# Antimicrobial Utilization in Zambia: A Multicentre Point Prevalence Survey.

30th August 2024

# Background

Antimicrobial Resistance is greatest health threats of our time. Antimicrobial R&D is dwindling.

According to recent estimates, in 2019, 1.27 million deaths were directly attributed to drug-resistant infections globally. By 2050, up to 10 million deaths could occur annually more than global COVID-19 deaths in 4 years combined.

If unchecked, AMR could shave US $3.4 trillion off GDP annually and push 24 million more people into extreme poverty in the next decade.

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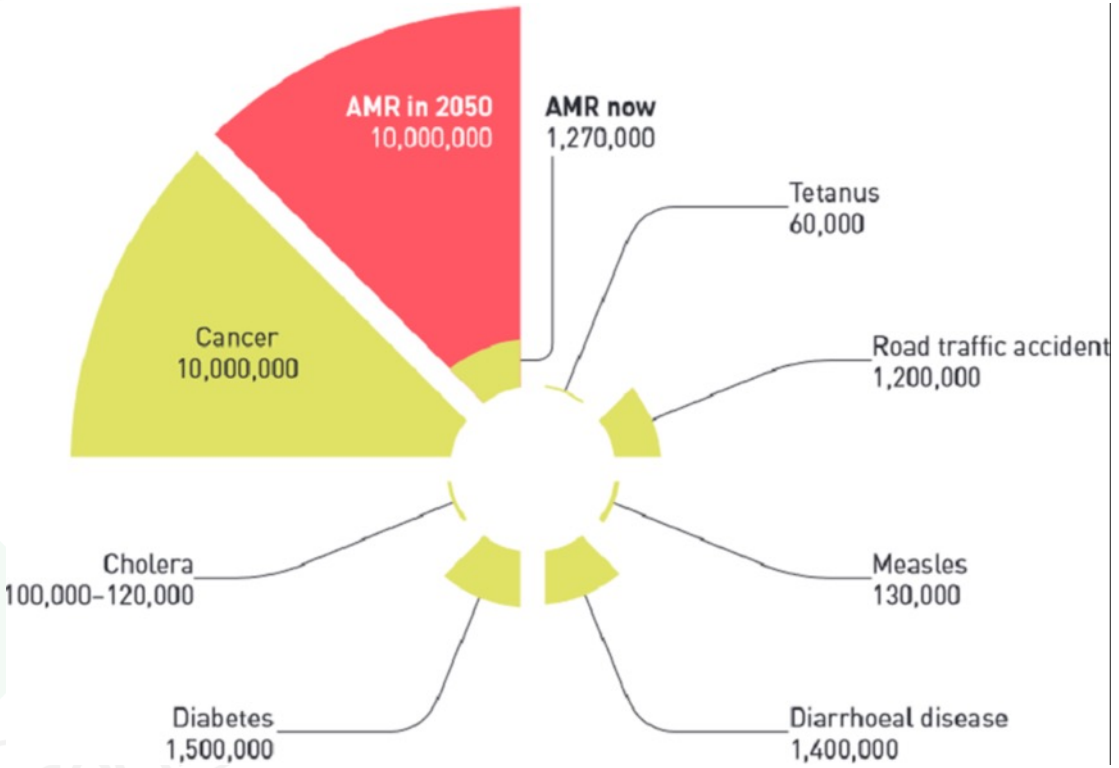


*Predicted mortality from AMR compared to common causes of death today (adapted from O'Neill 2016; Murray et al. 2022)*

# Objectives

## Main Objective

To quantify antimicrobial utilization and determine patterns of use in selected public and private hospital in Zambia.

## Specific Objectives

The primary objectives of the study are:

- To determine the prevalence of inpatients receiving at least one antimicrobial drug
- To determine the commonly prescribed antimicrobials in a facility, department and ward
- To describe the antimicrobial prescribing pattern in relation to choice of antimicrobial agent, indication, duration of therapy, directed/targeted or empirical and source of infection.
- To determine factors associated with antimicrobial utilization

# Methodology

This study was based on WHO methodology for PPS on antibiotic use in hospitals

This was a descriptive cross-sectional survey involving inpatient medical record reviews (patient files) in the 14 identified hospitals in Zambia.

All inpatients that were found admitted to the wards or had stayed in admission overnight and remained on the ward at 08:00AM on the day of the survey were included from which, all the patients on antimicrobial of interest were selected.

Statistical analyses were conducted using STATA 16.

# Results

A total of 1,401 patient records were reviewed during the study, 577 (41.2%) patients were male and 824 (58.8%) were female.

Inpatients on antibiotics were 1,003 out of 1,401. The prevalence rate of antimicrobial use was 70.9%.

The prevalence rate of antibiotic use was higher in males 442/577 (76.6%) than females 561/824 (68.1%).

There was wide use of antibiotics in neonates and intensive care units, 95.8% and 84.8% respectively than any other wards in the survey.

