GLOBAL POINT PREVALENCE SURVEY

Impact and Value

2023 EDITION

www.global-pps.com

*The **prudent use of antimicrobials** is a key pillar in the fight against antimicrobial resistance (AMR). Every country in the world must be mobilized to combat this rising pandemic.*

*One of the first steps for healthcare institutions is to assess the situation in their own setting by **measuring antimicrobial use and resistance** in order to raise awareness on areas of improvement of local prescribing behaviours.*

*This document presents the Global Point Prevalence Survey, its facilitating methodology and a selection of recent peer-reviewed publications. These papers demonstrate the **impact and value the Global-PPS can bring to healthcare institutions around the** world by supporting the effective implementation of Antimicrobial Stewardship interventions to **improve appropriate antimicrobial prescribing.***

*The document also illustrates the growing success of this **visionary Global-PPS tool initiated in 2013.***

*We hope that this document will be a useful, informative resource to **encourage new participants to join the growing community of Global-PPS participants** (now over 1,000 institutions) and to support healthcare professionals in their pursuit of optimal antimicrobial prescribing practices.*

WHAT IS THE GLOBAL-PPS?

- The Global Point Prevalence Survey of Antimicrobial Consumption and Resistance (Global-PPS) provides a **standardized method** for measuring and monitoring the quality of antimicrobial prescribing practices, the burden of Healthcare-Associated Infections (HAI) and antimicrobial resistance in institutions worldwide.
- The Global-PPS offers a **simple, freely available web-based tool** for data collection that ensures quality assurance through a validation process. Participants build their own database which is automatically enriched with additional variables to facilitate their own data analysis.
- The Global-PPS provides unique **real-time feedback reports** including detailed prevalence on the institutions' own antimicrobial prescribing practices as well as benchmarking figures for the country and region.
- The Global-PPS is adaptable and suitable for different healthcare settings. As such, it has established a **global network of institutions** conducting point prevalence surveys in more than 90 countries.
- The Global-PPS is instrumental in **planning and supporting local and national stewardship interventions** in a wide range of resource and geographical settings.
- The Global-PPS is led by the Laboratory of Medical Microbiology at the **University of Antwerp**, Belgium. The main coordinators are **Prof. Herman Goossens, Prof. Erika Vlieghe**, Ann Versporten and Ines Pauwels.

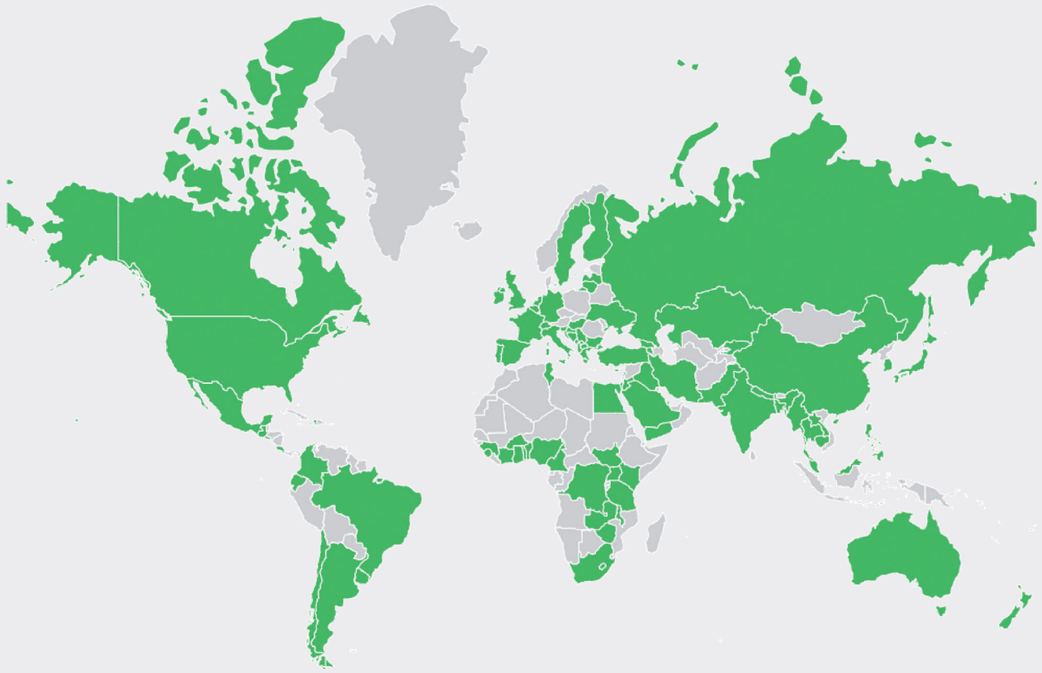
Professor Herman Goossens
Global-PPS Founder
Emeritus Professor
of Medical Microbiology

