**High rates of admission in LMIC neonatal units suggests an enhanced focus on infection prevention and control measures is required**

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The recent publication of key findings from a WHO/UNICEF report on care for sick and small newborns, *Survive and Thrive: Transforming care for every small and sick newborn,*[1] recommends the expansion of NICU services globally for small/sick babies, but does not include the need to enhance infection prevention and control (IPC) in parallel with expansion of NICU services. There is evidence that incidence of healthcare-associated infections (HAI) in NICUs in lower middle income countries (LMIC) is higher than in high income countries (HIC) and a high proportion of these neonatal infections are resistant to WHO recommended ampicillin and gentamicin.[2,3] Culture-positive neonatal infections in LMIC settings are predominantly caused by gram negative pathogens and *S. aureus* whereas Group B streptococci and coagulase-negative staphylococci are predominant in HIC settings. [3] A study in Tanzania found higher mortality among neonates with resistant infections such as ESBL gram-negative infections (52% died) or MRSA (55% died) compared to those with non-ESBL gram-negative infections (25% died) or methicillin susceptible *S. aureus* infections (21% died) respectively.[4] There is limited information available on current structures of care in NICU services in the LMIC setting that are likely to influence transmission of MDR pathogens although it is suspected that inappropriate use of antimicrobials during pregnancy, inappropriate empiric treatment for neonatal infections, overcrowding of NICU, and poor infection prevention and control programmes contribute to the rise and spread of resistant pathogens. [2]

In 2016, the Global Antimicrobial Resistance, Prescribing and Efficacy in Children and Neonates (GARPEC) project was launched to evaluate antibiotic prescribing in hospitalised neonates and children.[5] The GARPEC project recruited a global convenience sample of 65 hospitals treating paediatric patients and neonates with significant infection from both HIC and LMIC settings. All hospitals participating in GARPEC were invited to voluntarily complete a standardised survey on hospital characteristics including hospital type, bed count, admissions, and presence of NICU/PICU to which 44 sites responded. Hospitals were grouped by country into income categories using World Bank definitions for fiscal year 2018 (Figure 1). Low income and lower-middle income were combined into one category (LLMIC) due to a small number of hospitals from countries in these groups.

The median number of NICU beds in HIC hospitals was 20 (IQR: 16-39) compared to 12.5 (IQR 10-18) in upper-middle income country (UMIC) hospitals and 20 (IQR: 14-25) in LLMIC hospitals. The median number of NICU admissions per year was 605 (IQR: 296-1136) for HIC hospitals, 275 (IQR: 170-342) for UMIC hospitals and 800 (IQR 720-1200) for LLMIC hospitals. All hospital characteristics are summarised in Table 1.

Table 1. Summary of reported hospital services from 44 hospitals between February 2016 and February 2017

|  |  |  |  |
| --- | --- | --- | --- |
|  | High Income Country Hospitals  (n=25) | Upper Middle Income Country Hospitals  (n=10) | Low/Lower Middle Income Country Hospitals  (n=9) |
| Hospital Type |  |  |  |
| Stand-alone children’s hospital | 10 (40.0%) | 2 (20.0%) | 2 (22.2%) |
| Specialist children’s hospital | 0 (0%) | 1 (5.3%) | 0 (0%) |
| Paediatric and neonatal units within a larger adult hospital | 15 (60.0%) | 6 (60.0%) | 7 (77.8%) |
| Specialist adult hospital with a paediatric ward | 0 (0%) | 1 (10.0%) | 0 (0%) |
| Teaching Hospital | 22 (88.0%) | 10 (100.0%) | 7 (77.8%) |
| Have NICU1 | 21 (84.0%) | 9 (90.0%) | 9 (100.0%) |
| Median (IQR) NICU beds2 | 20 (16-39)  (range: 5-98) | 13 (10-18)  (range: 6-24) | 20 (14-25)  (range: 10-32) |
| Median (IQR) NICU admissions per year3 | 605 (296-1136)  (range: 200-4346) | 275 (170-342) (range: 114-500) | 800 (720 -1200)  (range: 199-1342) |

1 One UMIC centre missing data

2NICU bed count: 7 HIC missing, 2 UMIC missing, 0 LLMIC missing

3 NICU admissions/year: 8 HIC missing, 2 UMIC missing, 0 LLMIC missing

Our study indicates that hospitals in LLMIC settings have higher numbers of admissions to NICU than HIC and UMIC hospitals with generally fewer NICU beds available in their facilities. Overcrowding has been recognised as an important risk factor for neonatal nosocomial infection.[3] As more births globally take place in health facilities, ensuring that there is a very strong focus on enhancing IPC measures in parallel to the expansion of neonatal care will be vital to tackle neonatal mortality due to infection and AMR.

**References**

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