

# Antibiotic Use Among Surgical Patients in the Neonatal Intensive Care Unit (NICU): The NO-More-AntibioticS and Resistance in Surgery (NO-MAS-R-S) Study

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## Background

- Antibiotic exposure among preterm infants in the neonatal intensive care unit (NICU) is associated with short- and long-term adverse effects:
  - Necrotizing enterocolitis (NEC)
  - Late-onset sepsis and invasive candidiasis
  - Bronchopulmonary dysplasia, retinopathy of prematurity, and neurodevelopmental impairment
  - Emergence of multi-drug resistant organisms
  - Death
- Antibiotic exposure is also associated with adverse effects in term infants (e.g. autism, recurrent wheezing, GI disorders).
- The burden of antibiotic use in neonatal surgical patients has not been well described but is needed to inform antimicrobial stewardship efforts.
- All neonatal surgeries in Columbus are performed at the level 4 outborn referral NICU of Nationwide Children's Hospital (NCH).

## Objective

- To quantify and describe the use of antibiotic therapy among infants undergoing surgical evaluation in the NICU

## Methods

- Prospective observational study of all infants in the NCH NICU who underwent surgical evaluation from 1/3/2022 to 6/30/2022.
- The pediatric surgery fellow informed the neonatal clinical pharmacist about all consultations. In addition, all patients were captured via daily surgical census email and a pharmacy medication database.
- Pertinent demographic and clinical infant data were obtained from the electronic health records.
- All antimicrobial therapy provided to infants after the surgical evaluation was recorded.

