



Research Assistants extracting data from patient files

Technical Highlight
April 2025

Trends of Antibiotic Use in Nine Regional Referral Hospitals in Uganda

Background

Antimicrobial resistance (AMR) poses a critical threat to global health, with inappropriate antibiotic use being the major driver for the emergence and spread of AMR¹. Luckily, optimising antibiotic use through the implementation of antibiotic stewardship programmes can slow the development of AMR. For example, an antimicrobial stewardship programme implemented in six hospitals in Uganda between June 2019 and July 2022 showed overall reductions in unnecessary antibiotic use for upper respiratory tract infections (URTI) and the number of antibiotics per patient treated for urinary tract infections (UTI)².

However, implementation of antimicrobial stewardship (AMS) programmes faces several challenges such as shortage of human resources, inadequate laboratory capacity for microbiological tests, limited governmental funding, and a lack of national guidelines³.

The Ugandan Government has undertaken various efforts to fill the policy gaps; such efforts include development and launch of the second National Action Plan for AMR (NAP-AMR II) 2024–2029⁴ and creation of the Parliamentary Forum on AMR⁵. Now, all efforts are to implement, monitor, evaluate and optimise antimicrobial stewardship evidence-based strategies. However, these corrective actions need to be informed by evidence, obtained through data from surveillance of antimicrobial use.

To address gaps in data, we analysed antimicrobial use surveillance data that was obtained from nine regional referral hospitals (RRH) over a three-year period. This technical highlight synthesises findings from a 2020–2023 retrospective analysis of antibiotic use across nine Ugandan Regional Referral Hospitals (RRHs), involving 15,154 inpatients.

¹Antimicrobial Resistance: A Growing Serious Threat for Global Public Health: <https://pubmed.ncbi.nlm.nih.gov/37444780/>

²Development and evaluation of a continuous quality improvement programme for antimicrobial stewardship in six hospitals in Uganda: <https://pubmed.ncbi.nlm.nih.gov/37336576/>

³Barriers, facilitators, perceptions and impact of interventions in implementing antimicrobial stewardship programmes in hospitals of low-middle and middle countries: a scoping review: <https://arjjournal.biomedcentral.com/articles/10.1186/s13756-024-01369-6>

⁴Uganda Antimicrobial Resistance National Action Plan: https://health.go.ug/wp-content/uploads/2025/04/Uganda_NAP-AMR-II_Final_signed-version.pdf

⁵Parliamentary Forum on AMR Joins the fight against Antimicrobial Resistance : <https://cphl.go.ug/parliamentary-forum-amr-joins-fight-against-antimicrobial-resistance>

Methodology

This study adopted the World Health Organisation (WHO) point prevalence surveys (PPS) methodology⁶ to conduct quarterly surveys between October 2020 and December 2023 across nine anonymised Regional Referral Hospitals (RRHs) in Uganda. Data focused on oral and systemic antibiotic use (oral, intravenous, intramuscular, etc.) among hospitalised patients in five wards (gynaecology, maternity, medical, paediatrics, surgical).

Data Collection:

We collected anonymised patient data for those admitted before 8:00 AM on survey days and receiving ongoing antibiotics. Variables included demographics, ward, admission dates, antibiotic details, and key indicators in antibiotic stewardship including:

- Antibiotic use per AWARe classification (Access, Watch, Reserve)
- Adherence to 2016 Uganda Clinical Guidelines
- Prescriptions informed by Antimicrobial Culture and Sensitivity Tests (ASTs)
- Antibiotics prescribed without indication

The analysis focused on trends in antibiotic utilisation and alignment with antimicrobial stewardship indicators, leveraging standardised WHO tools for cross-comparison and policy insights.

Key Findings

• High antibiotic prescription rates with persistent inappropriate use

Antibiotic use remained consistently high across Ugandan tertiary hospitals, with 58.7% of inpatients (8,892/15,154) prescribed at least one antibiotic between 2020 and 2023, table 1.

