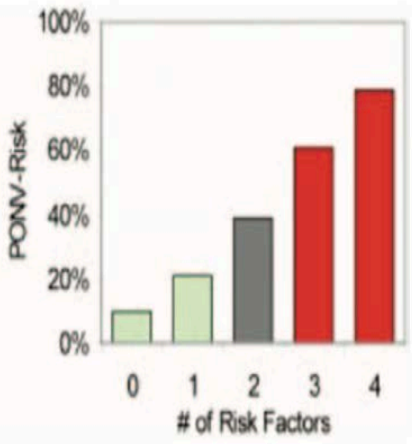
Values are mean ± sem. [a]This means that, for example, patients assigned $18.05 of $100 to avoid vomiting. (adapted from Macario 1999) (18)

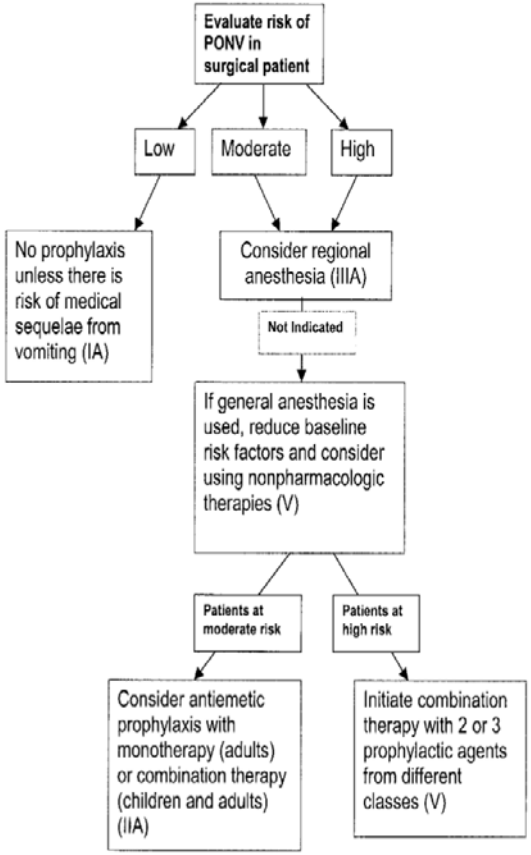
Smith et al. Annals of Palliative Medicine, 201

Consensus Guidelines for Managing Postoperative Nausea and Vomiting

Gan, Tong J. MD*; Meyer, Tricia MS, FASHP†; Apfel, Christian C. MD‡; Chung, Frances FRCPC§; Davis, Peter J. MD‖; Eubanks, Steve MD¶; Kovac, Anthony MD#; Philip, Beverly K. MD**; Sessler, Daniel I. MD††; Temo, James CRNA, MSN, MBA‡‡; Tramèr, Martin R. MD, DPhil§§; Watcha, Mehernoor MD‖‖

Risk Factors	Points
Female Gender	1
Non-Smoker	1
History of PONV	1
Postoperative Opioids	1
Sum =	0 ... 4





