DeNIS collaboration: setting the future research agenda

We salute the huge efforts of the DeNIS collaboration (October, 2016).[1] Their study not only comprehensively sets the scene for neonatal sepsis and antimicrobial resistance in a low-income and middle-income setting but also, by highlighting gaps in our understanding of neonatal sepsis and antimicrobial resistance, sets the future research agenda.

The absence of a globally accepted single standard definition of multidrug resistance is a key issue.[2,3] Difficulties in showing a clear relationship between antimicrobial resistance and outcomes might reflect the absence of clinical relevance of currently used definitions. Standardised definitions for multidrug resistance, which account for infection type, age, and key risk factors, are now needed.

The high rates of *Acinetobacter* and coagulase-negative staphylococcal infections among the pathogens causing early-onset sepsis are striking, but additionally they emphasise the absence of validated definitions for clinical sepsis.[4] Knowledge of the clinical features and outcomes associated with such cases and their correlation with those of more established pathogens, as well as non-infected control babies, might help our understanding of their relevance and aid in validating new definitions.

The study[1] reported high rates of antimicrobial resistance and also reminds us of the paucity of new drugs to treat such infections, especially in neonates, as well as the paucity of data on antimicrobial pharmacokinetics in this population. Observational and interventional multicentre studies are needed to establish the safety and efficacy of new regimens and antibiotics (targeted at antimicrobial-resistant pathogens) compared with existing combinations, together with new strategies for using them wisely.[5] Further study in low-income and middle-income countries is required and the DeNIS collaboration is a landmark step in this direction.

We declare no competing interests.

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1 Investigators of the Delhi Neonatal Infection Study (DeNIS) collaboration. Characterisation and antimicrobial resistance of sepsis pathogens in neonates born in tertiary care centres in Delhi, India: a cohort study. *Lancet Glob Health* 2016; **4:** e752–60.
2 Sievert DM, Ricks P, Edwards JR, et al. Antimicrobial-resistant pathogens associated with healthcare-associated infections summary of data reported to the National Healthcare Safety Network at the Centers for Disease Control and Prevention, 2009–2010. *Infect Control Hosp Epidemiol* 2013; **34:** 1–14.
3 Magiorakos AP, Srinivasan A, Carey RB, et al. Multidrug-resistant, extensively drug-resistant and pandrug-resistant bacteria: an international expert proposal for interim standard definitions for acquired resistance. *Clin Microbiol Infect* 2012; **18:** 268–81.
4 Fitchett EJ, Seale AC, Vergnano S, et al. Strengthening the Reporting of Observational Studies in Epidemiology for Newborn Infection (STROBE-NI): an extension of the STROBE statement for neonatal infection research. *Lancet Infec Dis* 2016; **16:** e202–13.
5 Bielicki JA, Sharland M, Johnson AP, et al. Selecting appropriate empirical antibiotic regimens for paediatric bloodstream infections: application of a Bayesian decision model to local and pooled antimicrobial resistance surveillance data. *J Antimicrob Chemother* 2015; **30:** dkv397.