P-2593

Benchmarking hospital antibiotic use in ten countries: comparing OBSERVED vs EXPECTED empiric use based on the WHO AWaRe book

Myo Maung Maung Swe[1,2], Ines Pauwels[3,4], Erika Vlieghe[3,5] , Ann Versporten[3,4], Michael Sharland [6], Ben S. Cooper[1,2], Cherry Lim[1,2] , ADILA Consortium and the Global PPS network

[1] Centre for Tropical Medicine and Global Health, Nuffield Department of Medicine, University of Oxford, [2] Mahidol Oxford Tropical Medicine Research Unit, Faculty of Tropical Medicine, Mahidol University – Bangkok (Thailand), [3] Global Health Institute, Department of Family Medicine and Population Health, Faculty of Medicine and Health Science, University of Antwerp – Antwerp (Belgium), [4] Laboratory of Medical Microbiology, Vaccine & Infectious Disease Institute, Faculty of Medicine and Health Science, University of Antwerp – Antwerp (Belgium), [5] Department of General Internal Medicine, Infectious Diseases and Tropical Medicine, University Hospital Antwerp, Antwerp, Belgium, [6] Centre for Neonatal and Paediatric Infection, St. George's School of Health and Medical Sciences, City St George's University of London.

Background

Expected levels of antibiotic use (AMU) in hospitals vary with patient characteristics and local resistance patterns. We compared observed empiric antibiotic use in ten countries (Brazil, Guatemala, India, Iran, Mexico, Montenegro, Nigeria, Philippines, Russian Federation and Zambia) with expected use if hospital treatment followed the WHO AWaRe (Access, Watch, Reserve) antibiotic book's guidance.

Methods

- We developed a decision tree model for empiric antibiotic treatment in hospital settings for ten infection syndromes and surgical prophylaxis based on the WHO AWaRe book.
- Input data: disease diagnosis and case severity (proportion of patients admitted to ICU or patients on parental antibiotics) from the Global Point Prevalence Survey (Global-PPS) and country-specific antimicrobial resistance (AMR) data from the WHO GLASS AMR dashboard, literature and the Global Research on Antimicrobial Resistance (GRAM) study.
- We performed a probabilistic analysis by sampling key input parameters from their respective probability distributions in each model iteration. The model was run 1000 times to derive uncertainty of the estimates. Two scenarios were analysed, each varying assumptions about case severity. In scenario 1, severe cases were defined by ICU admission. In scenario 2, severe cases were those treated with at least one parental antibiotic. In both scenarios, a high prevalence setting for ESBL was defined as local ESBL prevalence (proportion of ESBL producing *Escherichia coli* among bloodstream infection with *E. coli*) exceeding 20%. In such cases, the recommended broad-spectrum antibiotics (e.g., meropenem) are expected to be used empirically in high risk or severe cases of indicated clinical infections (intra-abdominal infection, febrile neutropenia, sepsis) in accordance with the guidelines outlined in the AWaRe book.
- Carbapenems are classified as the "High Watch" category, whereas all other antibiotic classes within the Watch group are classified as "Low and Medium Watch".

Figure 1. Lollipop markers represent the observed usage, while the ridgeline plots illustrate the distribution of expected usage on the day of point prevalence survey.

