Title: Reduction of Antibiotic Therapy Days in a Level 4 Neonatal Intensive Care Unit

Introduction:
Although crucial for the management of neonatal infections, antibiotic therapy can negatively impact the microbiome, promote a pro-inflammatory state, and contribute to morbidities. Implementation of consensus antibiotic therapy guidelines in our unit in January 2020 successfully curtailed unnecessary antibiotic exposure by 30%. However, there was not a decrease in total antibiotic therapy days likely secondary to significant culture negative sepsis diagnoses.

Methods:
Observational time series study between Jan 2019 – Nov 2022 in an academic level IV referral NICU with the aim to decrease total antibiotic therapy days by 10% within 1 year. Process changes focused on justification of antibiotic use after consensus guidelines were established and education on culture negative sepsis diagnosis were implemented in 1/2020 using plan-do-study-act-cycles. To facilitate antibiotic necessity documentation, an electronic medical record (EMR) smart-phrase was incorporated in the admission/progress note templates. Weekly feedback was provided to attendings and frontline providers on documentation fall-outs. To change the culture of culture negative sepsis, two antibiotic stewardship educational sessions on neonatal sepsis and culture-negative sepsis were held in 1/2022 and 5/2022. Outcome measures were tracked monthly including (1) days of therapy per 1000 patient-days (DOT-1000PD); (2) percentage of unnecessary antibiotic days; and (3) percentage of culture-negative sepsis diagnoses. Process measures included percentage of documented justification and diagnoses in problem list. Balancing measure was re-initiation of therapy within 2 weeks for any indication. Statistical process control charts were used and standard rules for special cause were applied.

Results:
A total of 441 patients received antibiotics during this time series. There was special cause variation in the total DOT-1000PD from 278 to 156 (44% reduction, Figure 1) and percent of patients with unnecessary antibiotic days further decreased from 11% to 3%. There was also a reduction in the percent of culture-negative sepsis diagnoses from 18% to 4% (Figure 2). There was special cause improvement in justification of antibiotic necessity from 88% to 97% (Figure 3), however, specification of diagnosis in the problem list remained at 87%. There was no change in re-initiation of antibiotics within 2 weeks.

Conclusion: Consensus guidelines for antibiotic use coupled with standardization of antibiotic necessity documentation are effective tools to reduce antibiotic therapy days in the NICU.