ERAS Pediatric Pectus Pathway

Preop & Intraop Components

Pre-Admit

- **Screening & Optimization for: Nutritional Deficiency – CBC, T&S**
- **Education provided during patient's clinic visit**

Preop DOS

Pre-emptive Analgesia

(written by Pediatric Pain Team)

- Celebrex PO*:
  - 20-39 kg: 100 mg
  - 40-60 kg: 200 mg
  - > 60 kg: 400 mg
- Gabapentin PO*:
  - <12 yrs and/or <40 kg: 15 mg/kg
  - >/=12 yrs and 40-59 kg: 600 mg
  - >/=12 yrs and >/=60 kg: 900 mg
- Acetaminophen PO:
  - <40 kg: 15 mg/kg
  - 40-59 kg: 650 mg
  - >/=60 kg: 1000 mg

(Exercise caution / dose adjust for renal impairment)*

Fasting and Carbohydrate Loading Guidelines

- Follow ASA NPO guidelines
- Allow for liberal clear carbohydrate consumption until 2 hours before surgery (inpatient) or scheduled arrival time (outpatient)
  - Clear carbohydrate beverages include: Gatorade, vitamin water, apple juice. (no protein containing liquids, no sugar free versions of above)

Fluid Bolus

- Lactated Ringer's 10 mL/kg fluid bolus (max 1000 ml) - administered just prior to or during epidural placement

Intraoperative

**Midazolam, given at discretion of ACT*

Anti-Emetic Prophylaxis

- Dexamethasone 0.1 mg/kg IV (MAX DOSE 8 mg)
- Ondansetron 0.1mg/kg (MAX DOSE 4 mg IV)

Types, Doses, and Routes of Anesthetics Administered

- Volatile agent titrated to MAC 0.5-1

Epidural Management (*may place in PCS if patient amenable)

- Recommend level T5-7
- Epidural bolus:
  - 0.25% bupivacaine 0.1 mL/kg (maximum 7 mL)
  - Duramorph 30 mcg/kg (max 250 mcg)
- Epidural infusion:
  - 0.25% bupivacaine 0.1-0.2 mL/kg/hr (max 10 mL/hr)

**Limit preop fentanyl to 100 mcg for awake epidural placement; avoid additional fentanyl intraop*

Non-Epidural Pain Management

- Bilateral erector spinae catheters:
  - Bolus 0.2% ropivacaine 0.5 mL/kg (maximum 20 ml per side)
  - Clonidine 1 mcg/kg per side (maximum 100 mcg total)
- Ketamine bolus 0.25 mg/kg IV on induction, and then 0.25 mg/kg/hour. Discontinue at start of skin closure
- Fentanyl 0.5-1 mcg/kg IV titrated to need
- Ketorolac 15 mg IV (if Celebrex not given preoperatively, discuss w/ surgeon first)

Patient Warming Strategy

- Raise room temp (68-72F) prior to patient arrival in OR
- Use active warming device and IV fluids
  - Core temperature monitoring (such as esophageal)

Mechanical Ventilation Guidelines

- TV 8 ml/kg IBW, PEEP 4, Fi02 minimal need to maintain > 95% O_2 Sat
- Recruitment breaths every 30 minutes

BP Goals

- MAP > 65 mmHg
- Maintain SBP within 20% of baseline

Intraoperative Fluid Management Strategy

- Generalized principles to limit excess crystalloid administration:
- Intraoperative maintenance fluid based on IDEAL BODY WEIGHT.
- Lactated Ringer's 3 ml/kg/hour

Transfusion Guidelines per ASA

- Maintain goal hemoglobin >7 g/dL – unless symptomatic
- Discuss transfusion with surgeon prior to administration of blood products

Administer 10ml/kg/dose or 1 unit/dose for children >30kg

PACU

Patients with epidural

- Epidural infusion (per Pediatric Pain Team)
- Fentanyl 0.5mcg/kg/dose IV (MAX DOSE 25mcg) x2 doses
- Avoid long acting opioids

Patients without epidural

- Erector Spinae catheter infusion 0.2% Ropivacaine at 0.1-0.2ml/kg/hr (per Pediatric Pain Team)
- Fentanyl 0.5mcg/kg/dose IV (MAX DOSE 25mcg) x4 doses
- Morphine or Dilaudid