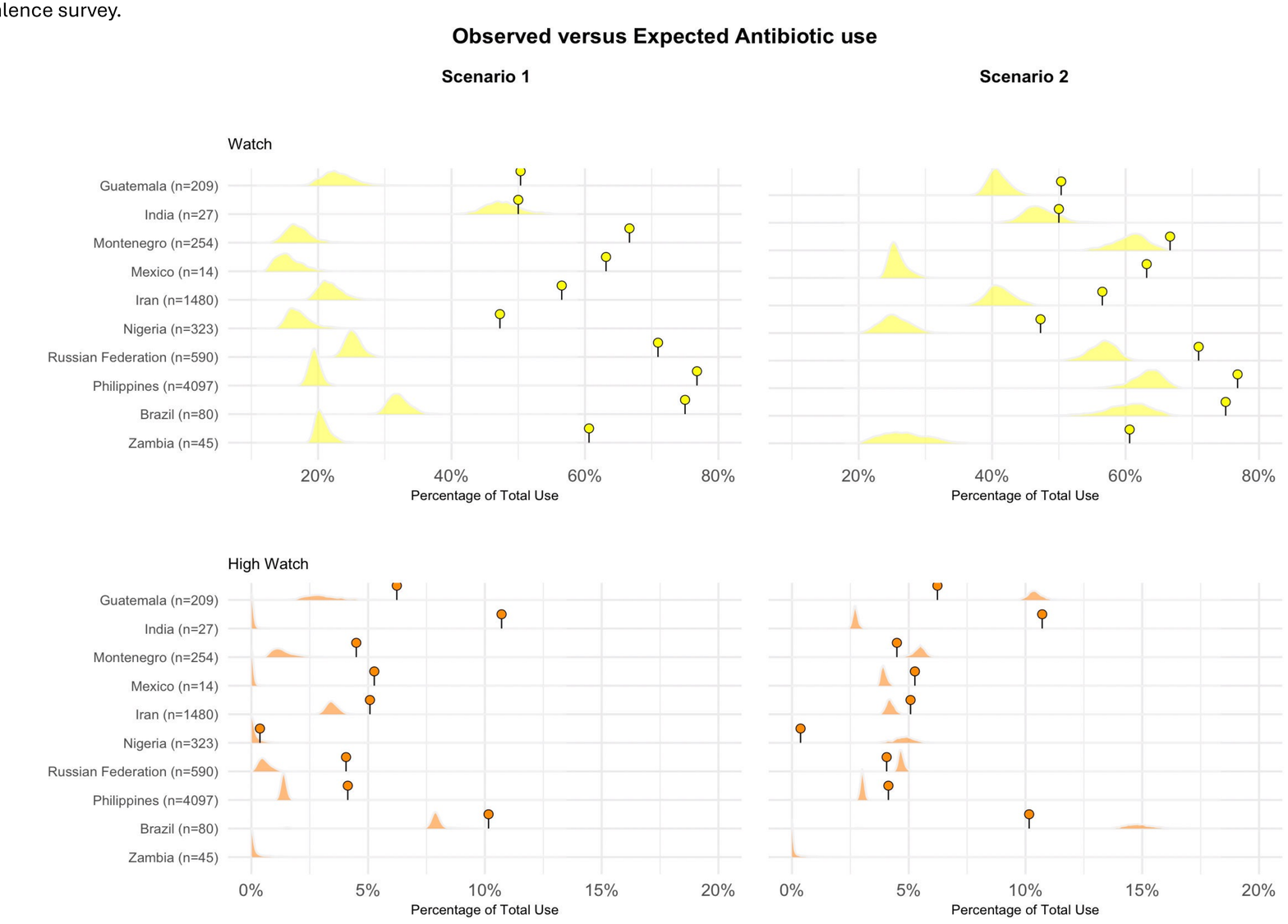
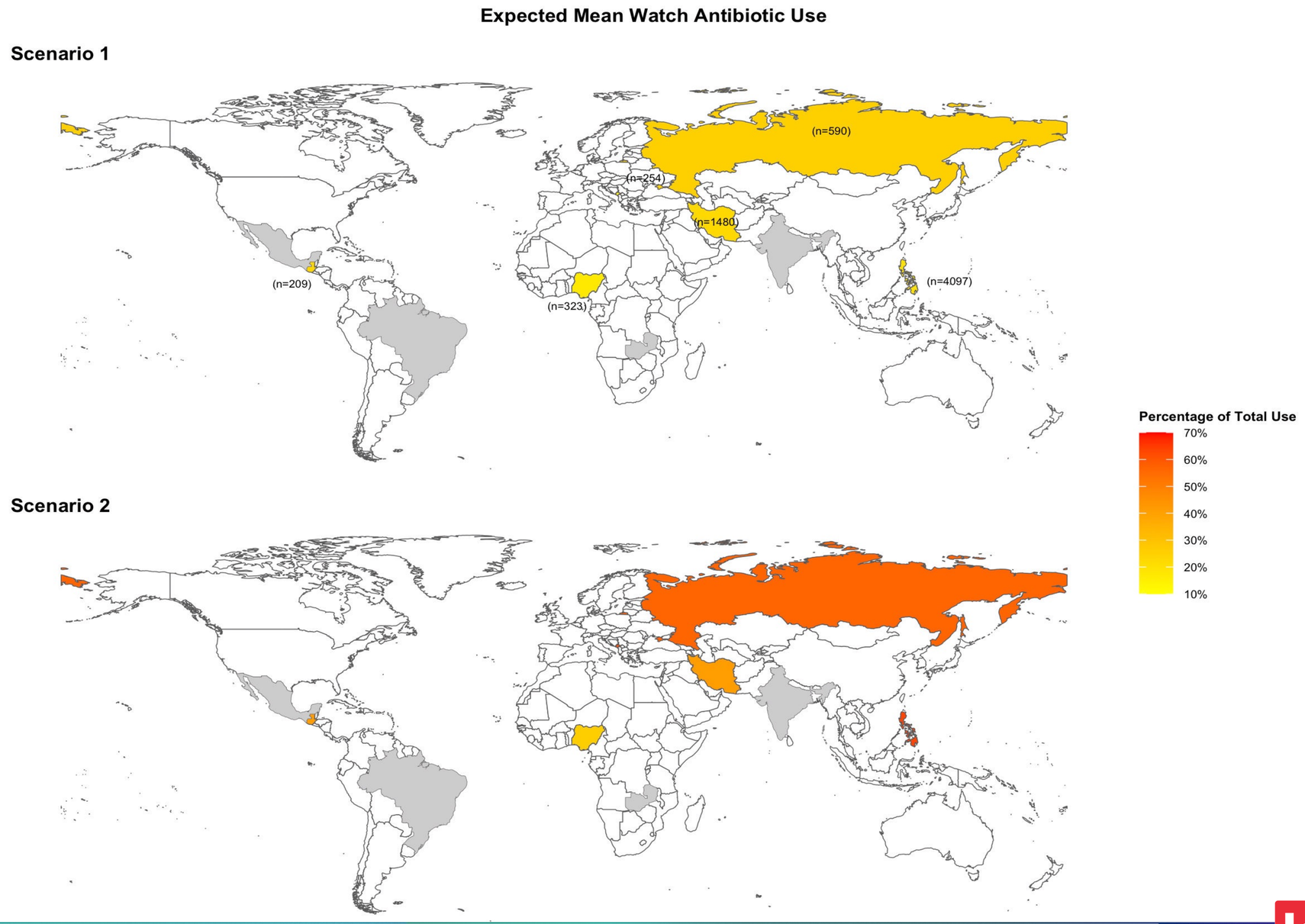


