Pediatric Complex Care Formulary

Editor:

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Based on MacPeds Survival Guide 2021-2022 (Green Book), Pediatric Palliative Care Approach to Pain and Symptoms Management 2020 (Blue Book), SickKids Drug Handbook 2020, Handbook of Drug Administration via Enteral Feeding Tubes 3rd edition

1st edition

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Gastro-intestinal

Constipation

Polyethylene glycol (PEG)

- Osmotic laxative.
- Used as maintenance therapy and for disimpaction.
- **DOSE:**
  - Maintenance: 0.5-1.0 g/kg/DOSE PO daily-BID.
  - Disimpaction: 1.0-1.5 g/kg/DOSE PO daily-BID for 3-6 days.
- Suggested initial dose:
  - 4-8 kg: 4.25 g daily.
  - 9-16 kg: 8.5 g daily.
  - Equal to or greater than 17 kg: 17 g daily.
- If inadequate response in 2-4 days → change to BID (titrate dose to effect).
- Max daily dose: 100 g.
  - Can increase to max dose in children weighing >34 kg who failed to respond to lower doses.
- Available as a 17-gram sachet.
- Mix in 125-250 ml of suitable beverage (water, juice, soda)
  - Min amount to mix with: 4.25 g in 30 ml, 8.5 g in 60 ml, 17 g in 120 ml.
  - May be mixed with food with adequate hydration afterwards.
- Odorless and tasteless.
- May cause flatulence.
- Onset of action: 2-4 days.
- Feeding tube: Can be given via G-tube and J-tube (mix with min amount if given via J-tube).

PEG + electrolyte solution

- Osmotic laxative.
- Used for disimpaction.
- **DOSE:** 100 ml/yr/hr to max 1 L/hr (max 4 L total) via GT (can be used in JT in slower rate).

Senna

- Stimulant laxative.
- Used as maintenance therapy.
- **DOSE:**
  - <2 years: 2.5 ml PO q24h.
  - 2-6 years: 2.5-5 ml PO q24h.
  - 6-12 years: 5-10 ml PO q24h.
  - >12 years: 10 ml PO or 1-2 tab PO q24hr.
    - Tablet: 8.6 mg.
    - Syrup: 8.5 mL/dose.
- Feeding tube: Can be given via G-tube and J-tube.

- Some patients, particularly those receiving opiates, may require higher doses and/or more frequent administration.

Bisacodyl

- Stimulant laxative.
- Used as maintenance therapy and for disimpaction.

	PR	PO
DOSE	6 months – 2 years: 5 mg daily. 2 years – 11 years: 5-10 mg daily. 12 years and older: 10 mg daily.	3-12 years: 5 mg daily. >12 years: 5-10 mg daily.
Time to effect	15-60 minutes to desired effect.	Can take 6-12 hours for effect.
Comments	10 mg suppositories (can be cut).	- Available only as delayed release 5 mg tab. - Tab taken whole, cannot be split/crushed (**NOT suitable for feeding tube administration**). - DO NOT administer with dairy products or antacids.

Lactulose

- Osmotic laxative.
- Used as maintenance therapy.
- **DOSE:**
  - 6 months – 3 years: 2.5-5 ml PO q8-24h.
  - >3 years: 15-30 mL PO q8-24h.
- Titrate dose to effect.
- Feeding tube:
  - Can be given via G-tube and J-tube.
  - For administration via feeding tubes, flush with 5-10 ml water after each dose.
- Often causes flatulence + cramping.
- Also used for hyperammonemia.

Milk of Magnesia

- Osmotic laxative.
- DOSE:
  - 2-6 years: 400-1200 mg/day (single or divided doses).
  - 6-12 years: 1200-2400 mg/day (single or divided doses).
  - >12 years: 2400-4800 mg/day (single or divided doses).
- Best if taken with 8 ounces of water.

Pico-Salax (picosulfate sodium/ magnesium oxide/citric acid)

- Stimulant and osmotic laxative.
- Used for bowel prep, clean-out, and refractory constipation.
- **DOSE:**
  - 1-6 years: Administer ¼ sachet PO.
  - 6-12 years: Administer ½ sachet PO.
  - Over 12 years: Administer 1 sachet PO.
- Feeding tube: Can be given via G-tube and J-tube.
- Dose can be repeated after 4-6 hours for bowel prep and may be ordered BID short-term for refractory constipation.
- Contents of 1 sachet are mixed with 160 ml water.
- Contains lactose (contraindicated with ketogenic diet).
- Often causes cramping.

Glycerin suppository

- Stimulant laxative.
- Used for disimpaction.
- **DOSE:**
  - <1 year: Glycerin "tip" (tip of adult Glycerin suppository).
  - 1-5 years: ½ adult Glycerin suppository.
  - >5 years: Adult Glycerin suppository.

Sodium phosphate (Fleet) enema

- Stimulant laxative.
- Used for disimpaction.
- **DOSE:**
  - Age < 12 years: Pediatric sodium phosphate (Fleet) enema.
  - Age 12 years and older: Adult sodium phosphate (Fleet) enema.

GERD

Omeprazole

- Proton pump inhibitor → decreased meal-induced gastric acid secretion.
- **DOSE:** 1-2 mg/kg/day PO q12-24h (maximum 40 mg/DAY).
- Feeding tube:
  - Can be given via G-tube and J-tube.
  - Tablet can be compounded, and liquid can be used for feeding tube administration.
- Liquid has a bitter taste.
- Metabolism by CYP2C19; if inadequate response, consider CYP2C19 polymorphisms (need higher dose or switch to rabeprazole as it is less metabolized by CYP2C19).
- Max acid suppression can take 4-7 days (can use H2RA as a bridge).
- Acid-labile: Ideally given 30-60 min before feeds; delayed-release preparations (with enteric coating) decrease drug degradation by acid.