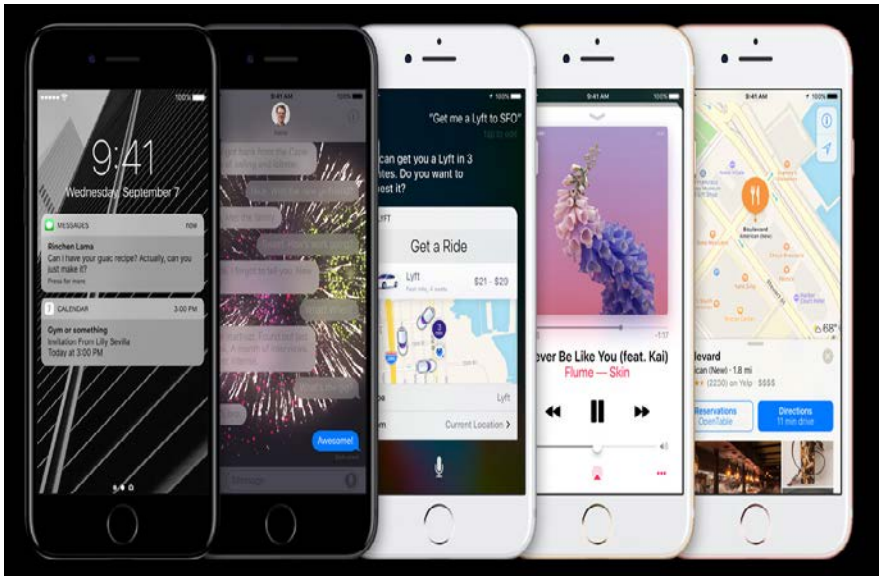
Gan, Anesthesia & Analgesia, 2003

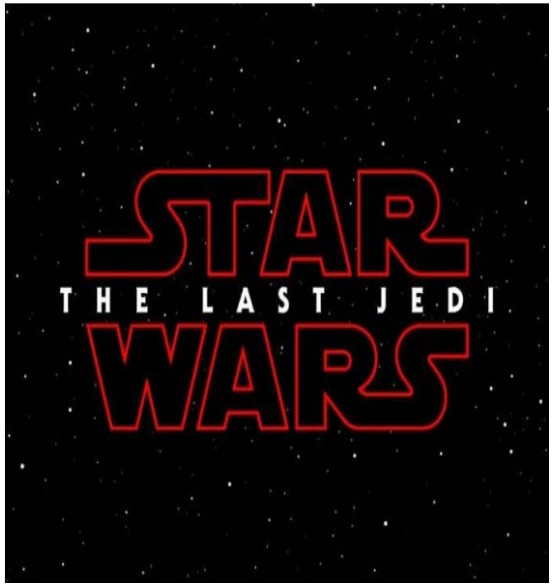
PACU Management

- More Fluids – 110 ml/hr
- Warm patient
- More Opioids!!
  - Goal of 4/10 pain
  - Bolus with opioids until comfortable then PCA
  - Continue PCA on the floors

15 Years Later…

Palm Pilot??





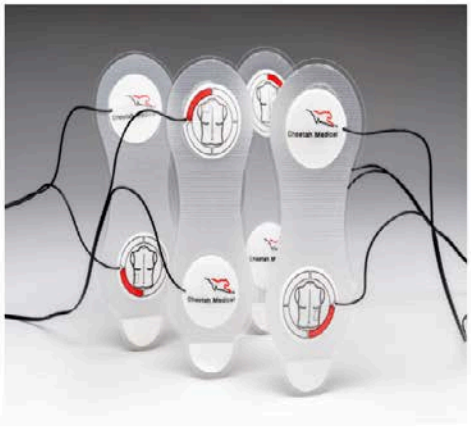
www.apple.com

Fluid Management

- Goal directed therapy
  - Improved technology/monitors
    - Flotrak, Cheetah, Clearsight
  - Crystalloids (avoid NS if possible)
  - Greater role for colloids

EV1000 clinical platform

Cheetah's accurate, precise and 100% noninvasive technology enables clinicians to make more confident and informed treatment decisions to help optimize a patient's fluid and perfusion status.



www.cheetah-medical.
www.edwards.com

Do We Still Need a Bowel Prep?

- If you did not have a bowel prep…
  - Earlier return of bowel function
  - Shorter hospital stay

- No difference in rates of anastomotic leaks or wound infections

Subtract 2-3 L from fluid deficit!!

Kumar et al. Clin Colon Rectal Sur

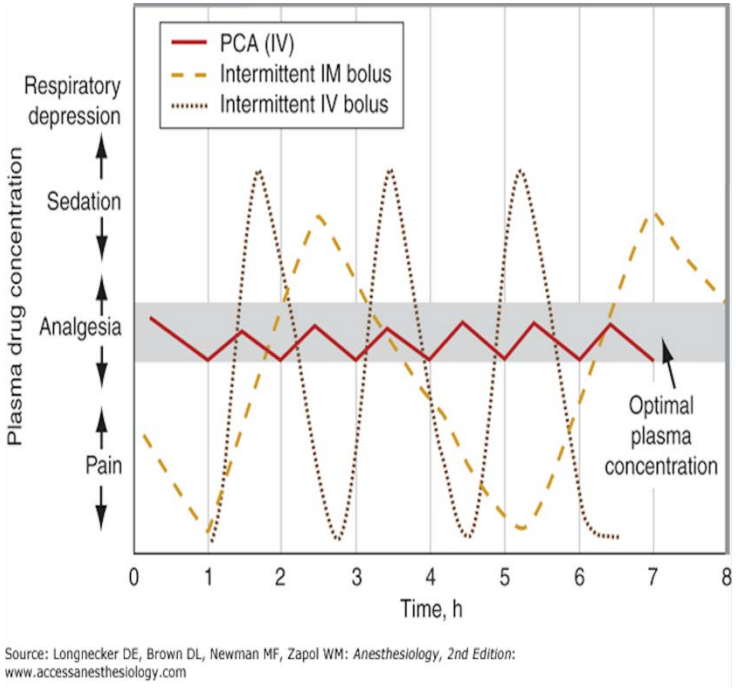
Reduced Preop Fasting

- Carbohydrate Loading
  - Up to 2 hours prior to surgery
  - Rate of pulmonary aspiration has not increased
  - Reduced thirst, hunger, anxiety
  - Reduced insulin resistance
  - More muscle strength and lean body mass
  - Accelerated recovery
  - Shorter hospital stay

Practice Guidelines for Acute Pain Management in the Perioperative Setting

An Updated Report by the American Society of Anesthesiologists Task Force on Acute Pain Management

