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Neonatal Post Operative Pain Guidelines

Version: 3

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1.0 Introduction

This guideline provides NICU clinicians with suggested post-operative pain and sedation management. However, as each infant will respond to both pain and medications differently, clinical judgement, pain scores, gestational age, underlying diagnosis, previous exposure to opioids/sedatives and type of surgical procedure need to be considered in managing post-operative pain and sedation.

Pain is an expected consequence of surgery. Adequate pain control in the post-operative period is essential to minimize the endocrine and metabolic responses and has been shown to significantly improve outcomes such as recovery time, healing and can prevent the development of persistent pain. However, exposure to opioids in the absence of pain may adversely impact the developing brain and neurodevelopmental outcomes.[1, 2] Judicious use of opioids in neonates is of utmost importance and following a pain management algorithm has been shown to be effective in providing adequate pain control while minimizing opioid exposure. [3]

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2.0 Definitions

APS	Acute Pain Service
Adjuvant	A drug that is not primarily analgesic but has independent or additive analgesic properties.
Analgesic	A medication used for pain relief.
Anxiolytic	A drug that relieves anxiety.
Non-opioid	Referred to as non-narcotic. Includes acetaminophen and non-steroidal anti-inflammatory drugs (NSAIDs).
Opioid	Refers to natural, semi-synthetic and synthetic drugs that relieve pain by binding to opioid receptors in the nervous system e.g. codeine, morphine. Opioid is preferred to the word 'narcotic', which has legal connotations.
Pain	An unpleasant sensory and emotional experience associated with actual or potential tissue damage or described in terms of such damage. It is a complex, multidimensional, and subjective experience.
Pharmacological strategies	The use of drugs for pain relief.
Physical dependence	Physical reliance on an opioid characterized by withdrawal symptoms if the opioid is abruptly stopped or an antagonist is administered
Non-Pharmacologic Interventions	The use of strategies that do not involve medications such as bundling, soother use, positioning for pain relief.
Sedative	A drug tending to calm, moderate, or tranquilize nervousness or excitement.
TAP Block	Transversus abdominis plane block
Tolerance	A process characterized by decreasing effects of a drug at its previous dose or the need for a higher dose of drug to maintain an effect.

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3.0 Clinical Practice Recommendations

3.1 Pain and Sedation Assessment

The pain assessment tools currently used at SickKids for the assessment of pain in neonates and infants are the Premature Infant Pain Profile Revised (PIPP-R) and the Face, Legs, Activity, Cry, Consolability (FLACC- R) scales.

- **The FLACC-R scale** is to be used for NICU infants once they are 2 months corrected age (48 weeks post menstrual age [PMA]).

- **The PIPP-R** has limited validation in the extremely low birthweight (ELBW) infant, thus factors such as developmental stage are to be considered when assessing post-operative pain in these infants.

- **PIPP-R Scoring**
  - 0 to 6 indicate no pain to mild pain.
  - 7 to 11 indicate moderate pain.
  - Greater than or equal to 12 indicate severe pain.

- **FLACC-R Scoring**
  - 0 to 3 indicates no pain.
  - 4 to 6 indicates mild to moderate pain.
  - 7 to 10 indicates severe pain. [4-6]

Sedation Assessment Using the Neonatal Pain, Agitation and Sedation Scale (N-PASS): In addition to pain assessment scores, all patients receiving opioids or sedatives are to be assessed using the Neonatal Pain, Agitation and Sedation Scale (N-PASS). The N-Pass measures level of sedation either as a side effect of the opioid or to aid in titration of sedative medications if sedation is required.

- **N-PASS Scoring**
  - 0 indicates no sedation.
  - - 1 to - 2 indicates light sedation
  - - 3 to - 5 indicates moderate sedation
  - Greater than or equal to - 6 indicates deep sedation. [7, 8]

Click Neonatal Pain, Agitation and Sedation Scale (N-PASS) to access the N-PASS Scale.

