Erase Post Operative Pain: Improving Brain Health

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Target Outcome and Drivers:

Goal: Decrease % patients with unrelieved postoperative pain from 20% to 10% over 12 months and sustain over the following 12 months

Balancing measure: Ensure no excessive sedation increase

Drivers

Standardized pain reports during pre and post operative hand off

Standardized use of postoperative pain management algorithm

Standardized documentation and reporting using tools for pain (PIPP-R/FLACC) and sedation (N-PASS)

Practice Changes:

- Standardized Algorithm based on expected level of pain (developed in collaboration with Anesthesiology and General Surgery colleagues)
  - Caveats and Exceptions noted for special populations:
    - History of long term opioid exposure
    - Extubation status post operatively
  - Titration and weaning of analgesia based on careful monitoring of pain (PIPP-R/FLACC) and Sedation (N-PASS)
- Discussion of pain management plan in post operative huddle with Surgery, NICU and Anesthesiology
- Roll out and utilization of IV Acetaminophen as adjunct and synergistic pain management strategy

4.0 Surgical Procedures

Although infants vary in their individual responses to pain, surgical procedures can be classified as **POTENTIALLY** causing mild, moderate or severe pain depending on the level and location of tissue injury. Expected severity of pain will be discussed in the post-operative huddle.

Procedures potentially causing **mild pain**	Procedures potentially causing **moderate pain**	Procedures potentially causing **severe pain**
▪ Minimally invasive procedures (e.g. bronchoscopy, laparoscopic surgeries) ▪ Ventricular shunt insertion ▪ Ommaya reservoir insertion ▪ Myelomeningocele repair ▪ Patent ductus arteriosus device closure ▪ Colostomy creation ▪ Local stoma reversal/closure ▪ Uncomplicated inguinal hernia repair ▪ Gastroschisis patch repair with no previous silo (primary repair)	▪ Abdominal drain insertion ▪ Chest tube insertion ▪ Tracheostomy/critical airway procedure ▪ Incarcerated hernia repair ▪ Gastrostomy tube insertion ▪ Omphalocele (small) ▪ Gastroschisis closure (uncomplicated) ▪ Gastroschisis silo insertion with spring and suture ▪ Throrascopic procedures	▪ Congenital diaphragmatic hernia (CDH) repair ▪ Esophageal atresia and/or tracheoesophageal repair ▪ Patent ductus arteriosus ligation ▪ Thoracotomy ▪ Laparotomy (excludes colostomy creation) ▪ Nissen fundoplication +/- gastrostomy tube insertion ▪ Operative necrotizing enterocolitis ▪ Gastroschisis or omphalocele closure under tension
See Algorithm A	**See Algorithm B**	**See Algorithm B**
Follow **Algorithm C** for postoperative pain management involving use of a **continuous regional block or epidural** Single shot regional blocks (e.g. tAP, ilioinguinal nerve block) should follow **Algorithm A**		

Algorithm B: Management of expected moderate to severe post-operative pain

Post - operative pain expected to be moderate to severe

Single shot regional blocks (e.g. tAP, ilioinguinal nerve block) should follow **Algorithm A** (Refer to surgical procedures chart 4.0)

1. Order scheduled acetaminophen for 72 hours (IV or Enteral – see e-formulary for dosing)
2. Start continuous morphine infusion 5 mcg/kg/hour
   NB: if morphine contraindicated due to hemodynamic instability, consider Fentanyl use and follow **Table A**
3. Order intermittent morphine IV (0.1 mg/kg/dose) every 4 hours PRN for breakthrough pain (if patient is extubated consider 0.05mg/kg/dose)
4. If on opioids ≤ 24 hours prior to operation:
   a. continue infusion and increase dose by 10% from pre-op dose
   b. if intra-operative analgesic requirements are high, an increase of > 10% from pre-op dose may be required

Assess pain* (PIPP-R or FLACC-R) and sedation* (N-PASS) scores minimum q1h x 4 hours

Box 1

N-PASS score - 3 to – 10
OR
PIPP-R scores ≤ 6
OR
FLACC-R score ≤ 3

No pain and over-sedation

- Wean continuous morphine infusion
- If continuous morphine infusion higher than initial dose, reduce continuous morphine infusion dose and consider PRN morphine dosing only
- If no morphine in use, change acetaminophen to PRN

Box 2

N-PASS score 0 to – 2
AND
PIPP-R score ≤ 6
OR
FLACC-R score ≤ 3

Adequate pain control and sedation

No dosing changes recommended

Box 3

N-PASS score 0
AND
PIPP-R score > 6
OR
FLACC-R score > 3

Inadequate pain control and sedation

- Use non-pharmacological treatment options
- Use PRN morphine
- Reassess pain score within 1 hour of intervention for pain

≥ 3 PRN doses used within 12 hours or 2 consecutive pain scores indicate pain after boluses

