Risk factors for and outcomes of neonatal bloodstream infections with extended-spectrum beta-lactamase producing Enterobacteriaceae at Princess Marina Hospital, Botswana

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Background: Septicaemia is the third most common cause of neonatal death in Sub-Saharan Africa, with extended-spectrum beta-lactamase (ESBL)-producing Enterobacteriaceae as leading bloodstream infection (BSI) pathogens. Risk factors for infection with ESBL-producing pathogens include exposure to 3rd generation cephalosporins, low birth weight, increased length of hospital stay and mechanical ventilation. In many African settings, therapeutic options ESBL-BSI are limited with affected neonates suffering prolonged hospitalisation, morbidity and excess mortality.

Methods: Episodes of neonatal laboratory-confirmed BSI with Klebsiella species and Escherichia coli between 1 January 2011 and 31 December 2014 were retrospectively identified from laboratory records at a Botswana referral hospital. Folder review was undertaken to determine: risk factors for acquisition of, antibiotic therapy for, and outcomes of BSI caused by ESBL- versus non-ESBL producing isolates.

Results: Of 3783 blood cultures in neonates, 482 laboratory-confirmed BSI occurred with gram negative predominance (291; 61%): the majority (208; 43%) were E. coli or Klebsiella species including 114 ESBL vs 94 non- ESBL-producing isolates. None of the factors investigated were associated with ESBL-BSI. ESBL-BSI were resistant to all first line antibiotics but showed high susceptibility (91%) to amikacin. Patients with ESBL-BSI were more likely to receive inadequate empiric antibiotic therapy (84.6% vs 15.4%; $p<0.001$). Use of mechanical ventilation was an independent risk factor for mortality (OR 4.07 [95% CI 1.77 – 9.38]; $p=0.005$).

Conclusion: ESBL-producing E. coli and Klebsiella accounted for 23.7% of neonatal BSI episodes. Predominance of ESBL-producing pathogens and high levels resistance to empiric antibiotics necessitates review of late onset sepsis empiric antibiotic regimens.