Laboratory challenges worsen AMR risks: Evidence from Two Referral Hospitals in Free-Town, Sierra Leone (2017–2019)

Key Messages

• A resistance patterns study among patients with laboratory samples from 2017 to 2019 using routine data was conducted in two hospitals in Freetown.
• As a result of the study, key challenges in AMR detection by hospital laboratory were discovered and documented in the WHO health systems model.
• Despite the challenges, the study found that antibiotic resistance for commonly prescribed antibiotics was high in two referral hospitals, highlighting the urgent need for antimicrobial stewardship.
• Resistance of the cultures to at least one antibiotic was high (91%), and even higher in the pediatric hospital (94%). Highest resistance with penicillin (81%) for Gram-positive bacteria and lowest with nitrofurantoin (13%).
• This study is one of a limited number of studies reporting on laboratory surveillance of antimicrobial resistance in Sierra Leone in the aftermath of the 2014/2016 EVD outbreak.

What is the problem and why is it important?

WHO reports a lack of established AMR surveillance systems in the African region. There is very limited data on AMR available in Sierra Leone, but there are concerns regarding over prescription of antibiotics as a routine in hospitals and community-based treatment and the practice of self- and non-clinician prescriptions on a wider scale.

Challenges in laboratory at the hospitals affect AMR in the following ways:
• Clinical - limited information for appropriate antimicrobial therapy
• Surveillance – inability of tracking occurrence of pathogen of AMR

How did we measure it?

• In the course of the AMR research, we documented 8 key challenges in laboratory procedures from the maternity hospital and the paediatric hospital

What did we find?

Our findings indicate a low utilization of the laboratory during the study period in terms of culture and sensitivity testing. The main gaps identified in this study can be categorized in the WHO Health Systems model, as follows:

1. Health care workers
   • Low awareness from health care workers about the availability of the services.
   • some Health workers might refer their lab requests to external laboratories
Laboratory gaps increase risks of AMR in Sierra Leone’s top maternity and paediatric hospitals

9 key challenges in Sierra Leone labs fall into WHO’s health systems model:

- Health workforce
- Infrastructure
- Data and surveillance

Antimicrobial Resistance Patterns

With the lab challenges, the study found high rates of AMR in the maternity and paediatric hospitals, as shown:

- Antimicrobial resistance to at least one antibiotic was observed among the 81 (91%) cultures with positive bacterial growth.
- Higher proportion of resistance in the pediatric hospital’s samples (94%) compared to the maternity hospital (85%).
- Significantly higher resistance among Gram-negative bacteria (59%) than Gram-positive bacteria (46%), $p = 0.0448$.
- Gram-positive bacteria, the proportion of antibiotic resistance was highest with penicillin (81%) and kanamycin (71.4%), and lowest with nitrofurantoin (13%).
- Gram-negative bacteria, antibiotic resistance was highest with six antibiotics: ampicillin, gentamycin, streptomycin, tetracycline, cephalothin and penicillin (100%) and not existent with novobiocin (0%).

Implications

Strong leadership from the study hospitals in collaboration with the National AMR Committee and the MoHS needs to improve on the laboratory challenges;

- Raise awareness among users but also with hospitals staff to increase the use and proper documentation of services.
- Improve and increase the use of the existing laboratory capacity for culture and drug sensitivity testing not only for better patient management but also as part of surveillance for AMR and improved antibiotic stewardship in the study hospitals and in the country.
- Use the laboratory as referral structure for more health facilities in the area where it is established to increase demand for culture.
- Integrate the laboratory into the national AMR surveillance network, which would provide venue for continuous capacity building and provision of supplies.
- Improve infrastructure, capacity building, human resources, equipment and reagents
- Support further studies on antimicrobial resistance.