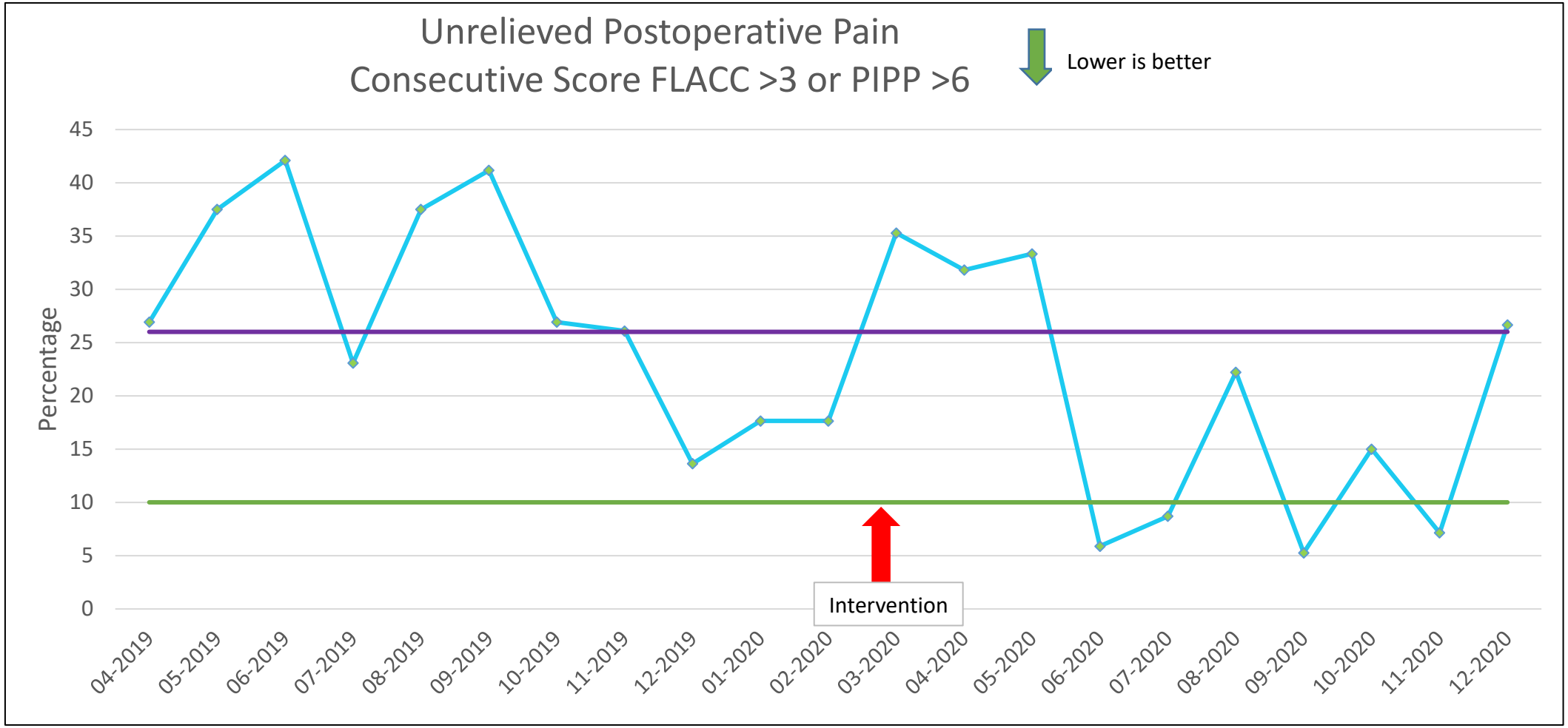
- Administer morphine bolus
- Increase continuous morphine infusion by 10%
- Continue PRN doses

- If pain management escalated multiple times or morphine > 40 mcg/kg/hour, consider alternate medications (i.e. change to fentanyl at equivalent dose)
- If fentanyl used for pain management refer to Table A
- Consider addition of dexmedetomidine (Table B) or benzodiazepine (Table C) for adjunct sedation (consider gestational age)