- Concerns about rebound acid hypersecretion with sudden discontinuation.
- Side effects:
  - Idiosyncratic reactions: Headache, nausea, diarrhea, constipation.
  - Drug-drug interactions: E.g., omeprazole-clobazam interaction.
  - Increase risk of gastric parietal cell hyperplasia +/– fundic gland polyps.
  - Increase risk of infections: Pneumonia, GE, C. difficile, SIBO.
  - Increased risk of nephritis and poor bone health.

Lansoprazole

- Proton pump inhibitor → decreased meal-induced gastric acid secretion.
- **DOSE:**
  - Less than 10 kg: 7.5 mg PO DAILY.
  - 10-30 kg: 15 mg PO DAILY.
  - Greater than 30 kg: 30 mg PO DAILY.
- Supplied as orally disintegrating tablets and capsules (15 mg, 30 mg).
- Feeding tube:
  - Feeding tube >8Fr, ODT can be dispersed in 10 mL of water and flushed down the feeding tube using a push–pull technique to keep the granules suspended.
  - Feeding tube <8Fr, dissolve the contents of the capsule in 8.4% sodium bicarbonate before administration.
  - If blocked, lock the tube using 8.4% sodium bicarbonate to dissolve any granules lodged in the tube.

Pantoprazole

- Proton pump inhibitor → decreased meal-induced gastric acid secretion.
- **DOSE:**
  - PO/IV: 1-1.5 mg/kg/DAY div q12-24h (usual max 40 mg/DOSE).
  - GI bleed (IV infusion):
    - 5-15 kg: 2 mg/kg/DOSE x 1, then 0.2 mg/kg/h.
    - 16-40 kg: 1.8 mg/kg/DOSE x 1, then 0.18 mg/kg/h.
    - Greater than 40 kg: 80 mg x 1 DOSE, then 4-8 mg/h.
- Peak concentration in 2-2.5 hr after PO administration.
- Feeding tube:
  - Tablets are enteric coated – not preferred for feeding tube administration.
  - Tablet can be crushed and mixed with 10 ml of 8.4% sodium bicarbonate for feeding tube administration (via G-tube and J-tube; same peak concentration time but bioavailability reduced to 75%).
  - No liquid formulation available.
- Intravenous and oral pantoprazole provide equivalent acid suppression.

Esomeprazole

- Proton pump inhibitor → decreased meal-induced gastric acid secretion.
- Comes tab (20 mg, 40 mg) and sachet (10 mg/sachet); mix sachet with 15 ml water/juice.

- **DOSE:**
  - Newborn: 5 mg PO daily.
  - Infant and older child:
    - Erosive esophagitis:
      - 1 month – 11 years
        - <5 Kg: 5 mg PO daily.
        - 5-20 Kg: 10 mg PO daily.
        - ≥20 Kg: 20 mg PO daily.
      - ≥12 years: 20-40 mg PO daily.
    - Non-erosive reflux disease:
      - 1 month – 11 years
        - <5 Kg: 5 mg PO daily.
        - ≥5 Kg: 10 mg PO daily.
      - ≥12 years: 20 mg PO daily.
- Feeding tube: Can be given via G-tube and J-tube.
- Best to be given 1 hr before or after feed (not applied to JT feeding).
- For patients on continuous GT feeding, best to hold feeding for 1 hr before AND after medication administration (not applied to JT feeding).

Ranitidine

- On backorder.

Famotidine

- Non-formulary-use only when ranitidine on backorder.
- H2 receptor antagonist.
- **DOSE:**
  - PO:
    - 1-3 months: 0.5 mg/kg/dose DAILY.
    - Greater than 3 months: 0.5 mg/kg/dose BID (MAX 40 mg/DOSE).
  - IV:
    - Infant up to 3 months: 0.25 mg/kg/dose DAILY.
    - Greater than 3 months 0.25 mg/kg/dose BID (to max 20 mg/DOSE).
- Supplied as 20 mg and 40 mg tablets, 8 mg/mL compounded suspension and 10 mg/mL IV formulation.
- Feeding tube: No specific data on feeding tube administration.
- Onset 30 min, peak 2.5 hr, duration 6 hr (4-10 hr).
- Associated with tachyphylaxis: Rapid decline in efficacy with prolonged use (i.e., >6 weeks); increasing the dose does not overcome it.
- Side-effects: Headache (17%; can occur in up to 70% of patients), fatigue/somnolence, dizziness, risk of pneumonia (causal relationship not established), A/W NEC in very low BW infants.

Domperidone

- Dopamine antagonist.
- Prokinetic agent.
- **DOSE:** 1.2-2.4 mg/kg/DAY div q6-8h PO (usual maximum 30 mg/DAY due to risk of QTc prolongation-Health Canada).
- Feeding tube: Can be given via G-tube and J-tube.
- Give 30 min prior to feeds/meals and at bedtime.
- Baseline ECG and ECG 48 hours after initiation recommended if risk factors (consult pharmacy):
  - Contraindicated with prolonged QTc.
  - Discontinue if repeat ECG showed significant QTc prolongation.
- Side-effects: Prolonged QTc, galactorrhea, headache, dry mouth, diarrhea.
- Does not cross BBB (does not treat N/V).