Professor Erika Vlieghe
Global-PPS Lead Investigator
Professor of Infectious Diseases

Ann Versporten
Global-PPS Coordinator

Ines Pauwels
Global-PPS Coordinator

A GLOBAL NETWORK



>500,000 patients

>1,300 institutions

>90 countries

>50 publications

"Our main objective is to support institutions implementing tailor-made antimicrobial stewardship interventions while sharing knowledge on antimicrobial prescribing and resistance globally."

Ann Versporten, Global-PPS Coordinator, Antwerp University, Belgium

HOW DOES THE GLOBAL-PPS WORK?

- Participating centers conduct a **"one-day" cross-sectional PPS** by collecting data for hospitalized patients receiving at least one antimicrobial agent at 8:00 am on the day of survey.
- Data are preferably **collected on paper forms**, and then **entered into a database** using the Global-PPS web-based application for data entry, validation and reporting.
- The Global-PPS **currently offers 3 survey periods a year** (January-April, May-August, September-December). Institutions are free to participate in one, two or all three surveys.
- The Global-PPS data collection protocol offers:
  - **the basic version of the PPS** for surveillance of antimicrobial use, HAI and antimicrobial resistance, as well as surveillance of COVID-19 patients;
  - **the full version of the PPS**, which includes an optional HAI module for more in-depth surveillance of use of invasive devices and measuring of multimorbidity burden.

WHAT KIND OF FEEDBACK WILL I GET?

- After data entry and validation, the hospital is able to **immediately download automated, real-time feedback reports** which can be used for local communications and presentations.
- **Institution-specific antimicrobial use** can be compared with national and regional benchmark figures.
- Prevalence data on several **antimicrobial quality indicators**, HAI and resistance are provided.
- The **WHO Access, Watch, Reserve (AWaRe) classification** is used to visualize antibiotic prescribing patterns.
- Institutions can **extract their own data in an Excel file** at any time for more in-depth analysis.

WHAT ARE THE FACILITATING FEATURES OF THE GLOBAL-PPS?

- **Standardized protocol** to collect valid and comparable data on the quality of antimicrobial prescribing and HAI.
- **Free, simple, web-based tool** requiring minimal training and guaranteeing a quality approach for data entry, validation and feedback reporting.
- **Possibility to centralize data entry** for a network of institutions.
- **Free central support and training** from dedicated Global-PPS team.
- **Secured data confidentiality**. The data remains the property of the institution. The participant adds anonymized data to its own database via repeated Global-PPS.
- **Minimal resource investment for maximum impact.**

HOW WILL THE GLOBAL-PPS HELP CHANGE PRACTICE IN MY INSTITUTION?

Identify the burden

- Evaluate **antimicrobial prescribing practices** and **survey performance indicators** in your institution through **real-time feedback reports** and meaningful comparisons.

Change antimicrobial prescribing practices

- Identify **targets for quality improvement** of antimicrobial prescribing and the prevention of HAI.
- Design **tailor-made AMS interventions** informed by Global-PPS results.

Measure impact and improve

- Assess the **effectiveness of AMS interventions** and improve changes in your institution through regularly repeated Global-PPS.
- Stimulate local **multidisciplinary communication, engagement and networking** with other Global-PPS participants.

READY TO JOIN US?

It couldn't be easier!

Enroll at www.global-pps.com
or CLICK HERE

WANT TO LEARN MORE?

- Visit the **Global-PPS website** at https://www.global-pps.com/
- Access >50 **Global-PPS publications** listed by region/year at https://www.global-pps.com/peer-reviewed-articles/
- Check out the regular **Global-PPS Training Webinars** at https://www.global-pps.com/events/
  In these interactive webinars, the aims and methodology of the Global-PPS as well as examples of successful AMS interventions are discussed.
- Read the **Global-PPS Newsletter** at https://www.global-pps.com/newsletters/

TRANSPARENCY DECLARATION

bioMérieux is the sole industrial partner of the Global Point Prevalence Survey. The company has no role in the study design, data collection, data analysis, data interpretation or in writing the report which is the sole and exclusive responsibility of the University of Antwerp.