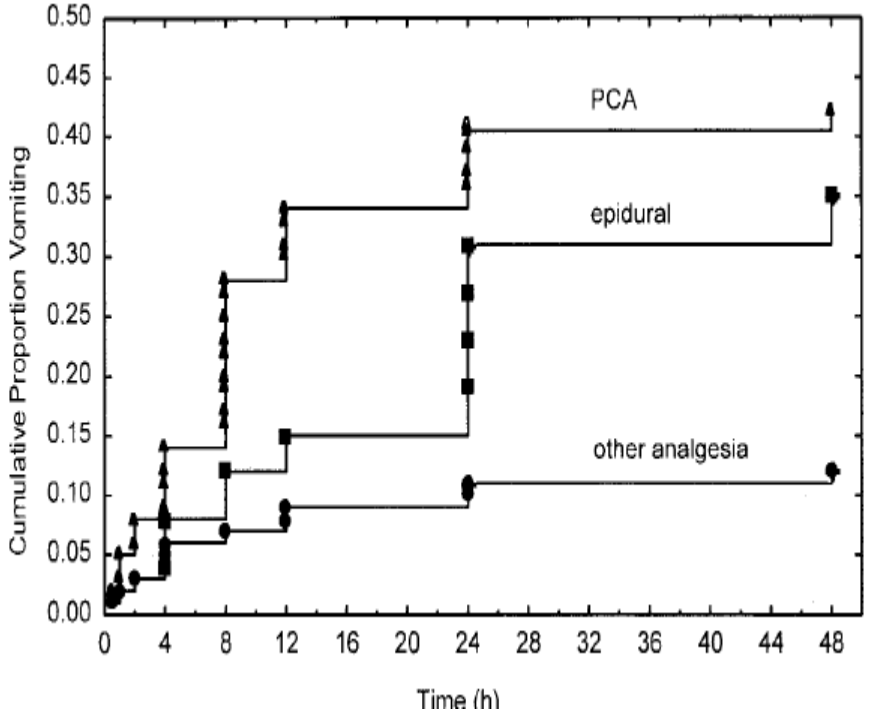
- Neuraxial opioids, PCA and regional techniques preferred over PRN opioids

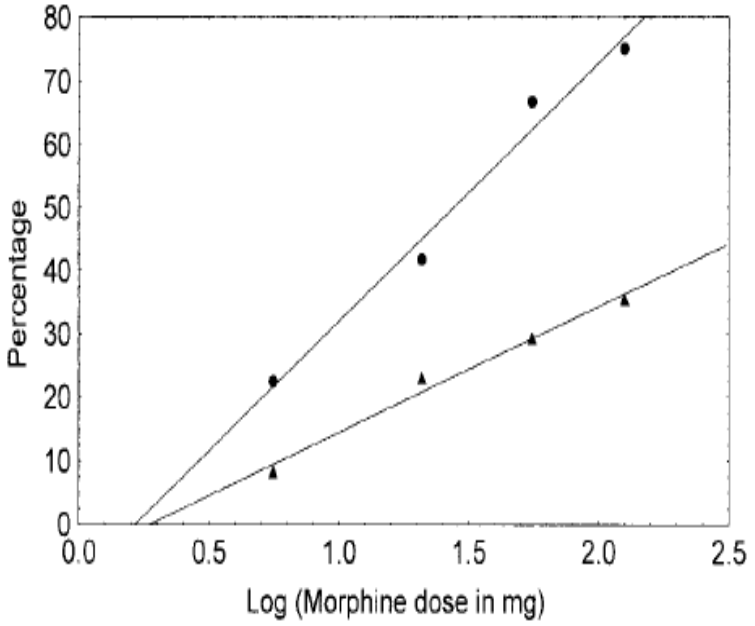


Source: Longnecker DE, Brown DL, Newman MF, Zapol WM: *Anesthesiology, 2nd Edition*: www.accessanesthesiology.com