*Table 1: Sociodemographic prevalence of Antibiotic use*

| | Patient Characteristics | Total No of patients(n) | No of patients on Antibiotics | Prevalence of Antibiotic use (%) | p-Value |
|---|---|---|---|---|---|
| Sex | Male | 577 | 442 | 76.6 | Pr = 0.001 |
| | Female | 824 | 561 | 68.1 | |
| Total | | 1401 | 1003 | | |
| Age group | Neonates | 143 | 137 | 95.8 | Pr = 0.000 |
| | Infants | 151 | 128 | 84.8 | |
| | Young child | 63 | 45 | 71.4 | |
| | Child | 52 | 31 | 59.6 | |
| | Adolescent | 82 | 52 | 63.4 | |
| | Adult | 765 | 512 | 66.9 | |
| | Eldely | 145 | 98 | 67.6 | |
| Total | | 1401 | 1003 | | |

# Results cont'

Three most predominantly prescribed antibiotics in the survey were metronidazole 20.9% (n=334), benzyl penicillin 15.3% (n=245), ceftriaxone 14.0% (n=224).

The prevalence of directed prescription in the survey was 2.5% (n=41) while empirical prescription was 97.5% (n=1612).

The shortest duration of treatment was one day 1.5% (n=26) with benzyl penicillin, gentamycin, and ceftriaxone as the anti-infectives of choice.

The longest observed duration of treatment was greater than 40 days 0.2% (n=3) with ceftriaxone, ciprofloxacin, and doxycycline as the antibiotics prescribed.

Patients records that did not indicate duration of therapy was 69.2% (n=694) with benzyl penicillin, metronidazole, and ceftriaxone as the most antibiotics with missing duration of treatment.

*Table 2: Prevalence of directed versus empirical prescribing*

| ANTIBIOTICS | Directed (D) | Empirical (E) | D+E | D% | E% |
|---|---|---|---|---|---|
| Amikacin | 0 | 12 | 12 | 0.0 | 100.0 |
| Amoxycillin | 0 | 37 | 37 | 0.0 | 100.0 |
| Amoxycillin/Clavulanic acid | 0 | 2 | 2 | 0.0 | 100.0 |
| Ampicillin/Cloxacillin | 0 | 2 | 2 | 0.0 | 100.0 |
| Azithromycin | 2 | 42 | 44 | 4.5 | 95.5 |
| Benzathine penicillin | 0 | 1 | 1 | 0.0 | 100.0 |
| Benzyl Penicillin | 5 | 294 | 299 | 1.7 | 98.3 |
| Cefepime | 0 | 43 | 43 | 0.0 | 100.0 |
| Cefixime | 0 | 2 | 2 | 0.0 | 100.0 |
| Cefotaxime | 2 | 86 | 88 | 2.3 | 97.7 |
| Ceftazidime | 1 | 9 | 10 | 10.0 | 90.0 |
| Ceftriaxone | 4 | 219 | 223 | 1.8 | 98.2 |
| Cefuroxime | 0 | 3 | 3 | 0.0 | 100.0 |
| Cephalexin | 2 | 44 | 46 | 4.3 | 95.7 |
| Chloramphenicol | 1 | 15 | 16 | 6.3 | 93.8 |
| Ciprofloxacin | 7 | 157 | 164 | 4.3 | 95.7 |
| Clarithromycin | 0 | 3 | 3 | 0.0 | 100.0 |
| Cloxacillin | 1 | 71 | 72 | 1.4 | 98.6 |
| Co-trimoxazole | 1 | 46 | 47 | 2.1 | 97.9 |
| Doxycycline | 1 | 10 | 11 | 9.1 | 90.9 |
| Erythromycin | 0 | 4 | 4 | 0.0 | 100.0 |
| Gentamycin | 3 | 142 | 145 | 2.1 | 97.9 |
| Imipenem | 0 | 2 | 2 | 0.0 | 100.0 |
| Levofloxacin | 0 | 1 | 1 | 0.0 | 100.0 |
| Meropenem | 3 | 25 | 28 | 10.7 | 89.3 |
| Metronidazole | 8 | 326 | 334 | 2.4 | 97.6 |
| Nalidixic Acid | 0 | 2 | 2 | 0.0 | 100.0 |
| Nitrofurantoin | 0 | 6 | 6 | 0.0 | 100.0 |
| Phenoxymethyl penicillin | 0 | 2 | 2 | 0.0 | 100.0 |
| Vancomycin | 0 | 4 | 4 | 0.0 | 100.0 |
| **Total (n)** | **41** | **1612** | **1653** | **2.5** | **97.5** |
| **n= number of prescriptions** | | | | | |

# Result Cont'

The total number of participants on at least one antibiotic treatment was 845. Of this total number, 69% (n=583) were on two antibiotic treatment, 23.3% (n=197) were on three antibiotics, 5% (n=42) were on four antibiotics and lastly 1.3% (n=11) were on five antibiotics.

