

Newborn Critical Care Center (NCCC) Clinical Guidelines

Peri-Operative Antibiotic Use

BACKGROUND

Antibiotics are the most commonly used medications in the NCCC and are given for infection or prophylaxis. Prolonged exposure to broad-spectrum antibiotics increases the risk of super-infections, NEC and resistant organisms. Most, if not all, surgical procedures performed in neonates require some time of antibiotic prophylaxis. The American Academy of Pediatrics (AAP) endorses a single pre-operative antimicrobial dose before surgical incision to provide adequate tissue concentrations throughout surgical procedures. The AAP does not recommend a prophylactic post-operative course for clean procedures except in cases where the consequences of infection are high, such as implantation of prosthetic material, open-heart surgery for repair of structural defects, body cavity exploration in neonates and most neurosurgical operations.¹ We do not have the benefit of published data from large randomized controlled trials in the post-operative neonate. Many of the recommendations are extrapolated from adult literature or small case series.²

GOALS

- Streamline antibiotic exposure to provide targeted coverage
- Avoid the burden of infection or extended stay and associated costs
- Minimize the risks of prolonged antibiotic exposure with unfavorable side effects
- Reduce practice variability in uncomplicated cases

PRE-OPERATIVE ANTIBIOTIC RECOMMENDATIONS

The choice of appropriate antibiotics should be driven by the following chart:

Infant Age	Likely Pathogens	Recommended Drugs	Pre-operative Dose
≤ 72 hours	GBS, enteric gram-negative bacilli, enterococci	Ampicillin AND Gentamicin	50 mg/kg ⁵ 100 mg/kg (<i>for neurosurgical procedures due to risk of meningitis</i>) PMA ≤ 29 wk: 5 mg/kg PMA 30-34 wk: 4.5 mg/kg PMA ≥ 35 wk: 4mg/kg ⁵
> 72 hours	Prophylaxis targeted to colonizing organisms, nosocomial organisms, and operative site	Cefazolin OR (If MRSA is likely) Vancomycin	30 mg/kg ¹ 10 mg/kg ⁵

NOTES: *If the infant is already being treated with ampicillin and gentamicin and is older than 72 hours, a pre-operative dose of cefazolin should also be administered for adequate coverage of skin flora. If the infant is already being treated with vancomycin at therapeutic levels and is older than 72 hours, no additional pre-operative antibiotics are required.*

While it is important to communicate with a member of the service performing the procedure regarding the most appropriate preoperative antibiotic choice, it is the expectation that a member of the primary team and not the consulting service will be responsible for ordering the antibiotic(s) on call to OR in advance of the procedure.

With rare exception, the Children’s Pre-operative Order Set should be used in infant’s ≥ 45 weeks PMA

POST-OPERATIVE ANTIBIOTIC RECOMMENDATIONS

Post-operative antibiotic therapy should be driven by surgical classification, operative findings and/or underlying medical condition.

Surgical Classification <i>(determined by surgeon – ask surgeon or refer to operative note)</i>	Post-Operative Antibiotic Course
Clean <i>(may include: skin incision only)</i>	None
Clean-Contaminated <i>(may include: entry into respiratory, GI or GU tract)</i>	1 day / 24 hours
Contaminated <i>(may include: gross spillage or inflammation)</i>	Case-by-case, likely > 3 days

- The post-operative hand-off at the NCCC bedside remains an essential time for communication between the surgery and anesthesiology teams and the senior level neonatal providers to discuss post-operative antibiotics.
- Please consult directly with sub-specialty surgical services (ENT, Neurosurgery, Urology) for their specific antibiotic preferences.

*Guidelines should **NEVER** replace provider-to-provider communication and confirmation of patient specific details.*

See [Appendix A](#) for examples of commonly performed procedures in NCCC.

References:

1. American Academy of Pediatrics. Antimicrobial Prophylaxis. In: Kimberlin DW, Brady MT, Jackson MA, Long SS, eds. Red Book®: 2018 REPORT OF THE COMMITTEE ON INFECTIOUS DISEASES. American Academy of Pediatrics; 2018.
2. Brindle et al. Consensus guidelines for perioperative care in neonatal intestinal surgery: Enhanced recovery after surgery (ERAS®) society recommendations
3. Vu et al. Conflicts in wound classification of neonatal operations. J Pediatr Surg. 2009;44:1206.
4. Fallat et al. Random practice patterns of surgical antimicrobial prophylaxis in neonates. Pediatr Surg Int. 1994;9:479.
5. Rangel SJ et al. Recent trends in the use of antibiotic prophylaxis in pediatric surgery. J Pediatr Surg. 2011; 46: 366-371.

Revised Fall 2022 – Delaney NNP / Smithwick NNP / Laughon MD / Phillips MD (Surgery)

APPENDIX A: COMMONLY PERFORMED PROCEDURES IN NCCC

Procedure	Recommended Drugs	Duration (First dose in OR unless otherwise specified)
Imperforate Anus / Large Bowel Atresia Repair	Age ≤ 72 hours: Ampicillin AND Gentamicin Age > 72 hours: Cefazolin OR (If MRSA is likely) Vancomycin	Case-by-case, likely 2-5 days.
Small Bowel Atresia Repair	Age ≤ 72 hours: Ampicillin AND Gentamicin Age > 72 hours: Cefazolin OR (If MRSA is likely) Vancomycin	24 hours post-surgery
Gastroschisis Repair	Age ≤ 72 hours: Ampicillin AND Gentamicin Age > 72 hours: Cefazolin OR (If MRSA is likely) Vancomycin	48 hours post-surgery (case by case if bowel perforation/penetration during repair)
Omphalocele Repair	Age ≤ 72 hours: Ampicillin AND Gentamicin Age > 72 hours: Cefazolin OR (If MRSA is likely) Vancomycin	24 hours post-surgery (case by case if bowel perforation/penetration during repair)
Congenital Diaphragmatic Hernia Repair	Age ≤ 72 hours: Ampicillin AND Gentamicin Age > 72 hours: Cefazolin OR (If MRSA is likely) Vancomycin	1 dose peri-operatively
Necrotizing Enterocolitis	Any age Ampicillin AND Gentamicin AND Metronidazole	Ampicillin, Gentamicin, and Metronidazole x 7-14 days
Open Neural Tube Defect Repair	Age ≤ 72 hours: Ampicillin AND Gentamicin Age > 72 hours: Cefazolin OR (If MRSA is likely) Vancomycin	From birth to 24 hours following closure with meningitic dosing