Table 1: Indicators of Antimicrobial Use (AMU)

Categories	Overall, n (%)
Number of patients admitted	15,154
Patients prescribed at least one antibiotic	8,892 (58.7)
Number of patients receiving parenteral antibiotics	8,233 (92.6)
Number of patients prescribed an antibiotic consistent with national guidelines	5402 (60.8)
Number of patients prescribed Antibiotic without indication	2,147 (24.1)
Number of antibiotic prescriptions based on culture and sensitivity test results	271 (3.0)

• Low utilisation of diagnostic tools

Antimicrobial culture and susceptibility testing (AST) were used for only 3% (271/8,892), of antibiotic prescriptions and showed an upward trend of utilisation over the project period particularly in maternity and gynaecology. This finding is concerning and may be explained by inadequate microbiology diagnostic capacity at hospitals that participated in the hospitals. Further, it could be due to lack of diagnostic stewardship (the interface between clinicians and the laboratory) that is meant to guide clinical decision making.

⁶ WHO Methodology for Point Prevalence Survey on Antibiotic Use in Hospitals: <https://iris.who.int/bitstream/handle/10665/280063/WHO-EMP-IAU-2018.01-eng.pdf>

- **Suboptimal adherence to WHO AWaRe guidelines**

The use of antibiotics from the WHO “Access” category was at (47.8%) of prescriptions. The use of “Access” antibiotics was followed by use of “Watch” antibiotics at 44.4%. This finding is concerning because the WHO recommends that over 60% of antibiotics used in hospitals should be from the “Access” category. A high low use of “Access” antibiotics contributes to the emergence and spread of AMR and increases healthcare costs since antibiotics in the “Watch” category are more expensive and should be reserved for more life-threatening bacterial infections. On the positive side “Watch” antibiotic use significantly declined over time particularly in the maternity and gynaecology wards. Ceftriaxone and Metronidazole were the most widely used “Watch” antibiotics.

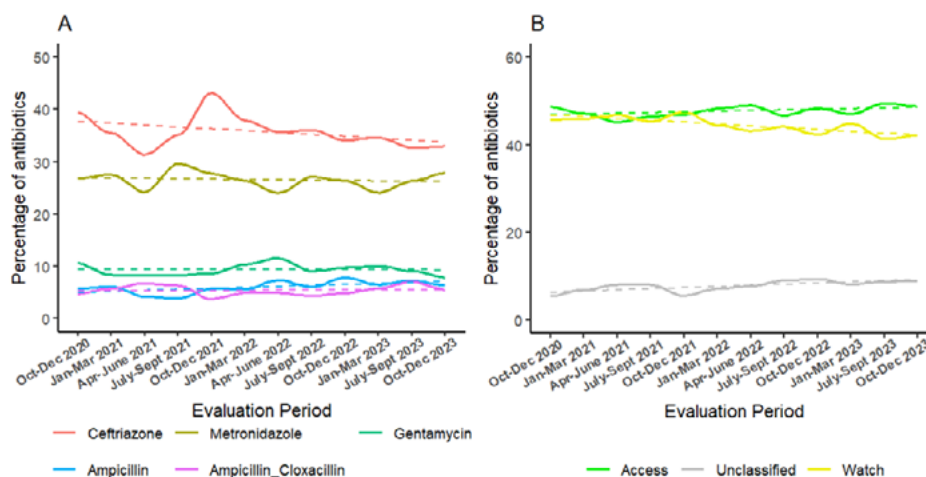


Figure 1: Trends in antibiotic prescription: Panel A – Percentage of common antibiotic prescriptions, Panel B – Percentage of prescribed antibiotics per WHO AWaRe categorisation.

Reserve antibiotics were rarely used (0.1%), while “unclassified” antibiotics defined as unrecommended fixed dose combinations increased over the study period and were used among 7.8% of inpatients, primarily driven by amoxicillin-cloxacillin (67.8%) and ceftriaxone-sulbactam (2.3%).

Table 2: Number of antibiotics prescribed per WHO AWaRe* categorisation

AWaRe Category	Proportion of use n (%)
Access	7,643 (47.8)
Watch	7,084 (44.4)
Reserve	4 (0.07)
Unclassified	1,258 (7.8)

*WHO AWaRe = World Health Organisation Access Watch and Reserve Categorisation. The WHO AWaRe categorisation of antibiotics is a framework that classifies antibiotics into three groups (Access, Watch, and Reserve) to promote their appropriate use and combat antimicrobial resistance. The AWaRe classification aims to guide antibiotic selection and use, ensuring that the most appropriate antibiotics are used for specific infections, while minimising the risk of resistance development.