GI dysmotility

Domperidone	Metoclopramide	Prucalopride	Erythromycin	Cisapride
Refer to "GERD" section. QTc	▪ **DOSE:** 0.1-0.2 mg/Kg/DOSE PO /IV/IM daily-QID (max 5-10 mg/DOSE). ▪ Dose for nausea & vomiting is different. ▪ Feeding tube: Can be given via G-tube and J-tube. ▪ Crosses BBB (can be used to treat N/V). ▪ Side-effects: Extrapyramidal symptoms (EPS). ▪ Do not need diphenhydrAMINE for EPS with this dose. ▪ Does NOT cause QTc prolongation.	▪ MOA: Serotonin 5-HT4 agonist. ▪ **DOSE:** 0.03 mg/Kg/DOSE PO daily (max 2 mg/day) – titrate up to effect/max dose. ▪ Feeding tube: Can be given via G-tube and J-tube. ▪ Side effects: headache, GI symptoms such as abdominal pain, diarrhea, N/V. ▪ Does NOT cause QTc prolongation.	▪ Macrolide antibiotic. ▪ **DOSE:** 2-5 mg/kg PO QID (max 250 mg per dose). ▪ Feeding tube: Can be given via G-tube and J-tube (use liquid preparation). ▪ Risk of QTc prolongation with ▪ other meds. ▪ May cause nausea. QTc	▪ Connect with **GI** for dosing. QTc

G-tube granuloma

- Saline soaks x5 min BID-QID, until improvement.
- Flovent 125 mcg 1 puff BID, until improvement.

Pain & irritability

Acetaminophen

Weight (kg)	Single Dose (mg)
2.5 - 3.9	40
4.0 - 5.4	60
5.5 - 7.9	80
8.0 - 10.9	120
11.0 - 15.9	160
16.0 - 21.9	240
22.0 - 26.9	320
27.0 - 31.9	400
32.0 - 43.9	480
44 – over	650

- Analgesic and antipyretic.
- **PO DOSE:** Refer to table for weight-based dosing standardization.
- **RP DOSE:** 10-20 mg/Kg/DOSE.
- Feeding tube: PO formulation can be given via G-tube and J-tube.
- Can be dosed q4-6h PRN.
- Max 75 mg/Kg/DAY.

Ibuprofen

Weight (kg)	Single Dose (mg)
2.5 - 3.9	20
4 - 5.4	30
5.5 - 7.9	40
8. - 10.9	60
11. 15.9	100
16. - 21.9	150
22 - 26.9	200
27. - 31.9	250
32. - 43.9	300
44 – over	400

- NSAID; analgesic, anti-inflammatory, and antipyretic.
- **PO DOSE:** Refer to table for weight-based dosing standardization.
- Q6-8hr PRN.
- Do not administer within 6 hours of Ketorolac.
- Administer with food, if able, to minimize GI upset.
- Avoid in those with renal impairment or increased risk of bleeding.
- Feeding tube: Can be given via G-tube and J-tube.

Naproxen

- NSAID; analgesic, anti-inflammatory, and antipyretic.
- **DOSE:** 5-10 mg/Kg/dose PO BID (max 1 g/day) PRN.
- Do not administer within 6 hours of ibuprofen.
- Side effects: Similar to those of NSAIDs.
- Feeding tube: Can be given via G-tube and J-tube (if NOT enteric coated).

Ketorolac

- NSAID; analgesic, anti-inflammatory, and antipyretic.
- **DOSE:**
  - IV/IM: 0.5 mg/kg/DOSE q6h (max 120 mg/DAY) PRN.
  - PO for adolescents: 10 mg q6h (max 40 mg/DAY) PRN - available as 10 mg tablets.
- No weight-based dosing available for children.
- Recommended for **max 5 days total**.
- Adverse effects include renal dysfunction, GI irritation and ulceration.
- Do not administer within 6 hours of ibuprofen.
- Feeding tube: Not enough data on feeding tube administration.

Celecoxib

- COX-2 inhibitor; analgesic, anti-inflammatory, and antipyretic.
- For children ≥ 2 years old.
- **DOSE:**
  - 10-25 Kg: 50 mg PO BID.
  - >25 Kg: 100 mg PO BID.
- Peak plasma concentration occurs 2–3 hours after oral dosing.
- Contraindications: Hypersensitivity/allergy to this drug or aspirin/other NSAIDs/sulfonamides.
- Side effects: Headache, hypertension, upper abdominal pain, N/V, diarrhea.
- Do not administer within 6 hours of ibuprofen.
- Feeding tube: Can be given via G-tube and J-tube.
  - Contents of capsule pour easily from an opened capsule and mix easily with 10 mL of water to form a milky suspension.

Morphine

- Opioid analgesic.
- Analgesia:
  - **PO DOSE:** 0.2-0.5 mg/kg/DOSE **q4-6h prn** (usual initial max is 10-15 mg/ DOSE).
  - **IV DOSE:** 0.05-0.1 mg/kg/DOSE **q2-4h prn** (initial max 5 mg) and increase as required.
- Sedation/analgesia:
  - Continuous infusion: 10-40 microgram/kg/hr infusion.
  - Initial bolus (loading) dose IV: 0.05-0.1 mg/kg.
  - PRN breakthrough dose: 0.05-0.08 mg/kg q3h PRN.
  - Refer to continuous infusion electronic order set.
- Feeding tube: PO formulation can be given via G-tube and J-tube.
- Reduced doses may be required if used in combination with benzodiazepines.
- To prevent withdrawal, avoid abrupt cessation following high doses or long duration of therapy (over 5 days).
- Common adverse effects are pruritus, nausea, and constipation.
- *For severe pain or non-opioid naïve patients, some children/youth may require substantially higher doses for adequate analgesia. Please speak with staff physician or pharmacist to titrate to effect.*
- Refer to the “Pediatric Palliative Care Approach to Pain and Symptoms Management 2020” book for conversion between IV & PO (or GT/JT) morphine AND between morphine and hydromorphone.

HYDROmorphone

- Opioid analgesic.
- Analgesia:
  - **PO DOSE:** 0.03-0.08 mg/kg/DOSE q4-6h prn (usual initial max 3 mg/DOSE).
  - **IV DOSE:** 0.01-0.02 mg/kg/DOSE q2-4h prn (usual initial max 1 mg).