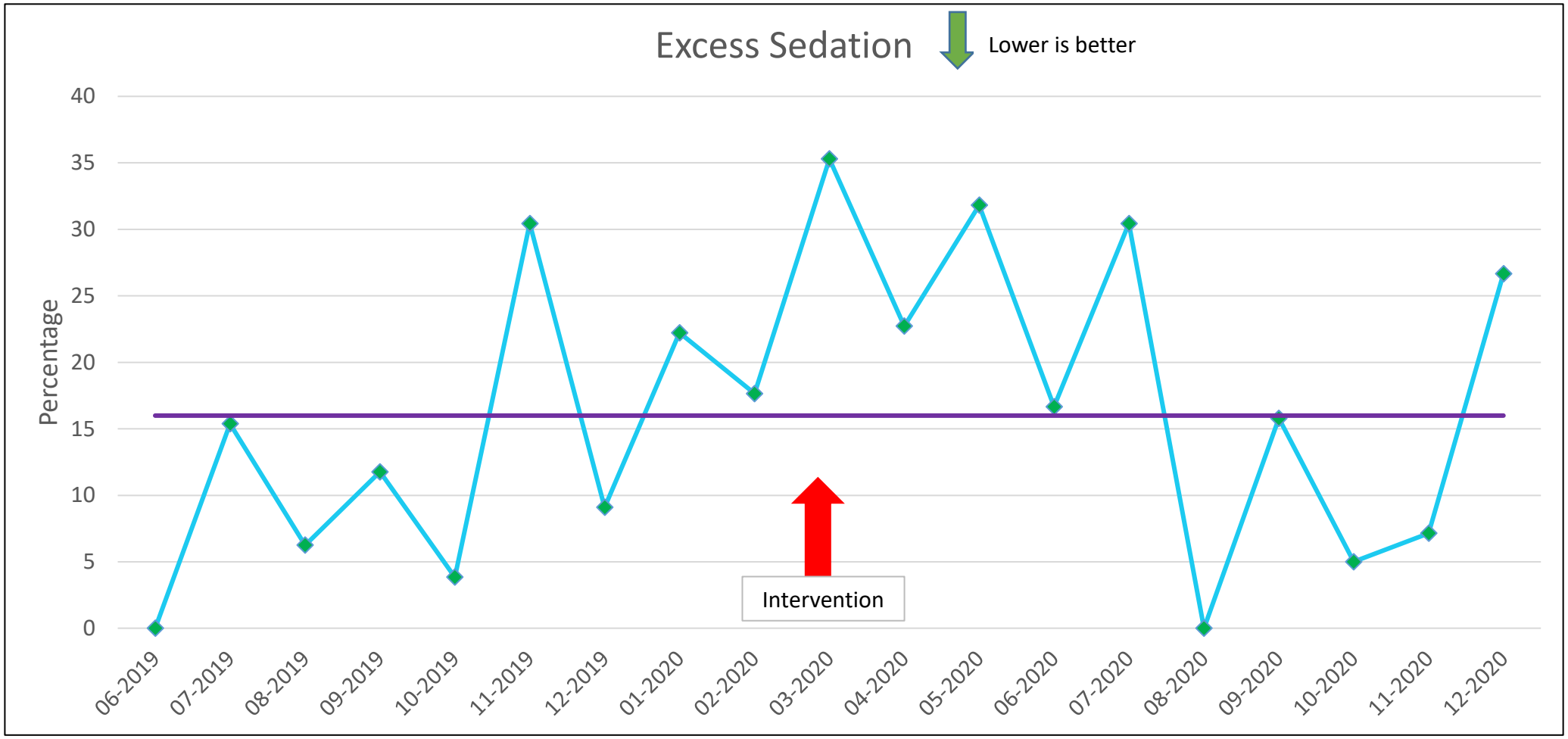
Reassess pain and sedation scores minimum every 4 hours

- If pain score indicates moderate/severe pain* give PRN morphine and/or titrate morphine dosing up by 5mcg/kg/hr despite PRN doses if 2 consecutive scores indicate pain* (Box 3)
- If 2 consecutive pain scores indicate no pain* OR 1 score indicates over sedation* titrate morphine down based on duration of exposure – refer to Prevention and Treatment of Opioid and Benzodiazepine Withdrawal Clinical Practice Guideline

* PIPP-R scores 0 - 6 = no/mild pain; 7 - 11 = moderate pain; ≥ 12 = severe pain
FLACC-R scores 0 - 3 = no pain; 4 - 6 = mild/moderate pain; 7 - 10 = severe pain
*N-PASS scores 0 = no sedation; -1 to -2 = light sedation; -3 to -5 = moderate sedation; ≥ - 6 = heavy sedation



Outcomes: Post-Operative Unrelieved Pain



Balancing Measure: Excess Sedation

Key Learnings

- Implementation of QI interventions show trend to decreasing unrelieved postoperative pain but still requires further monitoring and opportunity for improvement
- Excessive sedation remains an area for further optimization of management
- Communication between Surgical, Anaesthesiology and NICU teams improved awareness of anticipated pain and standardized management

Further Opportunities

- Evaluating time to first acetaminophen dose and correlation with increased opioid needs
  - Identifying strategies to optimize drug ordering/delivery with Pharmacy
- Parental satisfaction of pain management and perception of post-operative pain still to be further explored (challenges amplified by COVID restrictions)
- Further N-PASS education for nursing (rolled out Fall 2019) in order to ensure accurate sedation scoring, and continue to target lower rates of excess sedation

Thank You

Questions?

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