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4.0 Surgical Procedures and Management Algorithms

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. The 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 ▪ 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	▪ 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 or ilioinguinal nerve block) should follow **Algorithm A.**		

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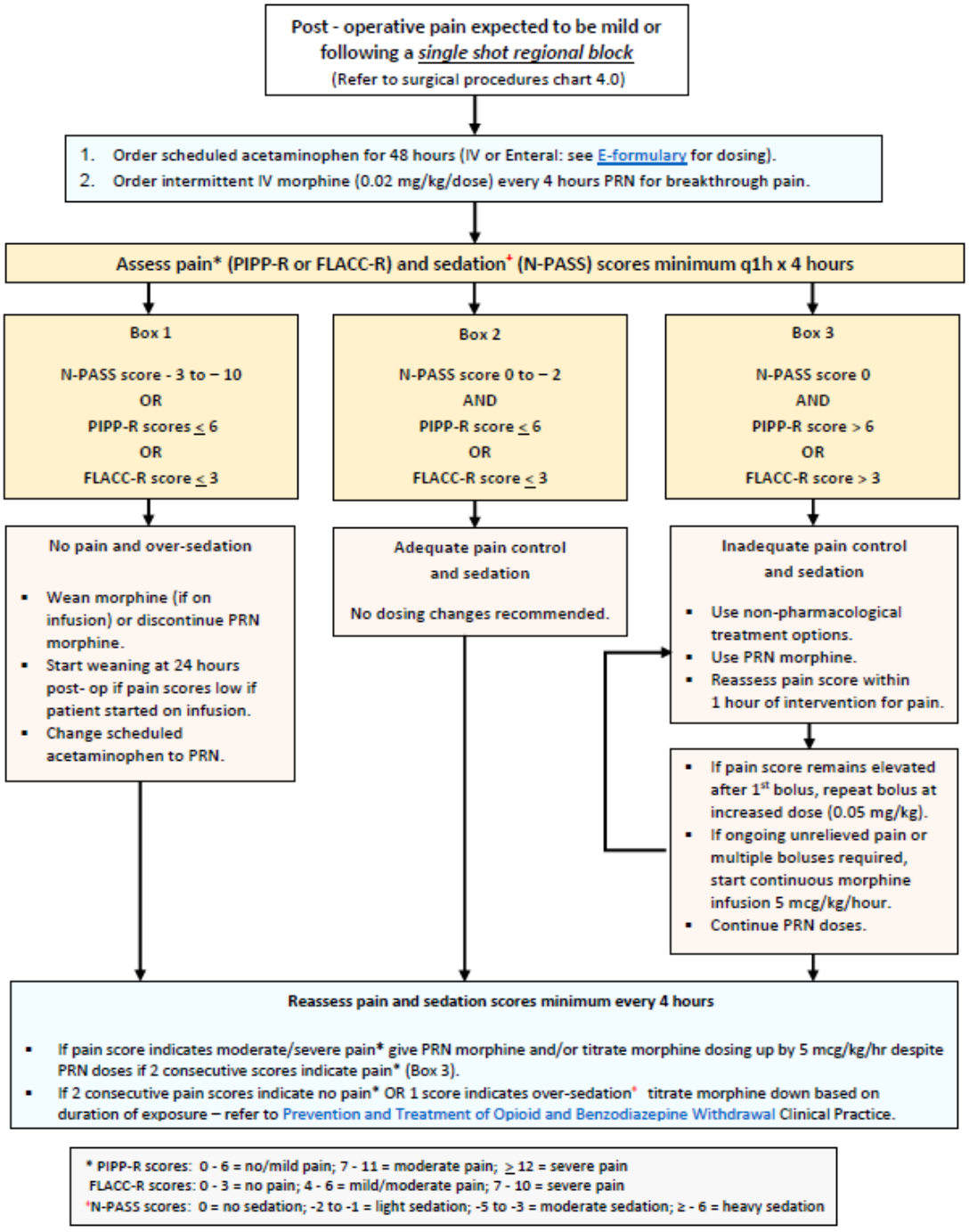
Algorithm A: Management of expected mild post-operative pain or patient with single shot block