Data are strictly confidential and stored anonymously at the coordinating center of the University of Antwerp. bioMérieux has no access to the data collected, nor does the University of Antwerp disclose hospital names to any third party, including bioMérieux.

GLOBAL-PPS
TESTIMONIALS

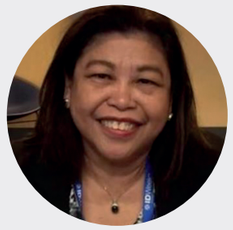
GLOBAL-PPS in a "Doctors without borders" (MSF) Hospital in Bentiu, South Sudan

Dr. Kate Clezy, Infectious Disease Specialist, Antimicrobial Resistance and Infectious Diseases Advisor for MSF Holland

Our ultimate goal is to make sure that the doctors working in LMIC are well informed and are able to use antibiotics optimally when treating patients.
The results of the Global-PPS can be very helpful when planning improvements in prescribing.

When we conducted the first survey in Bentiu, only a minority of diagnoses were documented in patient records. Thanks to repeated Global-PPS, documentation really improved over the years. This is important because if you improve documentation of diagnostic indicators, then you improve handover to your colleagues.

GLOBAL-PPS experience within the Philippines Network



Dr. Mari Rose De los Reyes, Infectious Disease Specialist at the Research Institute for Tropical Medicine (RITM) in Manila, the Philippines

We have been using the Global-PPS protocol since 2017 and over time adapted it to our own local setting. We encode our data in the Global-PPS database, which is based in Antwerp and we find it very useful and sustainable. Being part of the Global-PPS network, we get individualized hospital results within the Philippines and can compare our national data with other regions.

Through the repeated Global-PPS, we can monitor the trend of antimicrobial prescribing and other quality indicators useful for the implementation of our national AMS program. We can use this to develop policies, both for hospitals and on a national level.

▸ The Global-PPS is endorsed by multiple Global Health organizations and recognized for its contribution to antimicrobial stewardship and public health.
Consult the list at **https://www.global-pps.com/supporting-organisations/**

Implementing GLOBAL-PPS in the Democratic Republic of Congo

Dr. Mudji E'Kitiak Junior, Global-PPS Coordinator for the Vanga Evangelical Hospital with staff at the Vanga Evangelical Hospital

Our 4-point Global-PPS action plan:
- develop a local antibiotic policy and oversee its implementation,
- develop a cleaning program in the hospital,
- retrain staff and patients in hand washing,
- repeat the Global-PPS process.

For a long time, the overuse and inappropriate use of both antibiotics and antimalarial drugs has been observed.
To address this situation, I first had to document the current situation through the collection of antimicrobial use data.
I went to the internet and searched for ways to address this problem. Fortunately, I discovered the Global-PPS, a tool that offered exactly what I was looking for and which would help to measure the effectiveness of any future intervention.

Together with my team, we discussed the process of the Global-PPS. We practiced three times before we started the real data collection. Each of the exercises helped us to identify potential problems. We discussed them with the Global-PPS team in Belgium. They responded very quickly and helped us solve all the difficulties we encountered. After data collection, I entered the data on the online application for data entry. I immediately received the final report. It was a good experience for me and my team.

▸ Read more Global-PPS testimonials at **https://www.global-pps.com/news/**

GLOBAL-PPS TIMELINE

2006

As part of the **ESAC-PPS project**, the University of Antwerp developed an in-house **web-based PPS.**

2011

As part of the **ARPEC-PPS project**, the University of Antwerp developed a simple PPS methodology to **survey hospitalized children and neonates**. Together with the ESAC-PPS, it was a precursor for the Global-PPS methodology.

2013

At the **4th edition of the World Forum on HAI and Antimicrobial Resistance**, bioMérieux committed to fund the University of Antwerp to develop a worldwide standardized PPS on antimicrobial use and resistance.

2014

- The Global-PPS protocol, web-based resource and website were developed.
- **A pilot Global-PPS** was successfully conducted in 33 hospitals worldwide.