- Sedation/analgesia:
  - Continuous infusion: 2-8 microgram/kg/hr.
  - Initial bolus (loading) dose: IV: 0.01-0.02 mg/kg.
  - PRN breakthrough dose: 0.01-0.02 mg/kg q3h prn.
  - Refer to HYDROmorphone infusion electronic order set.
- Feeding tube: PO formulation can be given via G-tube and J-tube.
- Reduced doses may be required if used in combination with benzodiazepines.
- To prevent withdrawal, avoid abrupt cessation following high doses or long duration of therapy (over 5 days).
- Common adverse effects are pruritus, nausea, and constipation.
- *For severe pain or non-opioid naïve patients, some children/youth may require substantially higher doses for adequate analgesia. Please speak with staff physician or pharmacist to titrate to effect.*
- Refer to the "Pediatric Palliative Care Approach to Pain and Symptoms Management 2020" book for conversion between IV & PO (or GT/JT) hydromorphone AND between morphine and hydromorphone.

Other opioids (i.e., tramadol, oxycodone, fentanyl, methadone)

Require expertise - refer to the "Pediatric Palliative Care Approach to Pain and Symptoms Management 2020" book.

Gabapentin

- Neuropathic pain agent.
- **DOSE:** 20 – 90 mg/kg/DAY div TID PO (max 3600 mg/DAY).
  - Dose range for children <6 years old: 30 – 90 mg/kg/DAY.
  - Half of the total daily dose can be given as QHS if symptoms occur mostly overnight.
  - Starting dose is 5 mg/kg QHS, then increase every 3–5 days by 5-10 mg/kg/DAY until:
    1. Effective analgesia achieved (may be noted at 30–50 mg/kg/day).
    2. Side effects experienced (nystagmus, sedation, tremor, ataxia, swelling).
    3. Maximum total dose is reached.
  - Consider titrating more rapidly for severe pain or as tolerated, titrate more gradually if sedation noted.
- Feeding tube:
  - Gan be given via G-tube.
  - No specific data relating to jejunal administration of gabapentin, monitor for loss of efficacy or increased side-effects.
- Adjust dose for renal dysfunction (CrCl <60 mL/min).
- Avoid sudden discontinuation of gabapentin (unless at EOL or NPO status, in which case lorazepam PRN can be used for withdrawal symptoms).
- Food, including high-fat diets, does not influence the absorption of gabapentin.
- Refer to the "Pediatric Palliative Care Approach to Pain and Symptoms Management 2020" book for conversion between gabapentin and pregabalin.

Pregabalin

- Neuropathic pain agent.
- **DOSE:**
  - Day 1-3: 1 mg/Kg/dose PO QHS (max 50 mg/DOSE).
  - Day 4-6: 1 mg/Kg/dose PO BID (max 50 mg/DOSE).
  - Titrate dose every 3 days (2-4 days) by 1 mg/Kg/dose BID (max 50 mg/DOSE) until:
    1. Effective analgesia achieved.
    2. Side effects experienced (nystagmus, sedation, tremor, ataxia, swelling).
    3. Maximum total dose is reached (6 mg/Kg/dose OR 300 mg BID).
- Linear dose-response relationship (unlike gabapentin in which response is less with higher doses).
- Similar side effect profile to gabapentin.
- Feeding tube:
  - Gan be given via G-tube.
  - No specific data relating to jejunal administration of gabapentin, monitor for loss of efficacy or increased side-effects.
- Adjust dose for renal dysfunction (CrCl <60 mL/min).
  - CrCl 30-60 mL/min: 150 mg BID.
  - CrCl 15-30 mL/min: 75 mg BID.
  - CrCl <15 mL/min: 75 mg daily.
- Avoid sudden discontinuation of pregabalin (unless at EOL or NPO status, in which case lorazepam PRN can be used for withdrawal symptoms).
- The rate and peak concentration of pregabalin are reduced when co-administered with food; however, the total bioavailability is unaffected.
- Refer to the “Pediatric Palliative Care Approach to Pain and Symptoms Management 2020” book for conversion between gabapentin and pregabalin.

Amitriptyline

- For neuropathic pain and depression.
- **DOSE:**
  - Day 1-4: 0.2 mg/Kg/DOSE (max 10 mg) PO QHS.
  - Increase every 4-5 days by 0.2 mg/Kg/DOSE (max 10 mg) PO QHS until:
    - Effective analgesia, OR,
    - Reaching daily max dose of 50 mg/DAY.
  - Can consider BID dosing: 25-30% qAM, 70-75% qPM.
- Obtain ECG before starting medication.
- Obtain plasma level and ECG before each dose escalation.
- Wean every 4-5 days by 0.2 mg/Kg/DOSE (max 10 mg).
- Feeding tube:
  - Gan be given via G-tube.
  - No specific data relating to jejunal administration of gabapentin, monitor for loss of efficacy or increased side-effects.
- High rate of side effects with higher doses:
  - Side effects: Anticholinergic side effects (refer to atropine side effects in page **20**) + **QTc prolongation**.

Clonidine

- Central-acting alpha-2-adrenergic receptor agonist, reducing sympathetic outflow.
- For neuropathic pain, hypertension, insomnia, autonomic dysfunction, spasticity/dystonia, opioid withdrawal.
- **DOSE** (for neuropathic pain)**:**
  - Breakthrough pain: 2-4 mcg/Kg/DOSE Q4hr PO PRN (max 100 mcg/DOSE).
  - Scheduled:
    - Day 1-3: 2 mcg/Kg/DOSE PO QHS (max 100 mcg/DOSE).
    - Day 4-6: 2 mcg/Kg/DOSE PO BID (max 100 mcg/DOSE).
    - Day 7-9: 2 mcg/Kg/DOSE PO TID (max 100 mcg/DOSE).
    - Doses may be increased by 2 mcg/Kg/DOSE as tolerated (max 100 mcg/DOSE) – monitor for hypotension as you increase the dose.
- Tapering of clonidine dose may be required to prevent rebound hypertension, particularly with long-term use.
- Feeding tube:
  - Gan be given via G-tube.
  - No specific data relating to jejunal administration of gabapentin, monitor for loss of efficacy or increased side-effects.
- Side-effects: Bradycardia, hypotension (including postural hypotension), syncope.
  - Better tolerated in children unable to stand; eliminates risk of fall from orthostatic hypotension.