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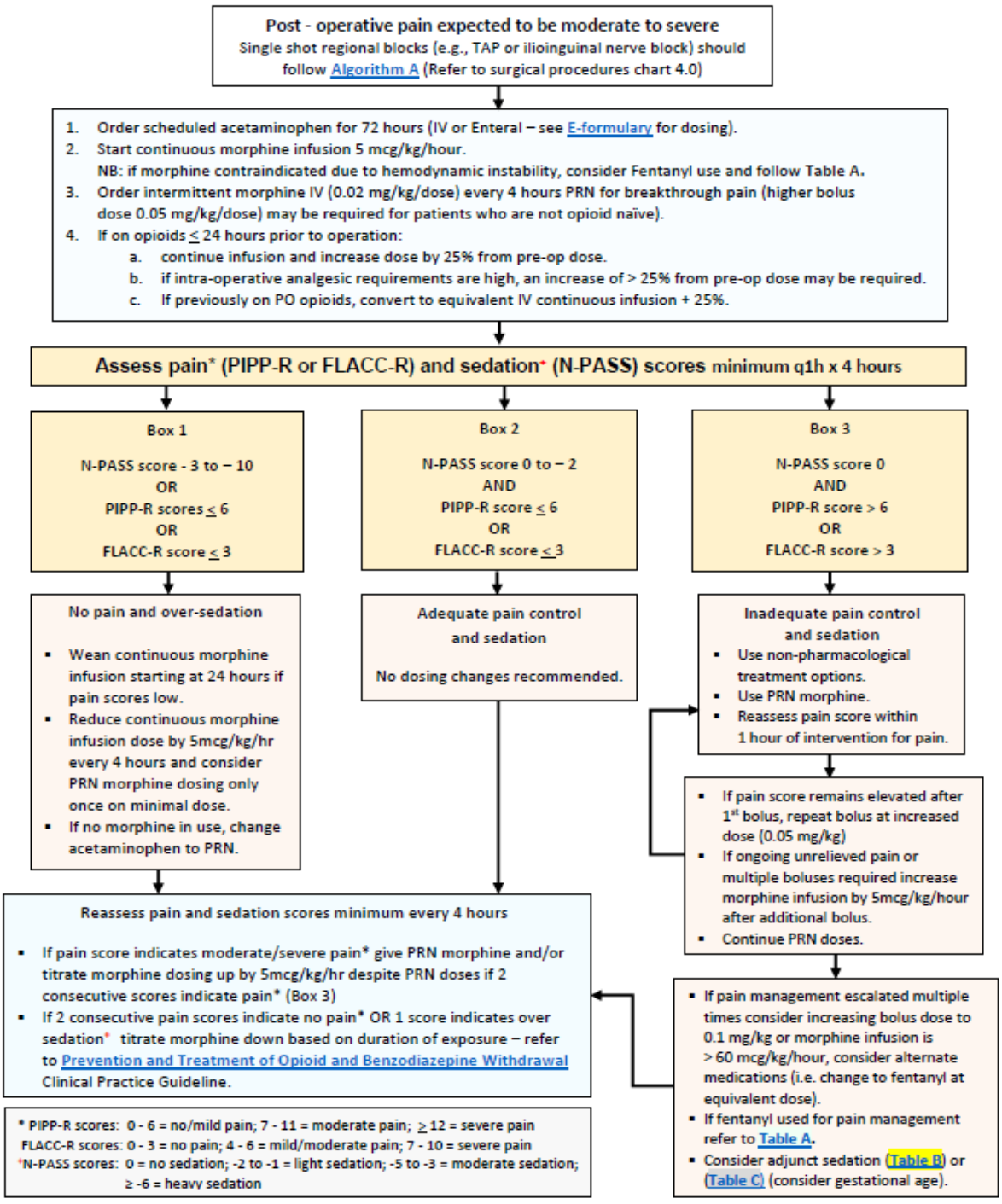
Algorithm B: Management of expected moderate to severe post-operative pain