2015

- **First worldwide Global-PPS** and establishment of a global network for PPS.
- Up to **335 hospitals in 53 countries** took part in the first Global-PPS.
- **First real-time feedback report** implemented.

2016

ECCMID 2016: Presentation of 18 posters and an oral presentation on the Global-PPS.

2017

- **Second worldwide Global-PPS** conducted in **391 hospitals in 51 countries**.
- Global-PPS publishes **first paper** on difference in quality of prescribing between antibacterials and antifungals.

2018

- New option to participate in up to 3 surveys a year.
- **ECCMID 2018:** Presentation of 25 posters.
- Global-PPS team publishes **key paper** on worldwide 2015 Global-PPS results in the **Lancet Global Health.**
- Four other papers published.

2019

- **Optional HAI module** added to collect data on invasive device use and other HAI risk factors.
- **Global-PPS website updated** and translated into 6 languages.
- Seven papers published.

2020

- Global-PPS protocol adapted to survey **COVID-19 patients.**
- **Real-time feedback report** enhanced.
- Fourteen new papers published.

2021

- **Tutorial videos** created to guide hospitals in using the Global-PPS tool.
- Global-PPS team publishes **2 major papers** on Global-PPS results.
- Twenty other scientific papers published.

2022

- **Novel methodology to survey outpatients** in development.
- **>1,300 hospitals in >90 countries** participating or enrolled in Global-PPS.

ABBREVIATIONS & ACRONYMS

ARPEC: Antibiotic Resistance and Prescribing in European Children

ECCMID: European Congress of Clinical Microbiology and Infectious Diseases

ESAC: European Surveillance of Antimicrobial Consumption

HAI: Healthcare-associated infections

SELECTION OF GLOBAL-PPS PUBLICATIONS

GENERAL GLOBAL-PPS PUBLICATIONS (UNIVERSITY OF ANTWERP / GLOBAL-PPS NETWORK)

BASELINE STUDIES

IMPACT STUDIES

GLOBAL POINT PREVALENCE SURVEY
METHODOLOGY

- Participating institutions must **set a time frame** to perform the point prevalence survey. Each inpatient ward needs to be surveyed only once, on a single day within this time frame.
- Institutions participating for the first time are encouraged to **survey the entire institution**. Institutions that have previously participated may also survey a subset of wards (e.g. **all** surgical wards, **all** pediatric medical wards,...).
- On the survey day, all records for inpatients occupying a bed at 8:00 am are audited and antimicrobial prescriptions are recorded. Admitted patients are counted in the **denominator**. Patients on antimicrobial agents at 8:00 am on the day of the survey are counted in the **numerator**.
  - **For each patient on antimicrobial agents**, the following information is recorded: age, sex, weight, biomarker information and whether cultures were sent to the lab.
  - **For each antimicrobial prescription**, information is collected on the antimicrobial agent, administration start day, dose, route of administration, indication for treatment (anatomical site of infection) and indication for therapy (community- or healthcare-associated infection; medical or surgical prophylaxis).

    The following quality indicators are recorded for every prescription: reason for antimicrobial prescription and stop/review date recorded in notes, adherence to local guidelines and whether the treatment was empirical or targeted. For targeted prescriptions it is possible to record the pathogens and their respective resistance types.
- Data are then entered into a **web-based application** that helps institutions validate their data using several built-in validation mechanisms.
- Global-PPS provides an **automated feedback report** for each participating institution. These reports show the institution's Global-PPS results in a set of graphs and tables, along with benchmarking results at the level of the country and the region.

General GLOBAL-PPS Publications

(University of Antwerp / Global-PPS Network)

CLICK TO ACCESS ARTICLE

ANTIMICROBIAL RESISTANCE AND INFECTION CONTROL
2021;10(1):138

Assessing the impact of the Global Point Prevalence Survey of Antimicrobial Consumption and Resistance (Global-PPS) on hospital antimicrobial stewardship programmes: results of a worldwide survey.

Pauwels I, Versporten A, Vermeulen H, Vlieghe E, Goossens H.

OBJECTIVE

This study aimed to (i) evaluate the impact of the Global-PPS on local antimicrobial stewardship (AMS) programs, (ii) pinpoint barriers to AMS implementation in different resource settings, and (iii) identify the learning needs of healthcare professionals involved in AMS who used the Global-PPS to support hospital AMS programs.