Anesthesiology, Feb 2012

One Problem With Opioids





Roberts et al. Anesthesia and Analgesia,

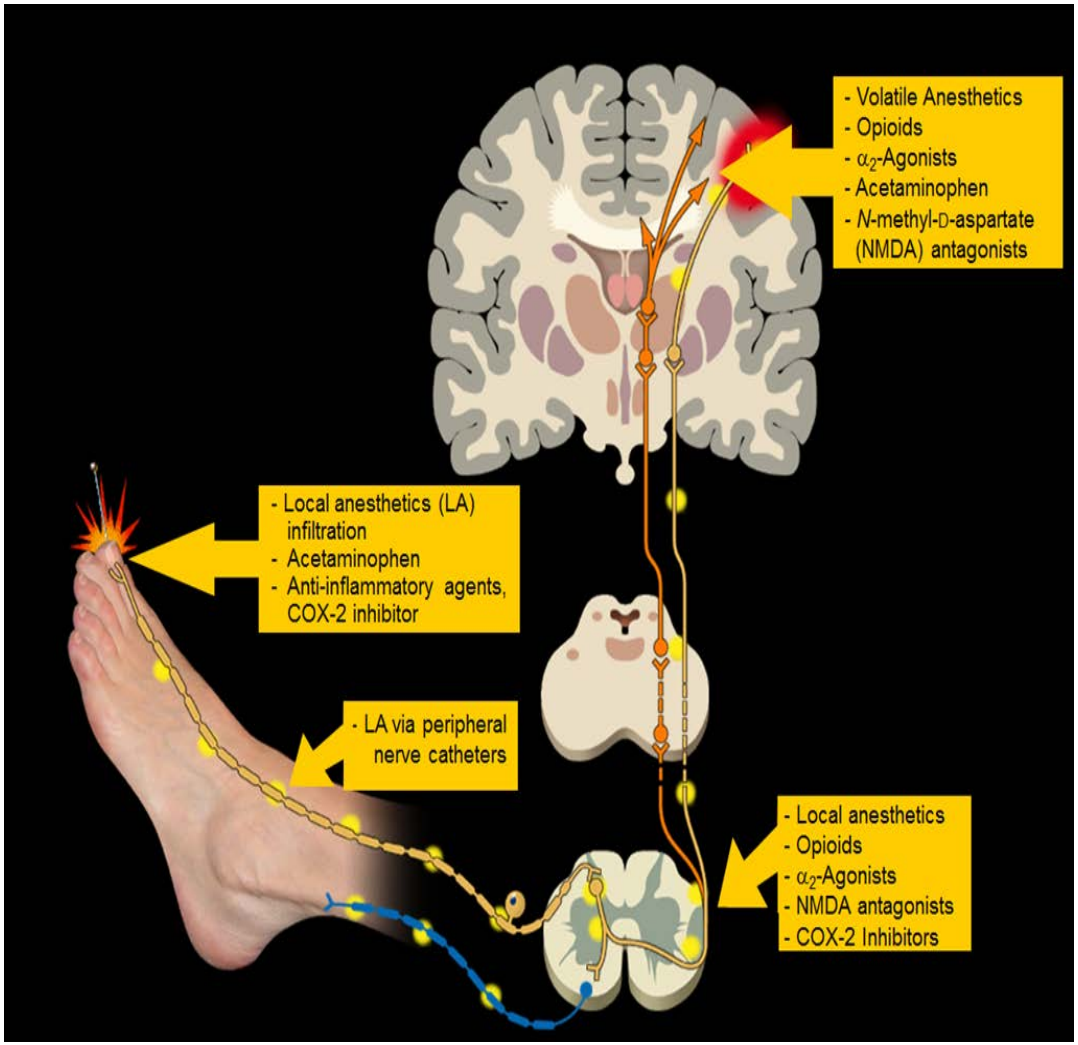
Practice Guidelines for Acute Pain Management in the Perioperative Setting

An Updated Report by the American Society of Anesthesiologists Task Force on Acute Pain Management

- Neuraxial opioids, PCA and regional techniques preferred over PRN opioids
- "…anesthesiologists should use multimodal pain management therapy…"
- "…patients should receive an around-the-clock regimen of COXIBs, NSAIDs or acetaminophen"