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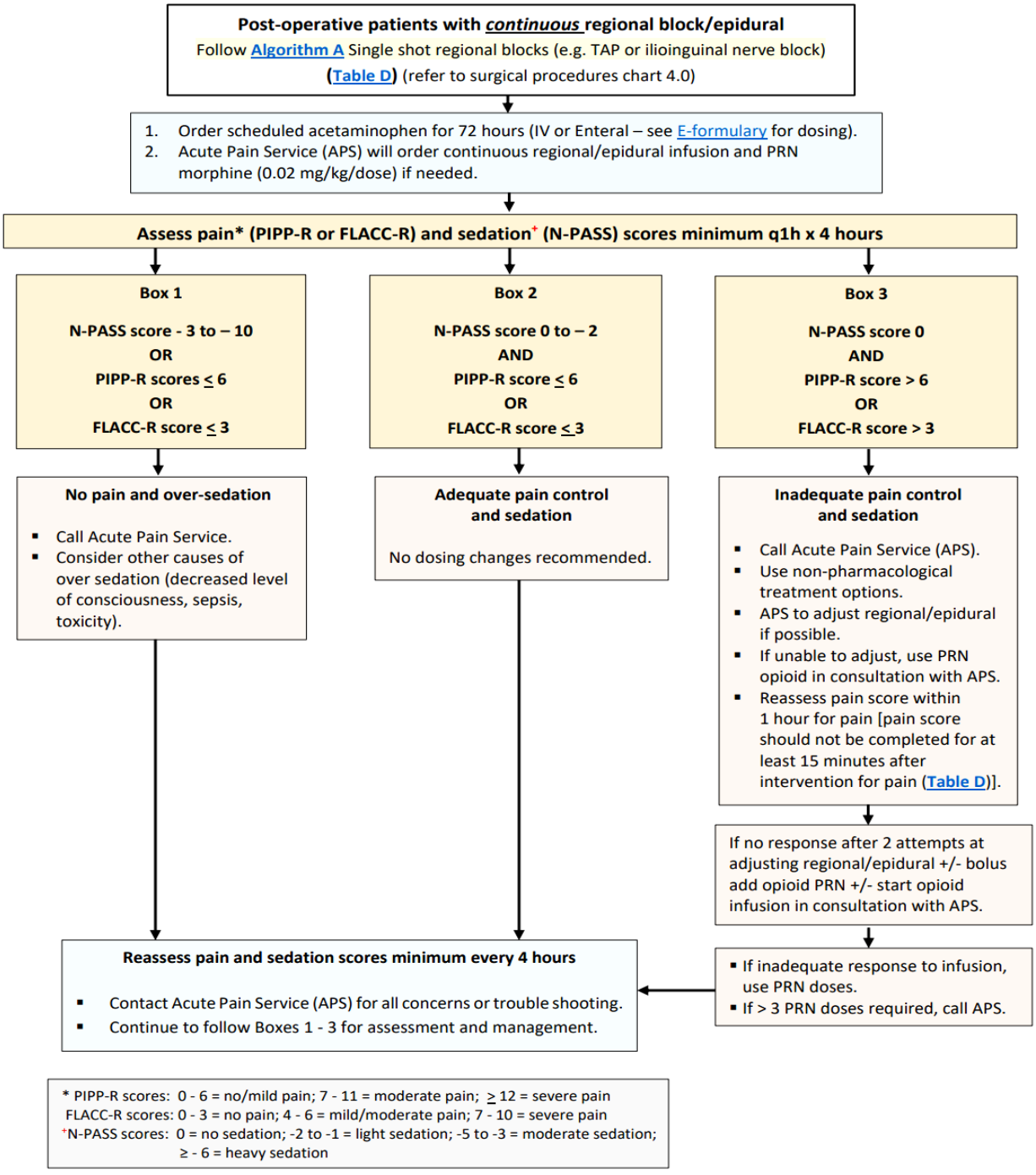
Algorithm C:
Management of post-operative pain in patients with continuous regional block/epidural