STUDY DESIGN

A cross-sectional survey on AMS was sent to members of the Global-PPS network. The survey comprised 24 questions relating to:

- changes to the structure and components of hospital AMS programs following participation in the Global-PPS;
- comprehensiveness and usefulness of the report generated by the Global-PPS automated feedback function and which report items were considered most important in their setting;
- barriers to AMS implementation and specific AMS-linked learning needs of local teams.

Responses were collected from February to May 2019. To analyze data, countries were grouped into the 2019 World Bank income classes and appropriate statistical analysis was performed.

RESULTS

- A total of 248 hospitals participated in the study, of which 192 (77.4%) had participated in at least one Global-PPS (**Figure 1**). This corresponded to an estimated response rate of 25% (192/765). Of those 192 hospitals, 81.8% had used the personalized Global-PPS feedback report.
- The majority of respondents were tertiary referral centers (65.7%) and teaching hospitals (79.4%). High-income countries accounted for 33.1% of responses; upper middle-income and lower middle-income countries represented 35.1% and 28.2%, respectively; 3.6% of responses came from low-income countries.
- The most common problems identified through this report were high relative use of certain antibiotic classes (62.0%), prolonged surgical antibiotic prophylaxis (60.9%), and a high antimicrobial use prevalence (60.4%). Importantly, of the 63 hospitals that conducted a follow-up Global-PPS, 54 (85.7%) reported an improvement in one or more of the prescribing-related problems identified earlier (**Figure 2**).
- Up to 43.1% of responding hospitals reported having a formal antimicrobial stewardship strategy, ranging from 10.8% Africa to 60.9% in North America. A further 29.7% of hospitals were planning to develop an AMS strategy. There were less local evidence-based prescribing guidelines in African hospitals than in other regions.
- Of the 179 hospitals that had participated in Global-PPS and had ongoing AMS activities, up to 69.3% reported that at least one of these activities had been initiated as a result of Global-PPS findings. The Global-PPS was mostly used in educational activities (50/98) and in informing the development or review of guidelines (67/143).
- A high percentage of respondents (86.4%) said that they educated clinicians on appropriate prescribing (ranging from 71.1% in Africa to 93.4% in Europe). **Table 1** shows which educational activities on AMS would best support AMS efforts in high- and low- and middle-income countries.
- The barriers to implementing AMS programs in high- and low- and middle-income countries are shown in **Table 2**. Three elements were predominant and shared globally: time to work on AMS activities (52.7%), knowledge on good prescribing practices (42.0%), and dedicated funding for the AMS program (39.9%).
- Significant regional differences were also noted. Hospitals in low- and middle-income countries were more often confronted with unavailability of prescribing guidelines (35.6% vs. 7.5%; $p<0.001$), insufficient laboratory capacity (35.0% vs. 12.5%; $p<0.001$), and suboptimal use of available laboratory services (21.5% vs. 2.5%; $p<0.001$) compared to high-income countries. In high-income countries, a lack of information technology to support antimicrobial prescribing was more frequently identified as a barrier compared to low- and middle-income countries (46.3% vs. 22.1%; $p<0.001$).

Figure 1: Countries that participated in the antimicrobial stewardship survey.
Reproduced from Pauwels I, *et al. Antimicrob Resist Infect Control*. 2021;10(1):138. Creative Commons licence - CC BY 4.0.