Duloxetine

- Selective Norepinephrine Reuptake Inhibitors (SNRI).
- For neuropathic pain and depression/anxiety.
- **DOSE:**
  - Initial dosing: 30 mg daily for two weeks.
  - Titrating dose: After 2 weeks, increase dose to 60 mg daily.
  - If needed, increase by 30 mg increments every 2 weeks to max 120 mg/day.
  - May be divided into BID dosing.
- Capsule may be opened and sprinkled onto food, though not recommended.
- Feeding tube: Not suitable for administration via enteral feeding tubes.

Agitation/delirium

Haloperidol

- Typical antipsychotic.
- **DOSE:**
  - 0.01-0.02 mg/kg IM/PO q8hr PRN (0.5-1 mg).
  - For acute agitation: 0.025-0.05 mg/kg IM/PO, may repeat 0.025 mg/kg in one-hour PRN.
- Risk of QTc prolongation with other medications.

- Feeding tube:
    - Can use liquid formulation via G-tube.
    - No specific data relating to jejunal administration of haloperidol (monitor for side-effects/loss of efficacy).

RisperiDONE

- Atypical antipsychotic.
- **DOSE:** 0.25-0.5 mg PO QHS or divided, titrate every 1-2 days (max 3 mg/day).
- Consider as short-term therapy with steroid induced behavior**.**
- Feeding tube:
    - Can use liquid formulation via G-tube.
    - No specific data relating to jejunal administration of risperiDONE (monitor for side-effects/loss of efficacy).

OLANZapine

- Atypical antipsychotic.
- Other indications: Insomnia, anxiety, nausea/vomiting.
- **DOSE:** 1.25-2.5 mg PO daily, increase weekly if needed, up to 20 mg daily.
- Feeding tube:
    - Can use liquid formulation via G-tube.
    - No specific data relating to jejunal administration of risperiDONE (monitor for side-effects/loss of efficacy).

QUEtiapine

- Atypical antipsychotic.
- Other indications: Anxiety.
- **DOSE:**
    - Child: 12.5 mg PO daily-BID.
    - Adolescent: 25 mg PO daily-BID.
        - To achieve maintenance dose, increase by 25-50 mg/DOSE every 2 days.
        - Max daily dose: 400-800 mg/day (usual target = 400 mg/day).
- Side effects: Prolonged QTc, suicidal tendency, exacerbation of depression, extrapyramidal symptoms, irritability, elevated liver enzymes (transient), neutropenia/agranulocytosis, hypothyroidism, constipation, weight gain, hyperprolactinemia.
- Monitor: CBC, liver enzymes, ECG (if with other QTc prolongation risk factors/increasing dose), thyroid function testing, prolactin.
- AVOID sudden discontinuation.

Seizures

Lorazepam

- Benzodiazepine sedative, anxiolytic and amnestic.
- Used for status epilepticus, myoclonus, pre-op/procedural sedation, agitation/anxiety, nausea/vomiting, dyspnea at EoL (clonazepam and diazepam may increase secretions).
- Status epilepticus:
  - **IV/SL DOSE:**
    - 0.1 mg/kg/DOSE (max 4 mg/DOSE).
    - May give parenteral preparation sublingually.
  - **PR DOSE:**
    - 0.2 mg/kg/DOSE (max 8 mg/DOSE).
    - May give parenteral preparation rectally.
- Pre-op/procedural sedation:
  - **PO/SL DOSE:** 0.05 mg/kg/dose (max 2 mg/DOSE).
  - **IV DOSE:** 0.03-0.05 mg/kg/dose (max 4 mg/DOSE).
- Anxiety/agitation:
  - **DOSE:** 0.03-0.05 mg/Kg/DOSE SL/PO/IV/IM q6hr PRN (max 1-2 mg/DOSE).
- Intermediate duration of action and no active metabolites.
- Withdrawal may occur if discontinued abruptly after prolonged use (over 5 days).
- Not recommended for continuous infusion due to poor solubility.

Midazolam

- Benzodiazepine.
- Status epilepticus:
  - **IN DOSE:** 0.2 mg/kg/DOSE (max 5mg/nare - split doses above 5 mg).
  - Dose can be repeated in 5 minutes PRN.
  - Onset within 5 minutes, peak within 10 minutes and duration 30-60 minutes following intranasal administration.

Diazepam

- Benzodiazepine.
- Status epilepticus:
  - **IV DOSE:** 0.1-0.5 mg/kg/DOSE (max 5 mg for child <5 years & 10 mg for child >5 years).
  - **PR DOSE:** 0.5 mg/kg/DOSE (max 20 mg/DOSE).
    - For PR route, use IV formulation.
- Fast onset and short duration of action with single doses, duration of action prolonged with continued use.
- Withdrawal may occur if discontinued abruptly after prolonged use (over 5 days).
- Not recommended for continuous infusion due to poor solubility.

LevETIRAcetam

- **Loading DOSE IV:** 20-40 mg/kg/dose (over 5-15 min).
- **Maintenance DOSE PO/IV:** 5-10 mg/kg/DAY divided daily or BID.
- May titrate dose to effect (max 3,000 mg/DAY), may require dosage adjustment in renal impairment.
- Available as 250 mg, 500 mg tablets and 100 mg/mL commercially available suspension.
- Feeding tube:
  - Gan be given via G-tube.
  - No specific data relating to jejunal administration of gabapentin, monitor for loss of efficacy or increased side-effects.
- Side effects: Irritability, behavioral changes, suicidality.