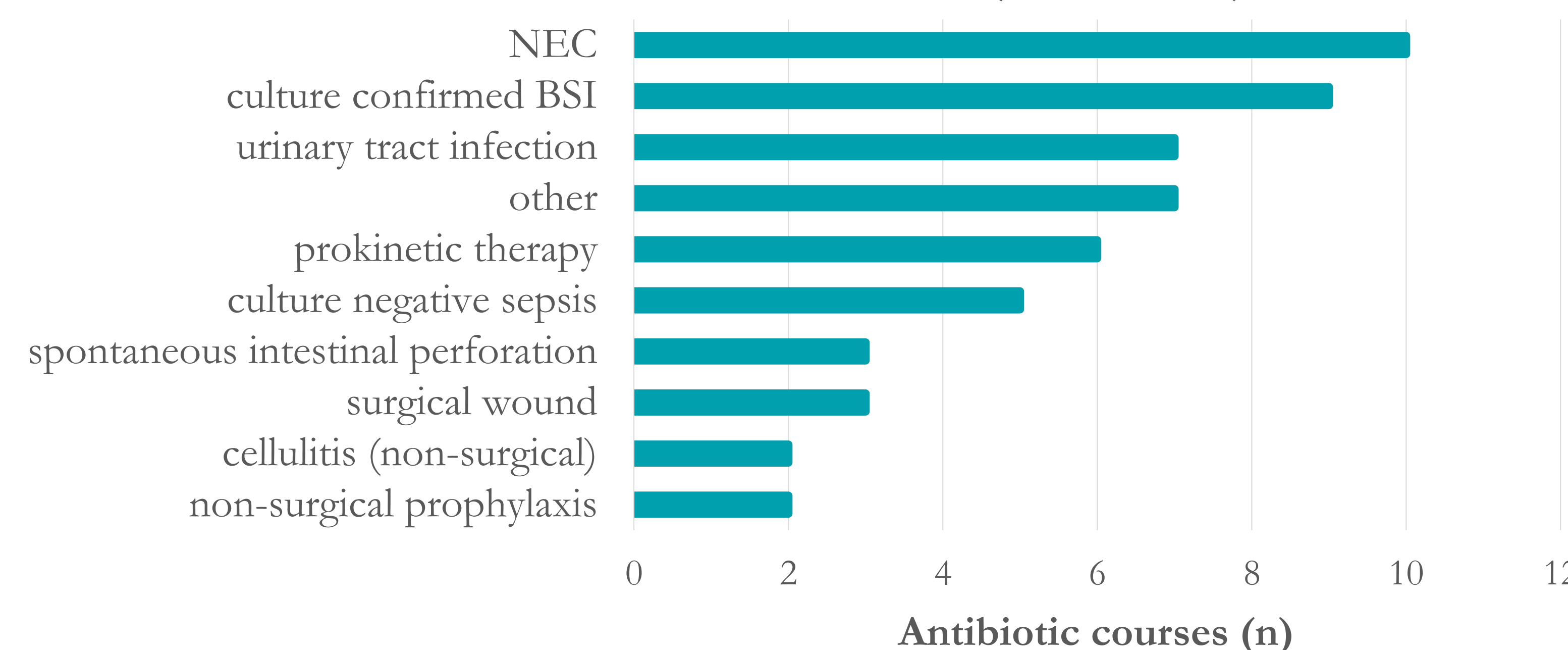
## Results

- Majority (79%, 74/94) of infants undergoing surgical evaluation in the NICU received antimicrobial therapy (Table 1).
- Of the 74 infants, there were 138 antimicrobial initiations (courses)
- The most common surgical procedures were laparotomy (23%), gastrostomy tube (13%), bowel resection (9%).

**Table 1 – Demographic and Clinical Characteristics (N=94 infants)**

Gestational Age (weeks); mean (SD)	33.7 (5.2)
Birth Weight (grams); mean (SD)	2216 (1079)
Sex, female; N (%)	40 (43)
Apgar, 1 minute; median [IQR]	7 [4-8]
Apgar, 5 minute; median [IQR]	8 [7-9]
Race; N (%)	
White	58 (62)
Black	29 (31)
Other	7 (7)
Postnatal age at time of the surgical consult; median [IQR]	2 [1-15]
Patients requiring antibiotics after surgical consultation N (%)	74 (79)
Antibiotics before surgical consult; N (%)	
No antibiotics before consult	41 (44)
48 hours or less	32 (34)
More than 48 hours	21 (22)
Antibiotic courses initiated within 24 hours of surgery N (%)	67 (49)

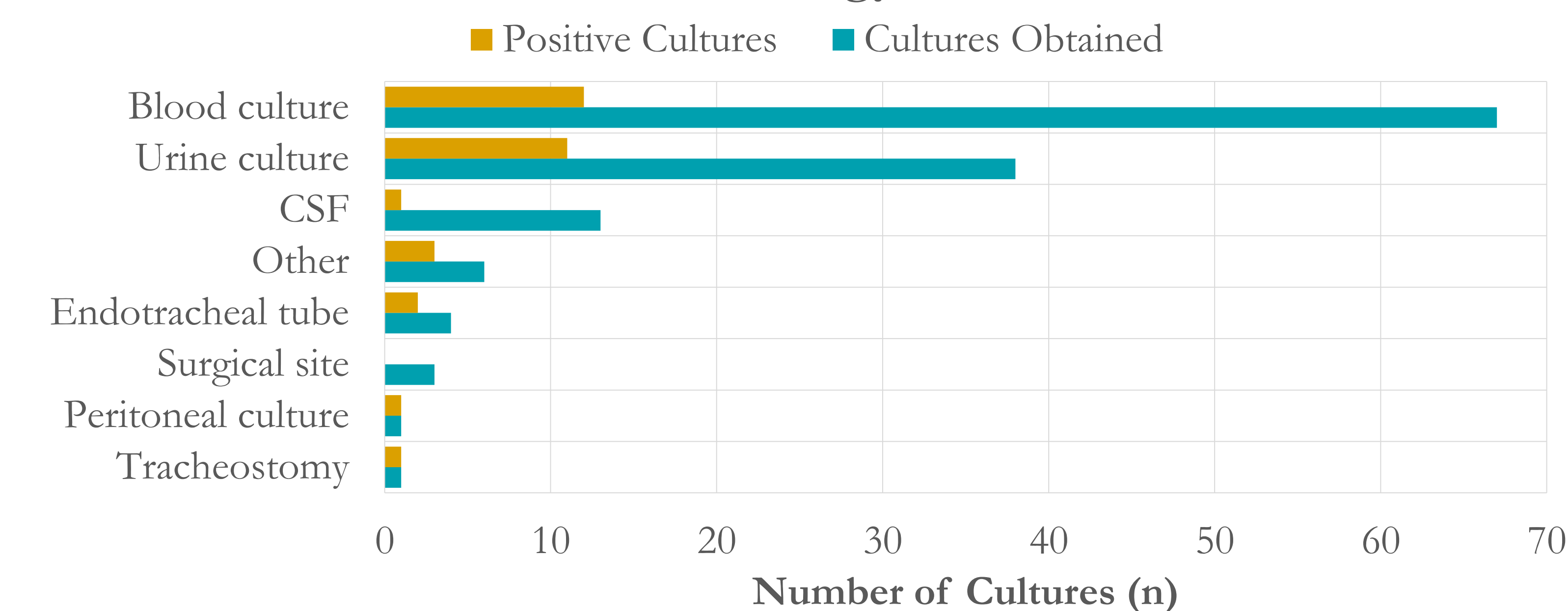
### Reasons for Antibiotic Use (>48 hours)