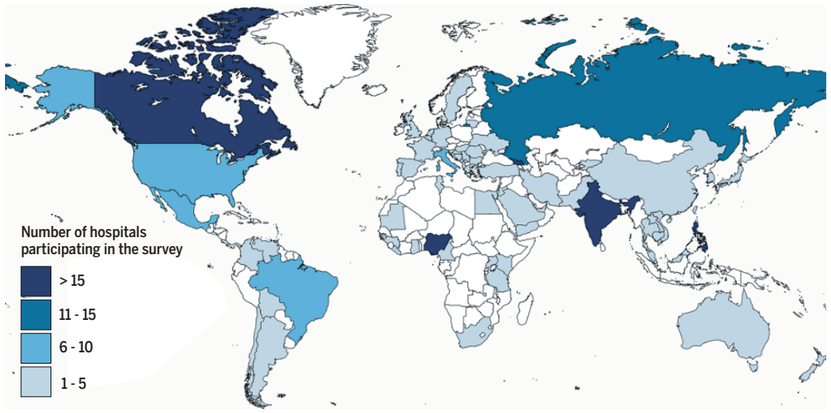


Figure 2: Problems concerning antimicrobial prescribing identified through Global-PPS (% of hospitals).
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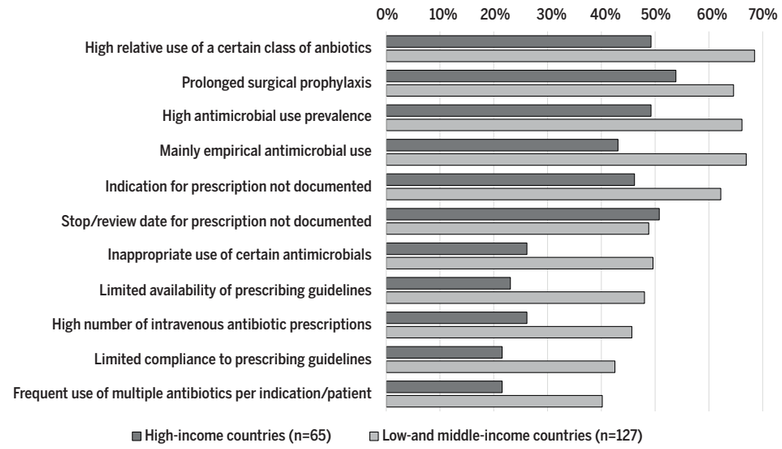

CONCLUSIONS

A substantial variation in hospital AMS programs and barriers to implementation of AMS across regions and income levels globally were revealed. The study showed how participation in the Global-PPS can contribute to hospital AMS activities, both in high- as well as low- and middle-income settings.

"The results from a survey in 248 hospitals from 74 countries show that the Global-PPS has been very useful in informing and evaluating stewardship activities in many of the participating hospitals."

KEY FINDINGS

- By providing participating hospitals with a personalized feedback report, the Global-PPS helps local teams to identify AMS targets without investing time and resources in complex data analyses.
- There are substantial regional variations in the percentage of hospitals that have a formal AMS program, and in the degree of implementation of AMS components.
- Organizational factors, e.g., a lack of financial and human resources, continue to constitute important barriers to AMS implementation.

Table 1: Educational needs of participating hospitals.
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	n (%)			
	High-income countries (n = 76)	Low- and middle-income countries (n = 156)	Total (n = 232)	*P-value*† (α = 0.0036)
Optimising therapeutic antimicrobial use	43 (56.6)	105 (67.3)	148 (63.8)	0.147
Optimising surgical prophylaxis	38 (50.0)	91 (58.3)	129 (55.6)	0.290
Translating PPS results into AMS interventions	38 (50.0)	71 (45.5)	109 (47.0)	0.615
Communicating with prescribers	35 (46.1)	61 (39.1)	96 (41.4)	0.386
Managing difficult-to-treat MDRO* infections	25 (32.9)	71 (45.5)	96 (41.4)	0.091
Identifying the low-hanging fruit for AMS in the hospital	38 (50.0)	56 (35.9)	94 (40.5)	0.056
Translating PPS results into IPC** interventions	17 (22.4)	61 (39.1)	78 (33.6)	0.017
Formulating/revising guidelines	21 (27.6)	54 (34.6)	75 (32.3)	0.359
Performing audit and feedback	17 (22.4)	54 (34.6)	71 (30.6)	0.081
Understanding antimicrobial susceptibility data	15 (19.7)	55 (35.3)	70 (30.2)	0.024
How to create an active stewardship committee/team	9 (11.8)	41 (26.3)	50 (21.6)	0.019
How to communicate with patients on antimicrobial use	13 (17.1)	28 (18.0)	41 (17.7)	1.000
Other learning needs	1 (1.3)	2 (1.3)	3 (1.3)	1.000
None	2 (2.6)	0 (0.0)	2 (0.9)	0.106

*MDRO: multi-drug resistant organisms; **IPC: infection prevention and control †Statistical significance evaluated using the Pearson's chi-squared test or Fisher's exact test. Significance level (**α**) has been corrected for multiple testing