Anesthesiology, Feb 2012

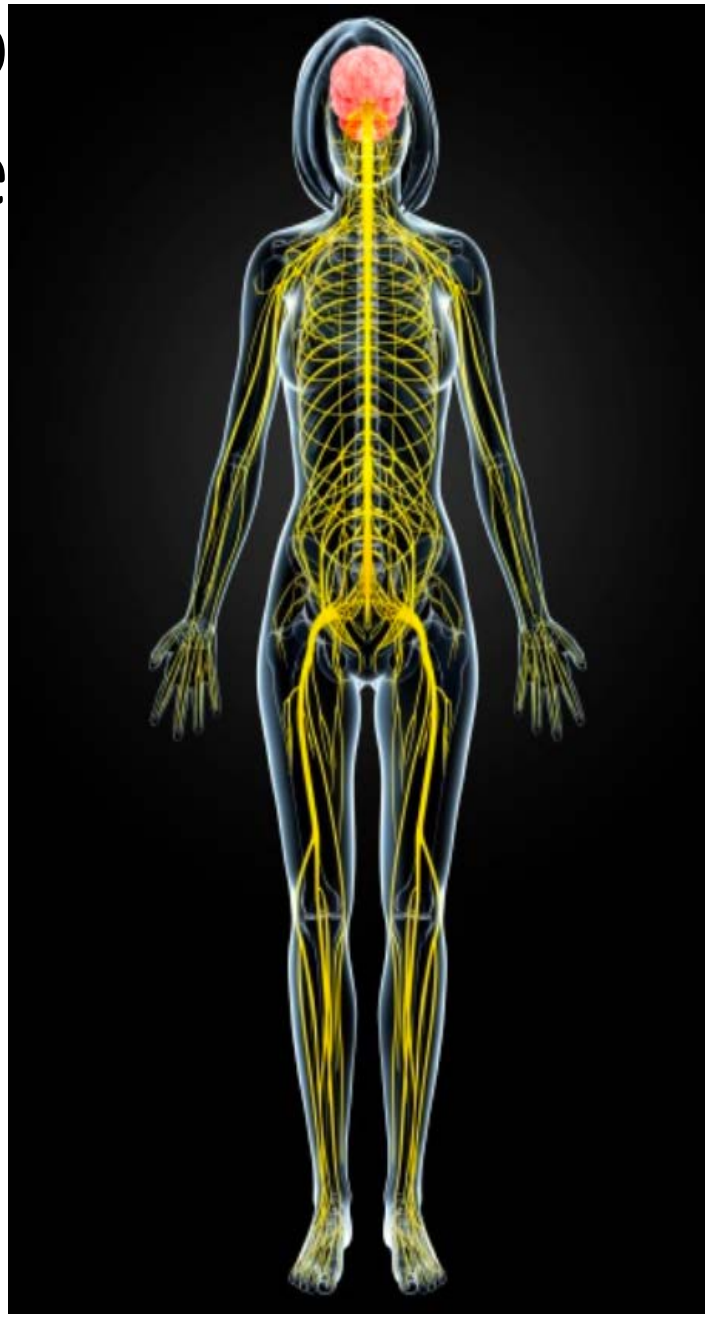
Intraoperative Pain Management



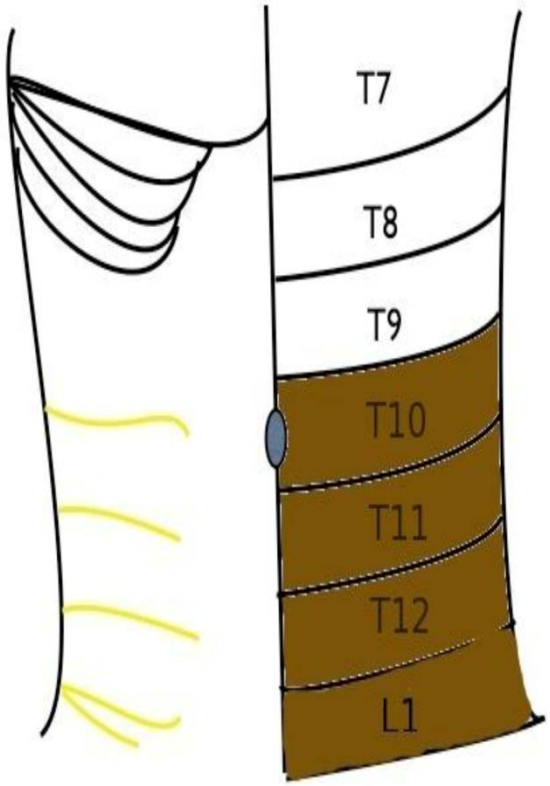
Multimodal Pain Management

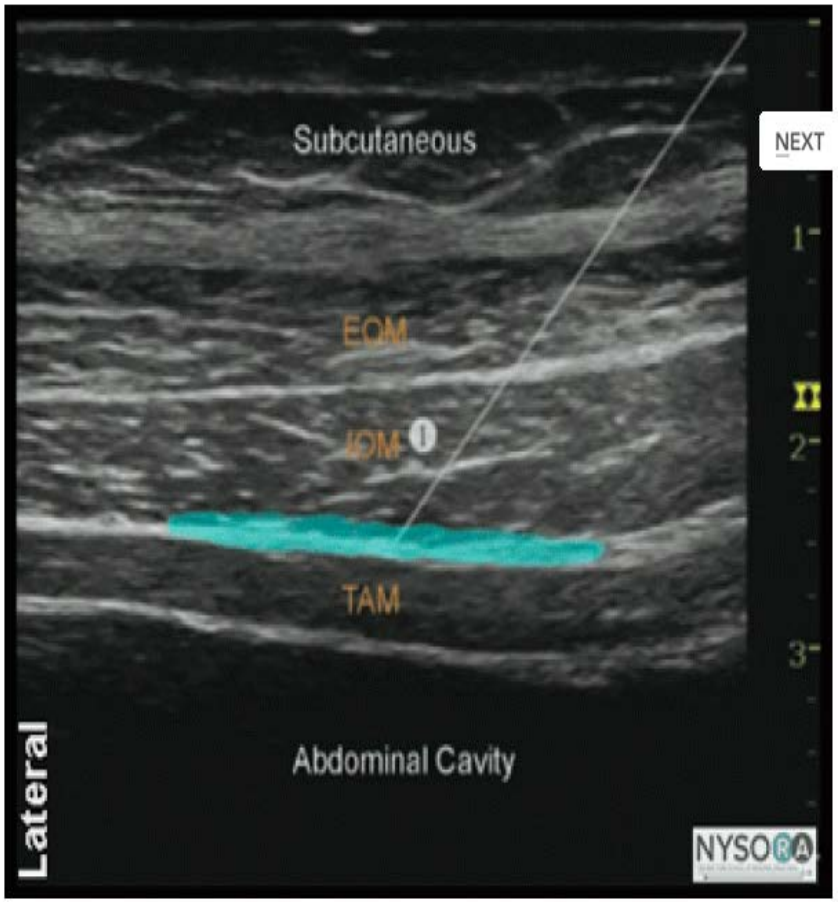
Drug	Outcome
Cox 2 inhibitor or NSAID	Reduced opioid requirements by 20-30%
Acetaminophen	Reduced opioid requirements by 20-30%
Ketamine	Opioid sparing effect, can treat opioid resistant pain
α-2 Agonist (clonidine, dexmedetomidine)	Reduced anesthesia requirements (not just opioids!)
Epidural (local anesthesia +/- adjuncts)	Potentially improved pain relief and reduced surgical stress response 30% failure rate