Adherence to Uganda national treatment guidelines

Adherence to Uganda’s 2016 Clinical Guidelines significantly improved by two-fold over the study period, with 60.8% compliance (5,402/8,892 patients). Surgical and medical wards demonstrated the most notable progress, aligning prescribing practices with national standards.

Challenges

- ▶ **Gaps in diagnosis:**
Limited access to Antimicrobial Culture and Sensitivity equipment, supplies and reliance on empirical prescribing perpetuate inappropriate antibiotic use.
- ▶ **Overuse of unclassified and broad-spectrum antibiotics:**
High “Watch” antibiotic use potentially exposes “Watch” antibiotic particularly Ceftriaxone to a high AMR risk. In addition, use of “unclassified” antibiotics has persisted and is on an increase.
- ▶ **Fragmented implementation of antimicrobial stewardship:**
Weak enforcement of AMR related policy and UCG guidelines across the various wards and hospitals, lack of dedicated stewardship teams, and insufficient training hinder progress.

Recommendations for AMR Stakeholders

- **Strengthening diagnostic capacity:**
There is need to strengthen the microbiological diagnostic capacity at the regional referral hospitals through procuring and maintaining microbiology equipment while ensuring a consistent supply of essential microbiology materials. Rapid diagnostic tools could be integrated into routine patient care, allowing clinicians to make evidence-based decisions. Expanding access to AST diagnostic services also necessitates training laboratory technologists and microbiologists through formal instruction and on-the-job training programmes. In addition, comprehensive in-service training for clinicians will enhance their ability to appropriately request, interpret and use AST results for adjusting therapy, reducing unnecessary antimicrobial use and the risk of resistance.
- **Enforcing AWaRe Categorisation:**
Ensuring adherence to the AWaRe (Access, Watch, and Reserve) classification of antibiotics is vital for reducing antimicrobial resistance. Hospital-level audits should be implemented to monitor antibiotic prescribing patterns, specifically aiming to minimise the use of “Watch” category antibiotics, which have a higher resistance potential. Special audit emphasis should be put on “Ceftriaxone.” Continuous Medical Education Sessions emphasising the use of “Access” antibiotics should be conducted, focusing on their better safety and resistance risk profile. Additionally, updating national guidelines based on hospital level and current resistance patterns will ensure that treatment protocols remain relevant in combating antimicrobial resistance.
- **Supporting hospital antimicrobial stewardship committees:**
Supporting work by the Medicines and Therapeutic Committees (MTCs) specifically on antimicrobial stewardship across all hospitals will ensure oversight of prescribing practices. Furthermore, the MTCs should leverage digital health tools such as the Electronic Medical Records (EMR) to facilitate real-time monitoring of prescriptions, enabling immediate feedback to prescribers and fostering responsible antibiotic use.
- **Policy and Resource Mobilisation:**
Strengthening partnerships with government agencies, international organisations, and stakeholders will enhance the implementation of evidence-based policies and support in resource mobilisation to support infrastructure and human resource development. Securing sustainable funding is essential for expanding AST infrastructure, supporting continuous antimicrobial stewardship training, and conducting public awareness campaigns.

Conclusion

While Uganda has made strides in guideline adherence and implementing the national action plan for AMR, critical gaps remain. Inappropriate use of antibiotics remains high, with low uptake of microbiology testing and poor prescribing behaviors among clinicians. Addressing these gaps will require coordinated action across policymakers, clinicians, and global health partners to safeguard antibiotic efficacy and mitigate AMR's growing threat.

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About CAMO-Net

The Centres for Antimicrobial Optimisation Network (CAMO-Net) is a global research partnership. Our aim is to address antimicrobial resistance and support antimicrobial optimisation for use in humans. This research is underpinned by the values of equity, local leadership, co-production of activities, knowledge mobilisation, mutual cross-regional learning, training, capacity and capabilities strengthening, and output sharing. The vision of CAMO-Net is a world where the appropriate, evidence-based use of antimicrobials is commonplace, supported by equitable availability and accessibility.



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