Table 2: Barriers to antimicrobial stewardship implementation.
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	n (%)			
	High-income countries (n = 80)	Low- and middle-income countries (n = 163)	Total (n = 243)	*p-value*† (α = 0.0026)
Lack of time to perform AMS activities	50 (62.5)	78 (47.9)	128 (52.7)	0.044
Lack of knowledge on good prescribing practices	28 (35.0)	74 (45.4)	102 (42.0)	0.160
Lack of funding for AMS programme	41 (51.3)	56 (34.4)	97 (39.9)	0.017
Lack of cooperation from prescribers	21 (26.3)	67 (41.1)	88 (36.2)	0.034
Lack of information technology	37 (46.3)	36 (22.1)	73 (30.0)	**<0.001**
Unavailability of prescribing guidelines	6 (7.5)	58 (35.6)	64 (26.3)	**<0.001**
Lack of qualified personnel	13 (16.3)	44 (27.0)	57 (23.5)	0.090
Lack of support from hospital management	14 (17.5)	40 (24.5)	54 (22.2)	0.282
Insufficient laboratory capacity	10 (12.5)	57 (35.0)	54 (22.2)	**<0.001**
Lack of expertise/training within the AMS team	13 (16.3)	32 (19.6)	45 (18.5)	0.644
Suboptimal use of laboratory services	2 (2.5)	35 (21.5)	37 (15.2)	**<0.001**
Lack of confidence in the hospital's IPC** processes	4 (5.0)	29 (17.8)	33 (13.6)	0.011
Lack of trust in prescribing guidelines	7 (8.8)	23 (14.1)	30 (12.4)	0.324
Regular shortages/stock outs of essential antibiotics	4 (5.0)	24 (14.7)	28 (11.5)	0.044
Patient demands	7 (8.8)	18 (11.0)	25 (10.3)	0.743
Poor quality of antibiotics	0 (0.0)	15 (9.2)	15 (6.2)	0.003
High cost of antibiotics	0 (0.0)	15 (9.2)	15 (6.2)	0.003
No barriers	5 (6.3)	1 (0.6)	6 (2.5)	0.016

†Statistical significance evaluated using the Pearson's chi-squared test or Fisher's exact test. Significance level (**α**) has been corrected for multiple testing. **Infection prevention and control
Values in boldface indicate statistical significance

CLICK TO ACCESS ARTICLE

JOURNAL OF ANTIMICROBIAL CHEMOTHERAPY
2021;76(6):1614-1624

Hospital antibiotic prescribing patterns in adult patients according to the WHO Access, Watch and Reserve classification (AWaRe): results from a worldwide point prevalence survey in 69 countries.

Pauwels I, Versporten A, Drapier N, Vlieghe E, Goossens H; Global-PPS network.

OBJECTIVE

The aim of this study was to analyze and visualize therapeutic and prophylactic AWaRe antibiotic use patterns in adult inpatients using data collected in the Global-PPS network. Moreover, the study examined for which indication common **Watch** antibiotics were prescribed globally.

STUDY DESIGN

Data on antimicrobial prescribing in hospitalized patients from the 2015, 2017, and 2018 Global-PPSs were analyzed.

Antibiotics were classified as **"Access", "Watch", "Reserve",** or **"Not recommended"** using the 2019 WHO AWaRe Classification Database; those not present on the list were recorded as **"Unclassified"**. The proportion of **Access, Watch, and Reserve** use was calculated as the number of prescriptions in each category divided by the total number of prescriptions and was stratified according to UN region/subregion/country and World Bank country income classification.

The five most prescribed antibiotics for therapeutic and prophylactic use are reported. To determine the relative use of **Access** and **Watch** antibiotics, **Access-to-Watch** ratios were calculated and expressed in relation to the overall country median.

For selected **Watch** (azithromycin, ciprofloxacin, ceftriaxone, vancomycin, and meropenem) and **Reserve** antibiotics, the most common indications for prescription are described. Finally, the proportion of **Reserve** antibiotics prescribed empirically is given.