Gabapentin	Reduced opioid requirements
Corticosteroids	Reduced opioid requirements
Peripheral Nerve Block	Superior analgesia (vs opioids), reduced PONV, reduced duration of stay Doesn't always work

Perip
Nerve



Transversus Abdominus Plane (TAP) Block





K Mukhtar, NYSORA, 2009

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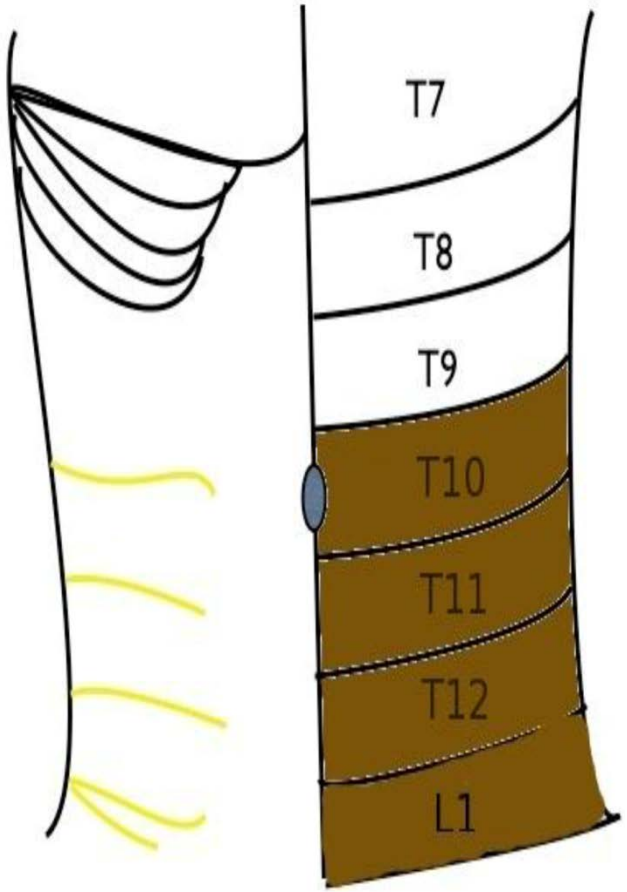

K Mukhtar, NYSORA, 2009

https://youtu.be/ab8Dvjauk_U

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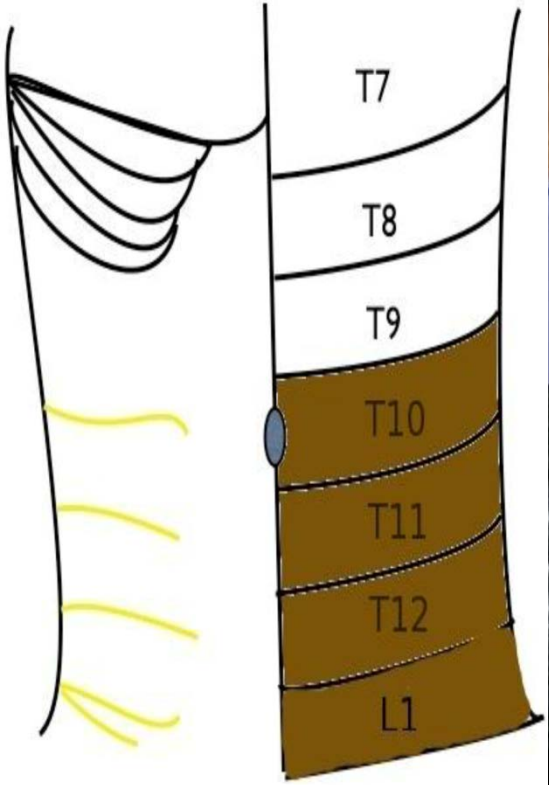

