

Antibiotics in the NICU: In the absence of confirmed infection, higher rates of antibiotic use associated with worse outcomes in very-low-birth-weight babies

All new-born babies are at risk of infection because their immune systems are not yet mature, and this is especially true for premature babies. This presumed presence of infection which is usually difficult to diagnose often leads to liberal use of antibiotics in the neonatal intensive care unit (NICU) setting, even in the absence of confirmed infection.

The Canadian Neonatal Network™ is a group of Canadian researchers who collaborate on research issues relating to neonatal care. The Network, founded in 1995 by Shoo Lee, now includes members from 30 hospitals and 17 universities across Canada. The Network maintains a standardized neonatal intensive care unit (NICU) database and provides a unique opportunity for researchers to participate in collaborative projects on a national and international scale. The Network captures more than 95% of all Canadian NICU admissions. To determine the extent of antibiotic use in very-low-birth-weight (VLBW) infants and the association between antibiotic use and outcomes in infants without culture-proven sepsis or necrotizing enterocolitis, the Network, performed a retrospective analysis of data submitted by tertiary-care NICUs between 2010 and 2014. In their cohort of 13,738 VLBW infants

(birthweight <1500 g), 11,669 (84.9%) were exposed to antibiotics. The antibiotic-use rate was defined as the proportion of hospital days that included treatment with ≥ 1 antibiotic. The reported that antibiotic-use rate decreased from 0.29 in 2010 to 0.25 in 2014. Among the antibiotic-exposed infants, the majority (75.6%) did not have necrotizing enterocolitis or any other infection confirmed by blood or cerebrospinal-fluid cultures. The rate of the composite primary outcome of mortality or morbidity (chronic lung disease, severe retinopathy of prematurity, or periventricular white matter damage) was 45.9% in the quartile with the highest antibiotic exposure (for 32%-100% of the hospital stay) and was significantly higher relative to the other three antibiotic-use-rate quartiles.

This analysis complements to a growing body of evidence that high levels of antibiotic use in very-low-birth-weight infants without confirmed infection may contribute to poor outcomes, possibly by disrupting the neonatal microbiome. Whereas it is understood that there will be a number of limitations inherent in retrospective analyses of database cohorts, doing a prospective study on the subject will also have its own challenges. However there is no doubt that these findings highlight the need for effective antibiotic stewardship programs in the NICU setting.

The Canadian Neonatal Network™