For all patients (notify Pediatric Pain Team of arrival in PACU, uncontrolled pain, persistent nausea, persistent itching or new neurologic symptoms)

- Diazepam 0.05mg/kg/dose IV (MAX DOSE 2mg) PRN for muscle spasms
- Ondansetron 0.1mg/kg/dose IV PRN nausea (MAX DOSE 4mg)
- Promethazine 3mg IV PRN refractory nausea (MAX # DOSES=2) only in PACU (Pediatric Pain team must be notified)

ERAS Pediatric Pectus Pathway:
Post-Operative Components

Floor	Service-Specific	Pain Management	Nutrition & GI Recovery	Early Mobilization	Drains and Lines
POD 0	•Post-op fluids: General guideline to minimize IVF •Use 4-2-1 rule for maintenance calculation •Medlock IVF once taking enough by mouth	•Epidural, Erector Spinae Catheter Infusions and PCA management per Pediatric Pain Team •Peds Pain team will follow and write for pain medications until the day following catheter removal •Postoperative multimodal pain medications listed below will continue for entirety of hospitalization unless otherwise noted •Acetaminophen 650 mg po q6 hours (or equivalent IV if NPO) •Gabapentin PO TID until 1 week post discharge (<40 kg: 5 mg/kg , 40-59 kg: 200 mg , >60 kg: 300 mg) •Ibuprofen 400 mg po q8 hours *(*ketorolac 0.5mg/kg IV Q8H (max 30 mg) scheduled x 72H if no regional or if regional pain management suboptimal. Discuss with surgeon and order prilosec for GI protection before ordering ketorolac)* •+/- Cyclobenzaprine 5 mg po Q6 prn for pain scores >/= 4 •D/C PCA when tolerating POGabapentin PO TID until 1 week post discharge (<40 kg: 5 mg/kg, 40--59 kg: 200 mg, >60 kg: 300 mg) •Oxycodone 0.1 mg/kg PO q3-4 hours (prn or scheduled, depending on patient) if taking PO (if patient has epidural, only start oxycodone when epidural infusion held).	• Clear liquid diet •Advance to regular diet as tolerated	•Morning surgery: OOB & Ambulation on POD 0 •Daily ambulation at least 3 X daily •Daily ambulation distances recorded by nursing staff in Epic chart •PT/OT consult •Child Life consult	•Remove foley on POD # 0 (unless an epidural is in place) • If requested patients with epidurals may also have their foley removed if >10yo **AND** if patient is willing to accept risk of potential replacement while awake in event of urinary retention •Remove CVL ASAP (if applicable)
POD 1				•Afternoon surgery: OOB & Ambulation on POD 1 •Daily ambulation at least 3 X daily •Daily ambulation distances recorded by nursing staff in Epic chart •Continue PT/OT/Child life as needed	
POD 2	•Hold epidural or erector spinae infusions morning of POD 2. If pain scores <= 4 with multimodal analgesia, discontinue epidural or erector spinae catheters.				•Remove foley catheter 6 hours after epidural infusion turned off
Post-Discharge	**Criteria for Discharge:** Pain control on oral pain meds, hydrated off IVF **Tracking of Post Discharge Outcomes:** Readmission within 30 days, ED visits, LOS, Opioid utilization in hospital and at home per opioid stewardship program, NSQIP-P complications				

DISCHARGE OPIOIDS per Opioid Stewardship Program Pediatric Pathways LOS ≥: 3 Days Algorithm

Pediatric Perioperative LOS ≥ 3 Days Algorithm

Population	Total Doses of Oxycodone (mg) in last 24 hrs	# of Opioid Doses Recommended[6]
Pediatric Patients < than 12 years of age or < 40kg	0 doses	0
	1-2 doses	0-5
	3-4 doses	0-10
	5 doses	0-15
	≥ 6 doses	0-30
Pediatric Patients ≥ than 12 years of age or ≥ 40 kg	0 mg	0
	1-15 mg	0-15
	16-35 mg	0-30
	≥ 36 mg	0-45

6. The above Standard Opioid Prescribing Schedule (SOPS) has been confirmed by the appropriate departments for opioid naïve pediatric patients. The recommended opioid for prescribing is **0.05-0.1 mg/kg** of Oxycodone.