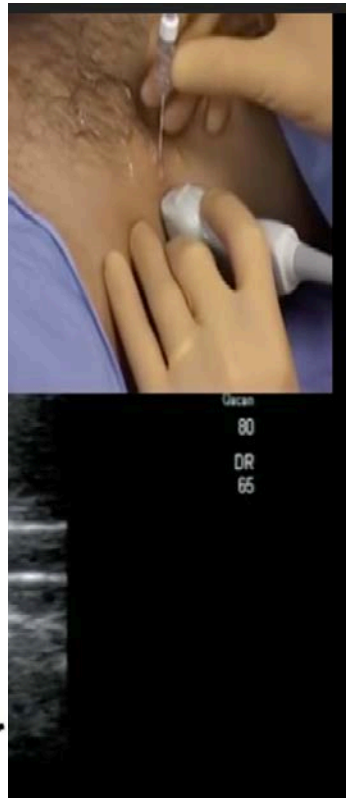

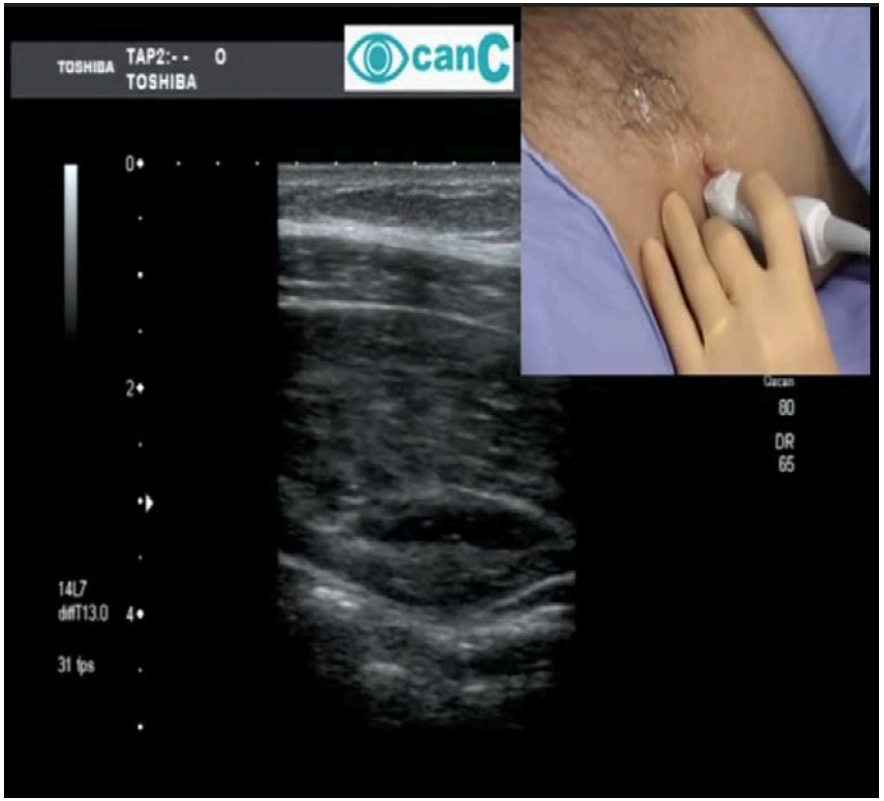

K Mukhtar, NYSORA, 2009
https://youtu.be/ab8Dvjaul

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Starting ERAS at Cooper: Preoperative Components

Sure. No problem…

- Preop counseling
- Discharge planning
- No/selective bowel prep
- Venous thromboembolism prophylaxis
- Pre warming
- Antibiotic prophylaxis

Are we sure about this?

- Reduced fasting duration
- Carbohydrate loading

Enhanced Recovery After Surgery (ERAS) for gastrointestinal surgery, part 2: consensus statement for anaesthesia practice

- “Intake of clear fluids should be allowed until 2 h before induction of anaesthesia. Solids should be allowed until 6 h.”