Phenytoin

- Anticonvulsant.
  - Status epilepticus: 20 mg/kg IV over 20 minutes (max 1 gram).
  - Maintenance: 5 mg/kg/DAY (range 3-10 mg/kg/DAY) divided q8-12h PO/IV (max 1 gram).
- Must be diluted in saline only and requires in-line filter (0.22 micron).
- Feeding tube:
  - Can be given via G-tube but need to hold feed 2 hr pre and 2 hr post enteral administration as feeds may decrease bioavailability of phenytoin.
  - Absorption is exceptionally poor via the jejunal route; plasma concentration should be monitored closely if this route is used.
  - Dilution of the suspension is important as phenytoin suspension is hyperosmolar → may cause diarrhea if administered in the jejunum.
- Significantly increased free fraction in patients with hypoalbuminemia and impaired renal function may result in underestimation of effective drug concentration and difficulty in interpretation of drug levels and toxicity may occur at “therapeutic” serum levels.
- Usual serum level for seizure control: 40-80 micromol/L (10-20 microgram/mL).

Phenobarbital

- Barbiturate anticonvulsant.
  - Status epilepticus: 20 mg/kg IV over 20-30 minutes (max 1 gram).
  - Maintenance: 3-5 mg/kg/DAY divided q12-24h PO/IV (max 1 gram).
- Feeding tube:
  - Gan be given via G-tube.
  - No specific data relating to jejunal administration, consider diluting the liquid formulation immediately prior to administration to reduce osmolarity, monitor for loss of efficacy.
- Usual serum level for seizure control: 65-172 micromol/L (15-40 mg/L).

Sleep disorders

Melatonin

- Natural sleep/wake regulator.
- **DOSE:**
  - Infants: 1.5 mg PO HS.
  - Children: 3 mg PO HS.
  - Adolescents: 6-10 mg PO HS.
- Must be given 30-60 min prior to desired bedtime.
- Children with SNI may need doses up to 10-12 mg.
- Side effects: Nightmares and headaches.
- Feeding tube:
  - Can be given via G-tube.
  - No specific information is available for jejunal administration, monitor for loss of efficacy.

Zopiclone

- **DOSE:** 2.5-7.5 mg/dose PO 30-45 min before bedtime (max 7.5 mg/day).
- Reduce dose in liver impairment.
- Recommended to be used for a short-term (7-10 day).
- Has a bitter taste.
- Feeding tube: Not suitable for administration via enteral feeding tubes.
- Side-effects: Irritability, tiredness/sleepiness the next day, constipation, dry mouth, vivid dreams/nightmares.

Clonidine

- **DOSE:** 0.002 mg/kg (2mCg/kg) PO QHS (0.1 mg), increase by 0.002 mg/kg (2mCg/kg) PO QHS every 3 days if needed, (max 0.008 mg/kg = 8mCg/kg QHS) (0.4 mg).
- Refer to page **12** for details about clonidine.

Zolpidem

- Sedative-hypnotic.
- **DOSE:**
  - Children <17 years limited data start at 0.25 mg/kg at bedtime (max 10 mg/DAY).
  - >18 years 5 mg QHS for females 5-10mg QHS for males (max 10mg/DAY).
- Tube feeding:
  - Can be given via G-tube.
  - No specific information on the jejunal administration of zolpidem (monitor for loss of efficacy/side effects).
  - Disperse tablets in water immediately prior to administration.
- Recommended to be used for a short-term (7-10 day).

QUEtiapine and OLANZapine

- Refer to the “agitation/delirium” section in page **13**.

Diazepam and Clonazepam

- Refer to the “spasticity/dystonia” section in page **17-18**.

Chloral hydrate

- NOT recommended as a scheduled medication for insomnia due to side effects.

Myoclonus

Clonazepam: Refer to the “spasticity/dystonia” section in page **18**.

Lorazepam: Refer to the “seizures” section in page **14**.

Spasticity & dystonia

Baclofen

- GABA agonist.
- Available as tab, liquid, and injection.
- **DOSE:**
  - 2-7 years: 3-5 mg PO TID, titrate dose q3 days by 5-15 mg/day to max of 40 mg/**day**.
  - ≥8 years: Titrate dose as above to max of 60 mg/**day**.
- Titration STOPS once effective dose has been reached, or patient becomes intolerable to the dose.
- Gradual discontinuation is recommended.
- Feeding tube: Can be given via G-tube and J-tube.
- Side-effects: GI upset, sedation, ataxia, weakness, fatigue, tolerance, renal insufficiency; tolerance may develop; withdrawal effects (e.g., increased spasticity, hallucinations, confusion, hyperthermia, and seizures).
  - Administration after food may reduce GI side-effects.

Diazepam

- Increases affinity to GABA at the level of the brain stem and spinal cord.
- Other uses: Seizures, insomnia.
- Benzodiazepam with a long half-life (20-80 hr).
- **DOSE:**
  - 0.03–0.05 mg/kg (2 mg) PO q6-8hr, titrate to effect (max 10 mg).
- Short-term treatment of spasticity (due to side-effects with prolonged use).
- Gradual discontinuation is recommended (if used >5 days).

- Feeding tube:
  - For intragastric use, use liquid preparation.
  - For intrajejunal use consider using tablets dispersed in water to reduce osmolarity.
  - The rectal or parenteral route can be used if GI absorption is compromised.
- Side-effects: Hypotension, sedation, memory impairment, incoordination/ataxia, depression, tolerance, and dependency, **hypersalivation**, withdrawal phenomenon, notably seizures, with abrupt cessation of therapy.