Figure 2. The estimated mean percentage of "Watch" antibiotic use across ten countries. These percentages are calculated based on total expected use in Defined Daily Doses (DDD). The numbers within each country indicate the number of inpatients included in the analysis. The assumptions for scenario 1 and scenario 2 are consistent with those outlined in the methods section. Countries with fewer than 100 patients are shown in grey and expected use are not reported in the map.



Results

- **7119** adolescent and adult inpatients from **101 hospitals** across ten countries for the year 2021 were included in the analysis.
- Observed ***Access*** antibiotic use ranged between 21% of total use in Brazil and 52% in Nigeria.
- Observed ***Watch*** antibiotic use ranged between 46 % in Nigeria and 77 % in Philippines.
- Observed ***High Watch*** antibiotic use was the lowest in Nigeria (< 1 %) and the highest in India (11 %).
- Observed ***Reserve*** antibiotic use constituted < 10% of total use in all countries.
- In scenario 1, both ***Watch*** and ***High Watch*** antibiotic use are expected to be lower than the observed use in most countries except Brazil, Guatemala and India.
- In scenario 2, expected use of both ***Watch*** and ***High Watch*** antibiotic were substantially increased compared to the scenario 1, but lower than the observed use in most countries.
- Observed use of ***High Watch*** antibiotic was lower than the expected use in Guatemala, Montenegro, Russian Federation, Brazil and Nigeria in scenario 2.

Conclusion

- Our model which benchmark empirical antibiotic use in hospitals against WHO guidance , found that observed use of ***Watch*** and ***High Watch*** antibiotics were higher than expected in most countries under both scenarios.
- Limitations: The observed data and expected antibiotic use estimates in Brazil, India, Mexico and Zambia are based on data fewer than 100 inpatients, which may impact reliability of the findings in those countries.

Please scan to visit ADILA website

The ADILA project is funded by the Wellcome Trust (222051/Z/20/Z).