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NICU Post-Operative Pain Management Supplement Tables

Table A: Use of Fentanyl in post-operative pain management

- Morphine is the pharmacological agent recommended for post-operative pain management.
- Fentanyl use is indicated for moderate to severe **procedural** pain.
- Fentanyl use in neonates provides limited sedation at low doses (< 5 mcg/kg/hr).
- Fentanyl use should be reserved for post-operative pain management when morphine dosing has increased to high doses and pain remains severe.
- In discussion with the medical team, fentanyl use as a first line post-operative pain management agent may be indicated for infants with hypotension or if there is a concern of hypotension developing (e.g. post PDA ligation).
- If fentanyl is used as a continuous infusion – consider starting at 0.5 mcg/kg/hour and increase by 0.1-0.2 mcg/kg/hr as needed and replace fentanyl for morphine in algorithm.
- Patients exposed to fentanyl for > 5 days will require weaning utilizing **Prevention and Treatment of Opioid and Benzodiazepine Withdrawal** Clinical Practice Guideline.

Table B: Dexmedetomidine as adjunct sedation in post-operative pain management

- Dexmedetomidine is a centrally acting alpha2-receptor agonist that has both sedative and analgesic properties.
- Unlike narcotics, it does not have an appreciable effect on respiratory drive or gastric motility.
- May be used in the post-operative period to provide sedation and **MINOR** analgesia.
- It is not a substitute for the appropriate analgesic, but concurrent use may result in lower analgesic use and faster recovery.
- Most common adverse effects include hypotension and bradycardia.

Table C: Benzodiazepines as adjunct sedation in post op pain management

- Benzodiazepines have no intrinsic analgesic activity.
- Midazolam is the main benzodiazepine used in neonates as a sedation adjunct for pain management.
- Benzodiazepines are not a substitute for the appropriate analgesic, but concurrent use may result in lower analgesic use and faster recovery.
- Benzodiazepine (e.g., midazolam or lorazepam) use can be considered in the care of infants **greater than** 34 weeks gestational age.
- Respiratory depression and apnea can occur, especially if co-administered with opioids.
- Hypotension can also occur if co-administered with fentanyl.
- Myoclonic, seizure-like activity can occur with rapid administration.

Table D: Regional/Epidural use in post op pain management

- The Acute Pain Service (APS) will manage patients with a regional block/epidural in consultation with NICU medical team.
- Adjustments to pain management are to be completed in consultation with Acute Pain Service (APS).
- An epidural bolus may require up to 20 minutes for effect, therefore allow this time period to pass before reassessing pain.
- Continue to use non-pharmacological strategies to optimize pain management.
- Single shot regional blocks (e.g. TAP or ilioinguinal nerve block) should follow **Algorithm A.**

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6.0 Guideline Group and Reviewers Guideline Group Membership

1. Carol McNair, NP, Neonatology
2. Sharifa Habib, NP, Neonatology
3. Erase Post Op Pain Committee

NICU Internal Reviewers:

1. Christine Elliot, Quality Leader, Neonatology
2. Judy Hawes, NP, Neonatology
3. Kyong-Soon Lee, MD, Neonatology
4. NICU Nursing Practice Committee

7.0 Attachments

Algorithm A - Management of expected mild post-operative pain.pdf
Algorithm B - Management of expected moderate to severe post-operative pain.pdf
Algorithm C - Management of post-operative pain in patients with regional block_epidural.pdf
Neonatal Pain, Agitation and Sedation Scale (N-PASS)

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