Clonazepam

- Other uses: Myoclonus, seizures, anxiety, insomnia.
- **DOSE:**
  - 0.005–0.01 mg/kg PO q8-12hr (0.5 mg), up to 0.2 mg/kg/day.
- Short-term treatment of spasticity (due to side-effects with prolonged use).
- Gradual discontinuation is recommended (if used >5 days).
- Feeding tube:
  - Can be given via G-tube.
  - No specific information on the jejunal administration of tizanidine (monitor for loss of efficacy/side effects).
  - Disperse tablets in water immediately prior to administration.
  - For very fine-bore tubes consider using a liquid preparation.
- Side-effects: Hypotension, sedation, memory impairment, incoordination/ataxia, depression, tolerance, and dependency, **hypersalivation**, withdrawal phenomenon, notably seizures, with abrupt cessation of therapy.

Tizanidine

- **DOSE:**
  - 0.04–0.08 mg/kg (4 mg) PO/GT QHS, increase up to 0.16 mg/kg q8hr (max 8-12mg q8hr).
- Gradual discontinuation is recommended.
- Side-effects (mainly in adult studies): Hypotension, sedation, asthenia, dry mouth, dizziness, hallucinations, and hepatotoxicity (incidence in pediatric patients has not been studied).
- Less experience in younger children; recommend collaboration with neurology & psychiatry.
- Tube feeding:
  - Can be given via G-tube.
  - No specific information on the jejunal administration of tizanidine (monitor for loss of efficacy/side effects).
  - Disperse tablets in water immediately prior to administration.

Others	▪ Trihexyphenidyl (Artane) – refer to “sialorrhea section” page **20**. ▪ Levodopa-Carbidopa. ▪ Gabapentin. ▪ Clonidine.

Resp

Aspiration pneumonia:

Ceftriaxone

- 3rd generation cephalosporin.
- **DOSE:** 50-75 mg/Kg/DAY IV/IM (max 2 g/DOSE).

Piperacillin-tazobactam

- If severe aspiration event (multilobar involvement) or known colonization with P. aeruginosa.
- **DOSE:** 100 mg/Kg/DOSE (of piperacillin component) IV q8hr (max 4 g/DOSE).

Amoxicillin-clavulanate

- **DOSE:** 30-50 mg/kg/DAY of amoxicillin component divided q8-12h PO (MAX 875 mg/DOSE).
- One major side effect with clavulanate (esp. at high doses) is GI intolerance.
  - Limit clavulanate to <10 mg/kg/day if possible (high risk for diarrhea).
- When writing discharge prescription and if suspension is required, please indicate the formulation (esp. if high dose amoxicillin used):
  - Example: Amoxicillin-clavulanate suspension - please dispense as 7:1 formulation (80 mg/mL amoxicillin + 11.4 mg/mL clavulanate) 480 mg (of amoxicillin component) PO TID x 10 days.
- Available as tablets (amoxicillin/clavulanate): 250/62.5mg (4:1); 500/125 mg (4:1); 875/125 mg (7:1), suspension (supplied at HHS): 1 mL = 80 mg amoxicillin and 11.4 mg clavulanate (7:1). Community may stock the 4:1 formulation (1mL = 50 mg amoxicillin and 12.5 mg clavulanate).
- Duration of treatment in uncomplicated cases: 7-10 days.
- Feeding tube:
  - Can be given via G-tube.
  - No specific information on the jejunal administration of amoxicillin-clavulanate (monitor for loss of efficacy/side effects).
  - Disperse tablets in water immediately prior to administration.

ENT

Sialorrhea

Atropine drops

- 1% ophthalmic solution (pharmacy can make 0.25% & 0.5% solutions).
- **DOSE:** 1-2 drops sublingually q4-6hr (can be given less frequently, i.e., daily, BID or TID).
- Make sure to dry mouth/suction before use.
- Wash hands after use (causes dilated pupils if in contact with eyes).
- Inform parents that the container says “eye drops”.

- Crosses BBB → more CNS toxicity and side effects (e.g., sedation, poor seizure control).
- Causes tachycardia notably more than other anti-sialorrhea medications.

Side effects:	**Contraindications:**
1) Constipation. 2) Urinary retention. 3) Tachycardia. 4) Hypertension. 5) Vomiting (secondary to lower esophageal sphincter relaxation). 6) Behavioral changes/irritability. 7) Over-drying of secretions. 8) Facial flushing/impaired ability to sweat → risk of hyperthermia in hot environments. 9) Sensitization. 10) Poor seizure control. 11) Mydriasis and cycloplegia. 12) Sedation.	1) Glaucoma. 2) Tachyarrhythmias. 3) Paralytic ileus/GI obstruction. 4) Urinary tract obstruction (check RFT and renal U/S before use, if available). 5) Hyperthyroidism. 6) Pregnancy. 7) Myasthenia graves.

Glycopyrrolate

- **DOSE:** 0.02 mg/Kg/DOSE PO TID, titrate up every 5-7 days to 0.1 mg/Kg/DOSE PO TID (max 3 mg/DOSE).
- Can use the IV formulation orally.
- To discontinue, gradually wean over 2 weeks to prevent withdrawal symptoms.
- May decrease gastric acid secretion.
- Side effects are similar to atropine side effects in table above, except:
  - Less CNS toxicity and side effects (e.g., sedation, poor seizure control), as it does NOT cross BBB.
  - Less mydriasis and cycloplegia.
  - Less tachycardia.
- Specific contraindications are similar to atropine contraindication in table above.
- Feeding tube:
  - Can be given via G-tube.
  - No specific information on the jejunal administration of glycopyrrolate (monitor for loss of efficacy/side effects).

