Antibiotics for Neonatal Sepsis in Africa (ANSA): deriving antibiotic recommendations utilising a data science approach

Larisse Bolton¹ Adrie Bekker² Cari van Schalkwyk¹ Andrew Whitelaw³
Angela Dramowski²

¹South African DSI-NRF Centre Of Excellence In Epidemiological Modelling And Analysis (SACEMA), Stellenbosch University, Mostertdrift, South Africa,
²Department of Paediatrics and Child Health, Faculty of Medicine and Health Sciences, Stellenbosch University, Tygerberg, South Africa,
³Division of Medical Microbiology, Department of Pathology, Stellenbosch University, South Africa, Tygerberg, South Africa, National Health Laboratory Service, Tygerberg Hospital, Tygerberg, South Africa

The Global Health Network

URL: https://tghncollections.pubpub.org/pub/1rxqtlez
License: Creative Commons Attribution 4.0 International License (CC-BY 4.0)
Background: The paucity of population-level neonatal sepsis data hampers development of antibiotic recommendations for neonatal sepsis in Africa with approximately 250,000 African neonates who die from severe bacterial infections annually. Antibiotic resistance rates in Sub-Saharan Africa (SSA) are high, and access to effective antibiotic therapy for neonatal sepsis is limited. Even if appropriate therapy is available, the occurrence of antimicrobial resistance could result in an increase in mortality. The Antibiotics for Neonatal Sepsis in Africa (ANSA) study aims to use available SSA neonatal bloodstream infection (BSI) datasets to determine the optimal empiric antibiotic choice for severe bacterial infection in neonates. Methods: Empiric antibiotic coverage estimates for neonatal sepsis will be calculated using weighted incidence syndromic antibiograms (WISCA). These estimates are stratified by neonatal unit type (regional or national) and geographic region (national and multi-national). Multi-national analysis will include South Africa, Malawi, Botswana and Ghana. The utility of this method for evaluating the appropriateness of existing empiric antibiotic recommendations was justified by an analysis of a regional South African dataset (136 early-onset and 485 healthcare-associated sepsis episodes at nine neonatal units in the Western Cape, South Africa, including central, regional and district hospitals between 2017 and 2018). Results: For this regional dataset, the mean estimated antibiotic coverage of ampicillin plus gentamicin for early-onset neonatal sepsis ranged from 55% (IQR: 40-71%) (tertiary) to 84% (IQR:74-93%) (district). Comparatively, antibiotic coverage for healthcare-associated neonatal sepsis ranged from 67-80% for piperacillin-tazobactam plus amikacin and 60-77% for meropenem at tertiary and district hospitals, respectively. Conclusions: The regional South African dataset highlights the need for annual review of empiric antibiotics in light of increasing antibiotic resistance rates. Applying novel quantitative approaches such as the WISCA to multi-national data sets will enable targeted empiric antibiotic therapy to be aligned with drug susceptibility in real time, ultimately improving patient outcomes.