ERAS in Ambulatory Surgery

Krista J Childress, MD, FACOG
Associate Professor
University of Utah & Primary Children's Hospital
Pediatric and Adolescent Gynecology

Disclosures

- None

Objectives

- ERAS principles in ambulatory setting
- Important considerations
- Keys to success

Table 1 Key components of paediatric ERAS pathways[14]

Intervention	APSA colorectal care pathway
Preoperative	
Provide preoperative information and education	Yes
Optimise underlying medical conditions	Yes
Minimise the use of mechanical bowel preparation	No
Avoid prolonged fasting	Yes
Administer non-opioid preoperative analgesic medications	Yes
Intraoperative	
Use thromboembolism prophylaxis	Yes
Use preoperative antibiotic prophylaxis and skin preparation	Yes
Use a standard anaesthetic protocol, including regional anaesthesia when possible	Yes
Apply a multimodal approach to preventing PONV if >2 risk factors	Yes
Utilise laparoscopic surgery	Yes
Avoid routine nasogastric tubes	Yes
Use standardised protocol for hypothermia prevention	Yes
Postoperative	
Avoid routine peritoneal cavity drainage after colonic anastomosis	Yes
Use goal directed fluid therapy or zero fluid balance model to guide postoperative fluid management	Yes
Avoid urinary catheter placement or early removal on postoperative day 1 or 2	Yes
Use interventions to minimise postoperative ileus	Yes
Minimise use of opioids	Yes
Use insulin to control severe hyperglycaemia in the ICU	No
Provide nutritional care, including screening for nutritional status	Yes
Begin early scheduled mobilisation on postoperative days 0–1	Yes
Collect information on protocol compliance and outcomes	Yes

Ambulatory Surgery

- Optimize perioperative care
  - Reduce surgical stress & improve recovery
  - Decreased narcotics & LOS
  - Increased patient satisfaction
  - No increase in cost
- Fewer interventions than inpatient procedures
- Fewer components than adult ERAS guidelines
- Do as many components as possible → higher success & better outcomes
- Some components can apply to all procedures & specialties
- Standardization

Sample ERAS protocol for abdominal procedures →

Roberts et al. Enhanced recovery after surgery in paediatrics: a review of the literature. 2020.
Rove et al. Enhancing recovery after surgery in children: promising evidence based multidisciplinary care. Ped Anesthesia. 2018.

Pre-operative counseling

BEFORE SURGERY EDUCATION:

1. After midnight, you will not be able to eat anything solid. However, you can have clear liquids with lots of sugar up until 2 hours before surgery. This will make you feel less thirsty, less hungry and less anxious. It will also help your body maintain its normal blood sugar levels during and after surgery.
2. Some examples of clear liquids you can drink include:

Gatorade

Apple Juice

3. You will be prescribed a pain medication called Neurontin to take three times a day as prescribed, the day before surgery. This will help control your pain after the operation. The usual dose is 100-300 mg taken three times. Your dose is dependent on your body weight.
4. On the day of surgery, you will be given a couple pain medications upon arrival to the pre-op area. You will be given a 325 mg or 650 mg dose of Tylenol depending on your body weight. You will also be given a loading dose of Neurontin, usually between 300 mg- 1000 mg depending on your body weight.

LEGO Surgery- ERAS is Awesome https://youtu.be/zHEincgSm1k

- Appropriate expectations
- Patient & family counseling
- Reminders prior to surgery
  - Email
  - Phone
- Pre op nursing*

Preoperative	• ***Counseling prior to surgery:**
	  ○ Medication overview, NPO instructions, intraoperative pain management, and discharge criteria
	• **Day before surgery:**
	  ○ Gabapentin 5 mg/kg PO TID
	• **Day of surgery:**
	  ○ Carbohydrate loading: 16-20 oz Gatorade or apple juice 2 hours before surgery
	  ○ *Gabapentin 15 mg/kg PO (max 600 mg)
	  ○ *Tylenol 10 mg/kg PO or IV

* Keys to success
  - Pre-op nursing champion
  - Reminder calls

Intraoperative	• ***Pain management**
	  ○ Peripheral nerve block (PNB)
	  ○ Local anesthetic
	  ○ Minimization of opioids
	  ○ Ketorolac IV
	• Minimally invasive surgery
	• Maintenance of near zero fluid balance
	• Normothermia
	• Antiemetics
	• **+/- Foley** placement with early removal

*Key to success: Anesthesia champion

Postoperative	• Early mobilization and oral intake • Limit fluid boluses • Limit narcotics for breakthrough pain • Bowel regimen • ***Outpatient ERAS Pain Medications*** ○ Gabapentin 5 mg/kg TID x 3-7 days ○ Acetaminophen 10 mg/kg every 6 hours ○ Ibuprofen 10 mg/kg every 6 hours ○ Lidocaine patches prn (OTC) ○ Narcotics PRN→ E-scribe

- Key to success: scheduled medications

Patient Outcomes

Follow-Up	• **Phone call within 7 days**
	  ○ Pain managed?
	  ○ Compliance with medications?
	  ○ Normal diet?
	  ○ Ambulating?
	• **Post-operative Visit**
	  ○ Was pain well managed on ERAS meds?
	  ○ Pleased with pain control?
	  ○ How long did you take gabapentin?
	  ○ Still requiring pain medications?
	  ○ Side effects from gabapentin?