The average number of antibiotics prescribed per hospital stay was 2.0.

*Table 3: Antimicrobials prescribed to the patient since admission*

| | Number of antimicrobials prescribed to patient | | | | |
|---|---|---|---|---|---|
| **Name of Antibiotic** | **1** | **2** | **3** | **4** | **5** |
| | n (%) | n (%) | n (%) | n (%) | n (%) |
| Amikacin | 4(0.5) | 8(1.4) | 2(1.0) | 0(0.0) | 0(0.0) |
| Amoxycillin | 27(3.2) | 7(1.2) | 0(0.0) | 1(2.4) | 0(0.0) |
| Amoxycillin/Clavulanic acid | 1(0.1) | 0(0.0) | 0(0.0) | 1(2.4) | 0(0.0) |
| Ampicillin/Cloxacillin | 1(0.1) | 1(0.2) | 0(0.0) | 0(0.0) | 0(0.0) |
| Azithromycin | 16(1.9) | 18(3.1) | 9(4.6) | 1(2.4) | 0(0.0) |
| Benzathine penicillin | 0(0.0) | 1(0.2) | 0(0.0) | 0(0.0) | 0(0.0) |
| Benzyl Penicillin | 227(26.9) | 55(9.4) | 13(6.6) | 3(7.10 | 1(9.1) |
| Cefepime | 41(4.9) | 2(0.3) | 0(0.0) | 0(0.0) | 0(0.0) |
| Cefixime | 0(0.0) | 1(0.2) | 1(0.5) | 0(0.0) | 0(0.0) |
| Cefotaxime | 62(7.3) | 14(2.4) | 11(5.6) | 1(2.4) | 0(0.0) |
| Ceftazidime | 4(0.5) | 5(0.9) | 1(0.5) | 0(0.0) | 0(0.0) |
| Ceftriaxone | 158(18.7) | 30(5.1) | 28(14.2) | 6(14.3) | 2(18.2) |
| Cefuroxime | 2(0.2) | 0(0.0) | 1(0.5) | 0(0.0) | 0(0.0) |
| Cephalexin | 29(3.4) | 30(5.1) | 7(3.6) | 2(4.8) | 1(9.1) |
| Chloramphenicol | 4(0.5) | 9(1.5) | 3(1.5) | 0(0.0) | 0(0.0) |
| Ciprofloxacin | 92(10.9) | 37(6.3) | 27(13.7) | 8(19.0) | 0(0.0) |
| Clarithromycin | 0(0.0) | 3(0.5) | 0(0.0) | 0(0.0) | 0(0.0) |
| Cloxacillin | 36(4.3) | 28(4.8) | 8(4.1) | 0(0.0) | 0(0.0) |
| Co-trimoxazole | 24(2.8) | 10(1.7) | 12(6.1) | 1(2.4) | 0(0.0) |
| Doxycycline | 3(0.4) | 4(0.7) | 7(3.6) | 0(0.0) | 0(0.0) |
| Erythromycin | 1(0.1) | 2(0.3) | 0(0.0) | 1(2.4) | 0(0.0) |
| Gentamycin | 22(2.6) | 103(17.7) | 15(7.6) | 4(9.5) | 1(9.1) |
| Imipenem | 0(0.0) | 0(0.0) | 2(1.0) | 0(0.0) | 0(0.0) |
| Meropenem | 9(1.1) | 5(0.9) | 8(4.1) | 5(11.9) | 2(18.2) |
| Metronidazole | 79(9.3) | 207(35.5) | 40(20.3) | 6(14.3) | 2(18.2) |
| Nalidixic Acid | 0(0.0) | 0(0.0) | 1(1.0) | 0(0.0) | 1(9.1) |
| Nitrofurantoin | 1(0.1) | 2(0.3) | 1(1.0) | 0(0.0) | 0(0.0) |
| Phenoxymethyl penicillin | 2(0.2) | 0(0.0) | 0(0.0) | 0(0.0) | 0(0.0) |
| Vancomycin | 0(0.0) | 1(0.2) | 0(0.0) | 2(4.8) | 1(9.1) |
| **Total (n)** | **845** | **583** | **197** | **42** | **11** |
| **%** | **100.0** | **69.0** | **23.3** | **5.0** | **1.3** |

# Conclusion

Patterns of AMU noted in the study:

- High prevalence of antibiotic use (70.9%)
- High prevalence of empirical prescription of antibiotics (97.5%)
- Missing duration of treatment of antibiotics (69.2%)
- Missing indications for treatment of antibiotics

Based on the survey findings, it is recommended that Medicines Therapeutic Committees (MTCs) working with subcommittees such as the Antimicrobial Stewardship Committees (AMSCs) should develop strong surveillance systems and ensure compliance to STGs and other relevant documents (EML-AWaRe) in clinical practice in addition to introducing periodic clinical audits (PPS, prescription audits) in respective hospitals to enhance patient outcomes.

# Thank you all for your attention