Trihexyphenidyl (Artane)

- For children >3 Y/O.
- Treats both sialorrhea and spasticity/dystonia.
- **DOSE:**
  - Initial dose 1 mg BID PO x7 days, titrate up every 3 days by 1-2 mg/day.
  - If daily dose >10 mg → div TID-QID (not BID), target dose (6-40 mg/day), max daily dose (100 mg/day).
- To discontinue, taper gradually.

- Feeding tube:
  - Can be given via G-tube.
  - No specific information on the jejunal administration of trihexyphenidyl (monitor for loss of efficacy/side effects).
  - Use the liquid preparation or disperse tablets in water immediately prior to administration.

Ipratropium bromide

- **DOSE:** 250-500mCg nebulization/MDI q4-6hr PRN.

GU

Urinary retention

Bethanechol

- Cholinergic effect (stimulates the parasympathetic nervous system).
- Induces contraction of the detrusor urinae muscle, usually producing a contraction sufficiently strong to initiate micturition and empty the bladder.
- **DOSE:** 0.2 mg/Kg/DOSE (max 10 mg/DOSE) PO q8hr.
- Time to effect: 30 min (may take 60-90 min for max effect).
- Feeding tube:
  - Can be given via G-tube.
  - No specific information on the jejunal administration of bethanechol (monitor for loss of efficacy/side effects).
  - Disperse tablets in water immediately prior to administration.

Tamsulosin (Flomax)

- Alpha-blocker that relaxes the muscles in the prostate and bladder neck.
- **DOSE:**
  - Initial dose: 0.2 mg PO once daily.
  - Increase by 0.2 mg increments based on response (symptoms and urodynamic studies) and tolerability.
  - Usual dose: 0.4 mg/DAY, max dose: 0.8 mg/DAY.
- Administer approximately 30 min following same meal every day.
- Capsules may be opened, and contents mixed with food or juice.
- Feeding tube: Not compatible with enteral tube administration due to risk of blockage.

Heme

Iron deficiency:

Elemental iron:

- **DOSE:**
  - Treatment: 4-6 mg/Kg/DAY of elemental iron divided q8-24hr PO/GT (max 180 mg/DAY).
  - Prevention: 2-3 mg/Kg/DAY of elemental iron divided q8-24hr PO/GT (max 180 mg/DAY).
- Side effects: Constipation, darkens stool color, GI upset, staining of teeth if given PO as liquid.
- Give with food if GI upset occurs (not with diary products/Ca as it interferes with absorption).
- Vitamin C enhances absorption.
- Rinse mouth if given PO as liquid.
- Prescribe for 3 months to replenish iron stores followed by blood work (i.e., CBC with retic count).

Endo

Menstrual management in adolescents with medical complexity

Levonorgestrel 150 mcg/ethinyl estradiol 30 mcg

- **DOSE:** 1 pill DAILY (active pills only).
- Benefits: Marked reduction in menstrual pain and blood loss, may eliminate cyclical seizures, dystonia, and other symptoms, provides contraception.
- Should start after menarche starts.
- Should be taken at same time every day (require daily reminders).
- **Risk of thromboembolism, particularly in immobile patients.**
- Concerns about increased risk of breast and cervical cancers.
- May interact with certain medications, particularly antiepileptics (confirm with pharmacist).
- Contraindications:
  - Absolute contraindications:
    - Hypertension (systolic > 160mmHg or diastolic > 100mmHg).
    - Current history of venous thromboembolism (VTE) – unless on anticoagulation.
    - Known ischemic heart disease.
    - History of cerebrovascular accident
    - Complicated valvular heart disease (pulmonary hypertension, atrial fibrillation, history of subacute bacterial endocarditis).
    - Migraine headache with aura.
    - Breast cancer (current).
    - Diabetes with retinopathy/nephropathy/neuropathy.
    - Severe cirrhosis
    - Liver tumor (adenoma or hepatoma).

- Relative contraindications:
    - Adequately controlled hypertension.
    - Hypertension (systolic 140 - 159mmHg or diastolic 90 - 99mmHg).
    - Currently symptomatic gallbladder disease.
    - Mild cirrhosis.
    - History of combined OCP-related cholestasis.
    - Users of medications that may interfere with OCP metabolism.

Norethisterone

- **DOSE:** 5 mg BID-TID (max 15 mg/day).
- Benefits: Marked reduction in menstrual pain and blood loss, may eliminate cyclical seizures, dystonia, and other symptoms.
- Risk of breakthrough bleeding.
- Does NOT provide contraception.
- Should start after menarche starts.
- Should be taken at same time every day (require daily reminders).
- May interact with certain medications, particularly antiepileptics (confirm with pharmacist).
- **Does NOT increase risk of thromboembolism.**
- Contraindications (almost none in adolescents):
    - Liver dysfunction.
    - Pregnancy.
    - Breast cancer.

Medroxyprogesterone

- **DOSE:** Depo-Provera 150 mg IM every 12 weeks.
    - A 2-week trial of oral medroxyprogesterone (e.g., Provera) prior to IM medroxyprogesterone is recommended to ensure it is well tolerated.
- Benefits: Marked reduction in menstrual pain and blood loss, may eliminate cyclical seizures, dystonia, and other symptoms, provides contraception.
- Risk of breakthrough bleeding.
- Risks:
    - **Decreased BMD and possibly increased fracture risk**, particularly in immobile patients and patients on meds that impact BMD (e.g., certain antiepileptic meds).
        - Consider DXA scan before starting medication and every 2 years while on medication.
        - Adequate recovery of BMD is expected after medication discontinuation.
    - **Weight gain** (more pronounced in patients who were overweight/obese before treatment).
- Calcium and vitamin D supplementation is recommended while on treatment.
- Contraindications (almost none in adolescents):
    - Liver dysfunction.
    - Pregnancy.
    - Breast cancer.