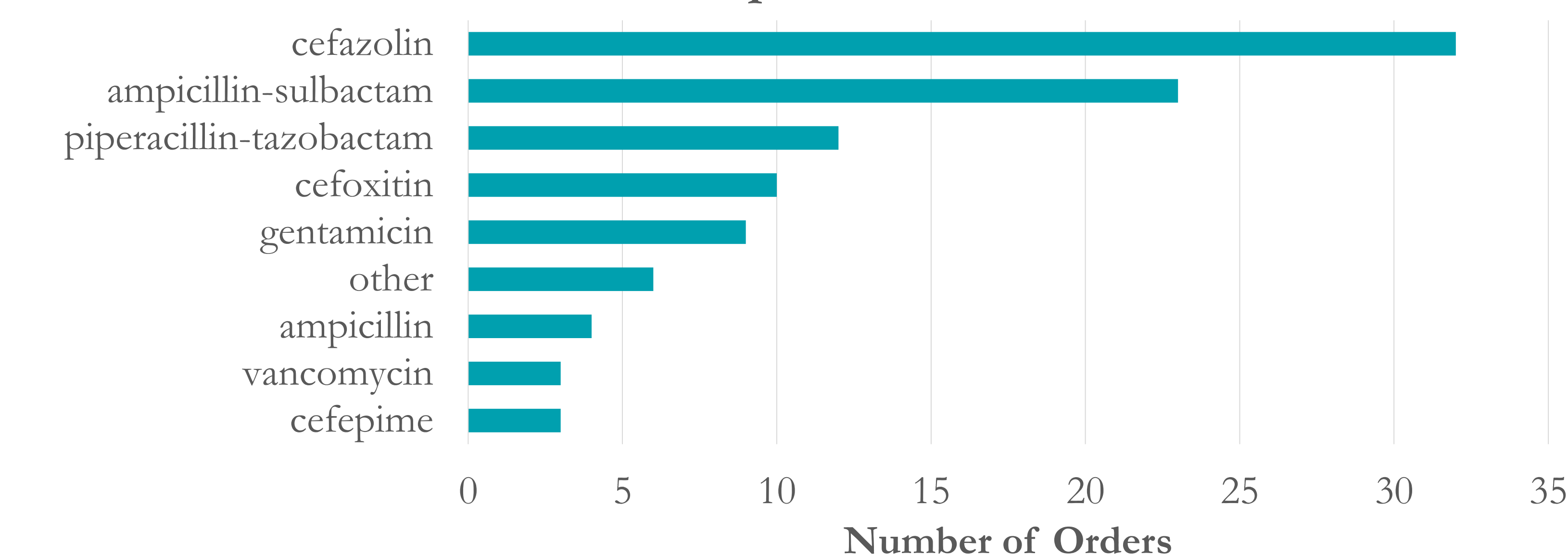
## Results

- Cultures were obtained in 83 different cases
- There were 28 positive cultures
- Most common pathogens isolated were *E. coli* (29%) and *Klebsiella spp.* (18%)

### Microbiology Data



### Post-op Antibiotics



## Conclusions

- Antibiotics were utilized in the majority of infants who had surgical consultation.
- Broad-spectrum antibiotics were used frequently in surgical patients.
- Cefazolin was the most commonly used agent among post-operative surgical patients.
- Surgical site and peritoneal cultures were done infrequently; additional studies are needed to investigate the utility of surgical site cultures.
- Surgical prophylaxis was the main indication and may serve as a potential opportunity for ongoing surgical stewardship efforts.