Acta Anaesthesiologica Scandinavica 2016

ASA Practice Guidelines for Preoperative Fasting

Ingested Material	Minimum Fasting Period (hours)
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Anesthesiology 2017; 126:37

ERAS at Cooper: Anesthesia Intraoperative Components

OK…

- Active warming
- Multimodal pain management
- Avoid NG tubes
- Multimodal PONV prophylaxis

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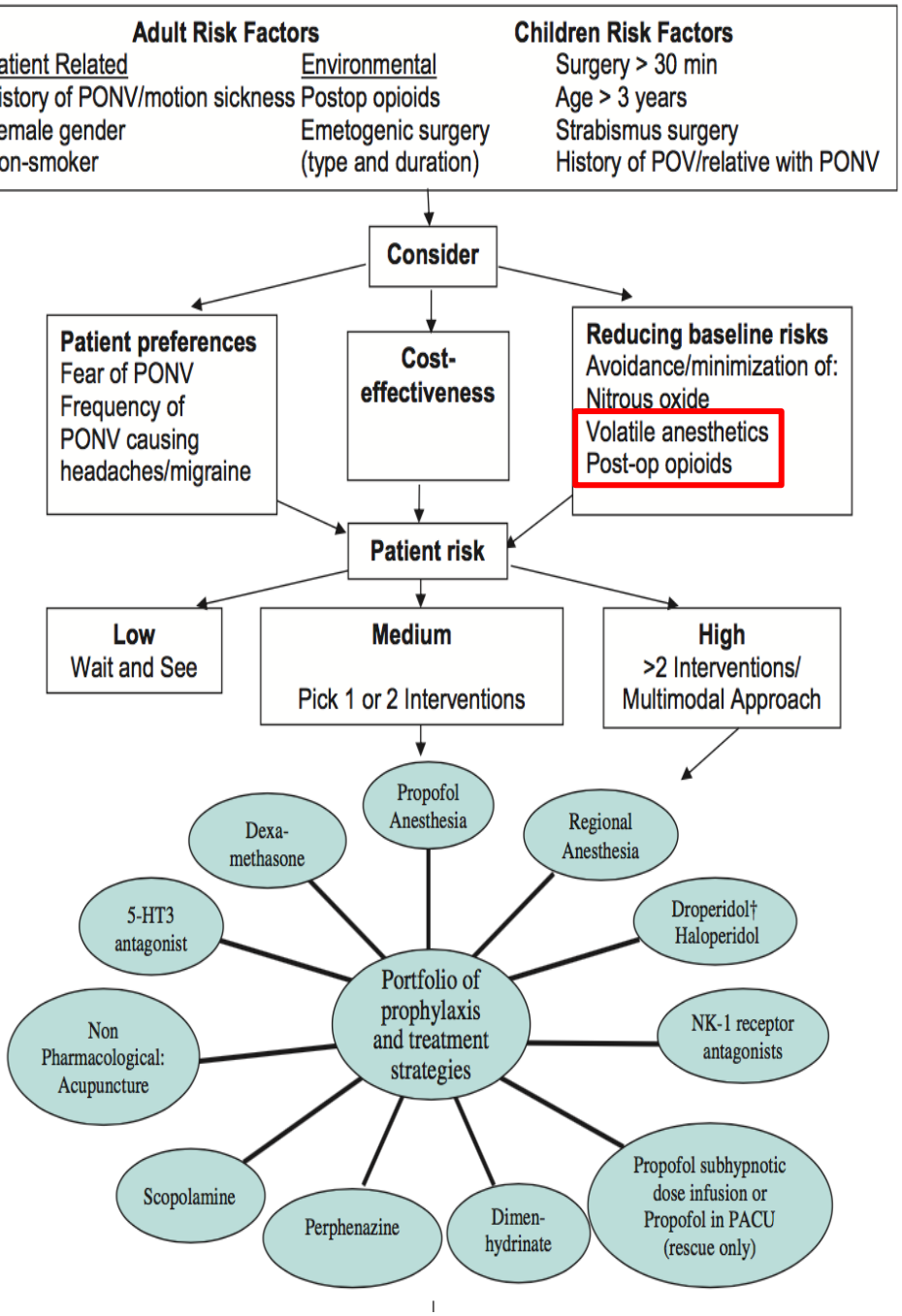
Prc



Gan, Anesthesia & Analgesia, 2014

ERAS at Cooper: Anesthesia Intraoperative Components

OK…

- Active warming
- Multimodal pain management
- Avoid NG tubes
- Multimodal PONV prophylaxis

Not so sure about this…

- Goal directed fluid therapy
  - Can I potentially damage my patients vital organs by underperfusing?
- Avoid long acting opioids
  - Am I taking care of my patient?
  - Practitioner's opioid dependence
- Anesthesia is not cookbook!

Barriers to implementing ERAS

- Semi-structured interviews of Surgeons, Anesthesiologists, Nurses and Patients
  - “I think one of the challenges you are going to have is breaking the habits of anesthesiologists as to preoperative fasting…” – surgeon
  - “Whenever you have change you have compliance issues…It is a change from my routine.” – anesthesiologist
  - ”People are skeptical of change” -- nurse

Alawadi et al. Surgery 2016

ERAS at Cooper

- Reduced morphine (equivalent) use
- Improved pain scores
- Decreased length of stay in hospital

Thank You!