Pediatric Gynecology Multi-Center Study

- 2 large children's hospitals
- 3 years of data
- n = 187 open and minimally invasive abdominal gyn procedures
- 80% minimally invasive (n=167)
- Compliance:
  - Pre-op gabapentin:70% day before; 80% pre-op
  - Carb beverage: 50%
- Regional anesthesia: 100%
  - Peripheral nerve blocks: 30% (majority QL)
  - Local anesthetic: 70%
- Ketorolac at end of case: 80%
- Outpatient ERAS medications: 90%
- POD#0 discharge: 99% of minimally invasive
- Satisfaction with pain management:
  - Phone call: 91% (*medication compliance/chronic pain)
  - Post-operative visit: 93%

Multi-Modal Pain Management

- **Pre-operative**: midazolam +/- gabapentin or NSAIDS
- **Intra-operative**: Regional anesthesia
  - Peripheral Nerve blocks (PNB): QL, TAP, Rectus sheath (procedure/anesthesia dependent)
  - Benefits:
    - Decreased anesthesia requirements → faster awakening/earlier extubation
    - Attenuate proinflammatory metabolic responses
    - PRAN data: PNB safe in children of all ages with no neurological damage
      - Neurologic deficit incidence: 2.4/10,000
      - Local systemic toxicity: 0.76/10,000
    - Neonates: scheduled Tylenol + regional (PNB or epidural)→ decreases respiratory complications and shortens time to bowel function
- **Post-operative**
  - Scheduled pain medication: NSAIDS + Tylenol +/- gabapentin
  - Bowel regimen
  - Oxycodone prn

Polaner DM et al. Pediatric regional anesthesia network (PRAN). Anesth Analg 20212; 115;: 1353-64.
Taenzer et al. Variation in pediatric local anesthetic dosing for peripheral nerve blocks: an analysis from the PRAN. Reg Anesth Pain Med 2020.
Brindle et al. Consensus guidelines for perioperative care in neonatal intestinal surgery: ERAS society recommendations. World J Surg. 2020.

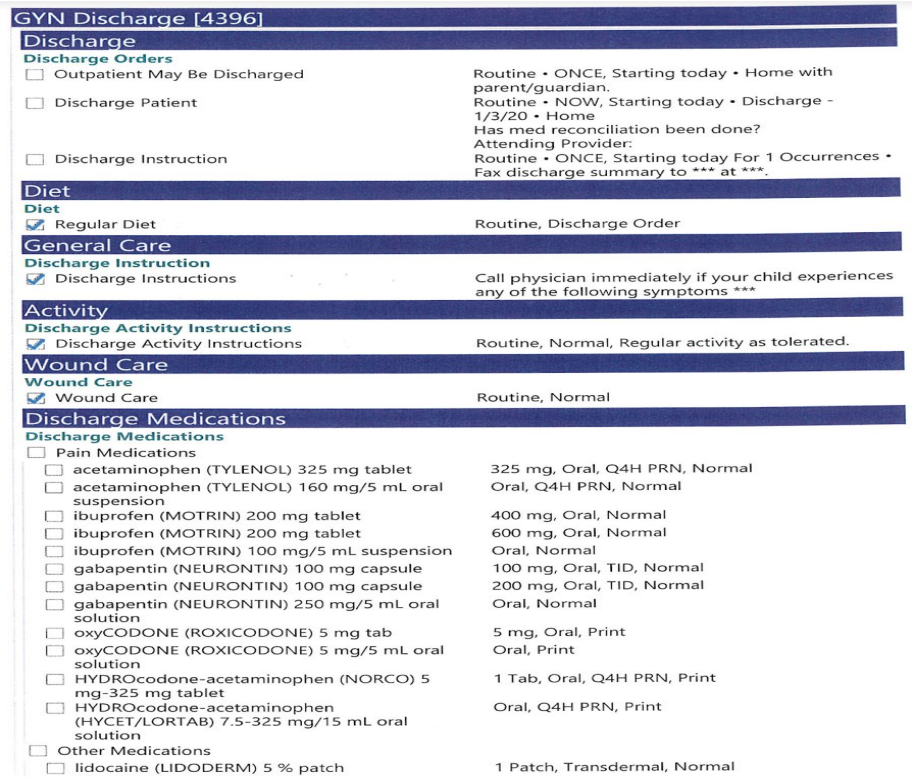
Gabapentinoids

- Mixed results → no clear evidence in pediatric population
- Improvement
  - Pre and post op anxiety
  - Nausea
  - Decreased narcotic use (multi-dose, not single dose)
  - Decreased side effects (GI)
- Needs further research
  - Decrease in pain scores (improved in early post op period)
  - Vomiting
  - Patient satisfaction
  - Early ambulation/transition to oral medication
  - Sedative effects compared to narcotics
- Consider for certain populations
  - Chronic pain
  - Complex minimally invasive procedures

Tomaszek et al. Perioperative gabapentin in pediatric thoracic surgery patients-RTC, phase 4 trial. Pain Medicine. 2020
Dinesh et al. Evaluation of gabapentin and clonidine use in children following spinal fusion surgery for idiopathic scoliosis: a retrospective review.J. Pediatr Ortho. 2019.
Baxter et al. Effectiveness of gabapentin as a postoperative analgesic in children undergoing appendectomy. Ped Sur Int. 2018
Anderson et al. Multimodal pain control in adolescent posterior fusion patients: RTC with gabapentin. Spine Deform. 2020

Tips & Tricks

- Compliance
- Champions/Partners
  - Anesthesia
  - Nursing (pre/post)
  - APPs
  - Fellows
- Patient/family counseling
- Order Sets: auto check
- Dot phrases
- Data collection
- Reminder phone apps: Twilio
- EDUCATION!
- Expand to all services



GYN Discharge [4396]

Discharge

Discharge Orders

☐ Outpatient May Be Discharged	Routine • ONCE, Starting today • Home with parent/guardian.
☐ Discharge Patient	Routine • NOW, Starting today • Discharge - 1/3/20 • Home Has med reconciliation been done? Attending Provider:
☐ Discharge Instruction	Routine • ONCE, Starting today For 1 Occurrences • Fax discharge summary to *** at ***.

Diet

Diet

☑ Regular Diet	Routine, Discharge Order

General Care

Discharge Instruction

☑ Discharge Instructions	Call physician immediately if your child experiences any of the following symptoms ***

Activity

Discharge Activity Instructions

☑ Discharge Activity Instructions	Routine, Normal, Regular activity as tolerated.

Wound Care

Wound Care

☑ Wound Care	Routine, Normal

Discharge Medications

Discharge Medications

☐ Pain Medications	
☐ acetaminophen (TYLENOL) 325 mg tablet	325 mg, Oral, Q4H PRN, Normal
☐ acetaminophen (TYLENOL) 160 mg/5 mL oral suspension	Oral, Q4H PRN, Normal
☐ ibuprofen (MOTRIN) 200 mg tablet	400 mg, Oral, Normal
☐ ibuprofen (MOTRIN) 200 mg tablet	600 mg, Oral, Normal
☐ ibuprofen (MOTRIN) 100 mg/5 mL suspension	Oral, Normal
☐ gabapentin (NEURONTIN) 100 mg capsule	100 mg, Oral, TID, Normal
☐ gabapentin (NEURONTIN) 100 mg capsule	200 mg, Oral, TID, Normal
☐ gabapentin (NEURONTIN) 250 mg/5 mL oral solution	Oral, Normal
☐ oxyCODONE (ROXICODONE) 5 mg tab	5 mg, Oral, Print
☐ oxyCODONE (ROXICODONE) 5 mg/5 mL oral solution	Oral, Print
☐ HYDROcodone-acetaminophen (NORCO) 5 mg-325 mg tablet	1 Tab, Oral, Q4H PRN, Print
☐ HYDROcodone-acetaminophen (HYCET/LORTAB) 7.5-325 mg/15 mL oral solution	Oral, Q4H PRN, Print
☐ Other Medications	
☐ lidocaine (LIDODERM) 5 % patch	1 Patch, Transdermal, Normal

.ERASPhonefollowup
.ERASClinicfollowup

REDCap Data Collection!

Thank you!

Questions:

Email: krista.childress@hsc.utah.edu

References

1. Roberts et al. Enhanced recovery after surgery in paediatrics: a review of the literature. BJA Education. 2020.
2. Tomaszek et al. Perioperative gabapentin in pediatric thoracic surgery patients-RTC, phase 4 trial. Pain Medicine. 2020
3. Dinesh et al. Evaluation of gabapentin and clonidine use in children following spinal fusion surgery for idiopathic scoliosis: a retrospective review.J. Pediatr Ortho. 2019.
4. Baxter et al. Effectiveness of gabapentin as a postoperative analgesic in children undergoing appendectomy. Ped Sur Int. 2018
5. Anderson et al. Multimodal pain control in adolescent posterior fusion patients: RTC with gabapentin. Spine Deform. 2020.
6. Polaner DM et al. Pediatric regional anesthesia network (PRAN). Anesth Analg 20212; 115;: 1353-64.
7. Taenzer et al. Variation in pediatric local anesthetic dosing for peripheral nerve blocks: an analysis from the PRAN. Reg Anesth Pain Med 2020.
8. Brindle et al. Consensus guidelines for perioperative care in neonatal intestinal surgery: ERAS society recommendations. World J Surg. 2020.