RESULTS

- After excluding data on pediatric antibiotic use, the final dataset included 80,671 inpatients (106,105 prescriptions) treated in adult wards in 664 hospitals in 69 countries. Three hundred fifty-two (53.0%) hospitals were located in high-income, 144 (21.7%) in upper-middle-income, 141 (21.2%) in lower-middle-income, and 27 (4.1%) in low-income countries. Most institutions were tertiary hospitals (267; 40.2%). Pneumonia was the most common reason for antibiotic prescription (19.2%), followed by skin and soft tissue infections (9.8%), and intra-abdominal infections (7.0%).
- **Region-wise**, West and Central Asian hospitals prescribed the highest percentage of **Watch** antibiotics (66.1%) and the lowest Access percentage (28.4%) (**Figure 1**). In Europe, **Access** percentages varied between 30.2% in Eastern Europe and 55.2% in Northern European hospitals. The overall percentage of **Reserve** use was 2.0%, ranging from 0.03% in Sub-Saharan Africa to 4.7% in Latin America. The highest percentage of **not-recommended** antibiotics was seen in Northern Africa (2.3%).
- **Country-wise**, the highest **Access** percentages were observed in Sub-Saharan countries and the lowest were in Armenia (12.1%), Jordan (12.2%), and China (15.1%). **Watch** prescribing was high in Armenia (87.9%) and Jordan (84.4%), whereas the lowest percentages were reported by Guinea (32.1%), South Africa (37.7%), and the UK (39.5%). **Reserve** prescribing was highest in Argentina (12.6%), India (7.8%), and Brazil (7.1%). For several participating countries (Nigeria, Guinea, Togo, Laos, Kosovo, Kyrgyzstan, and Armenia) no **Reserve** prescriptions were reported. Most countries had an **Access-to-Watch** ratio lower than 1, with the median being 0.7 (IQR 0.5–0.9). Only in 9/43 countries, the **Access-to-Watch** ratio was higher than 1, corresponding to a higher proportion of Access compared to Watch antibiotics prescribed.
- The most commonly used antibiotic for therapeutic use on adult wards worldwide was ceftriaxone, ranging from 2.5% of therapeutic prescriptions in Northern Europe to 24.8% in Eastern Europe. For prophylactic use **Access** antibiotics were more commonly prescribed in almost all regions.
- The most common indications for selected **Watch** antibiotics are shown in **Table 1**. Their use differed between regions.
- Regarding **Reserve** antibiotics, linezolid was most commonly prescribed worldwide (29.9% of **Reserve** prescriptions); closely followed by colistin (27%). **Reserve** antibiotics were mainly used to treat pneumonia (26.2%), skin and soft tissue infections (12.9%), and intra-abdominal infections (10.5%). Empirical prescribing of **Reserve** antibiotics ranged from one-third to half of the prescriptions, with up to 53.0% in lower-middle-income countries, which likely indicates a lack of diagnostic capacity.

CONCLUSIONS

An important heterogeneity in AWaRe prescribing at the level of countries, regions, and income was observed. An analysis of the indications of some essential **Watch** antibiotics was enabled by the availability of prescription-level Global-PPS data.

GENERAL GLOBAL-PPS PUBLICATIONS

Figure 1: Proportions of AWaRe antibiotic use in adult inpatients by UN region.
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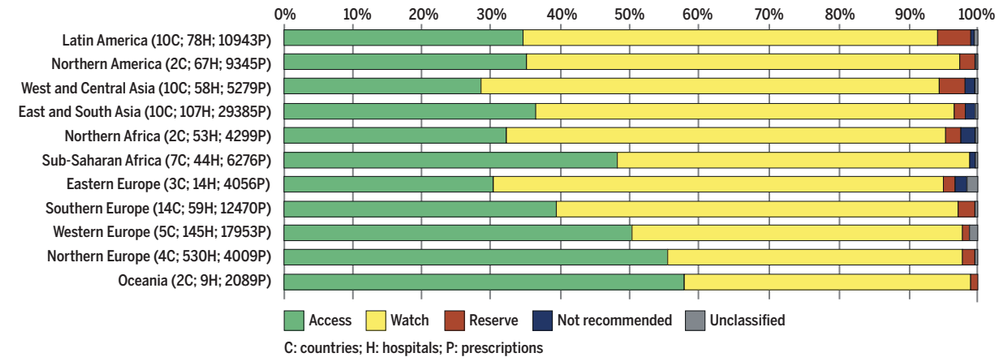

C: countries; H: hospitals; P: prescriptions

Figure 2: Proportions of AWaRe antibiotic use in adult inpatients by income level.
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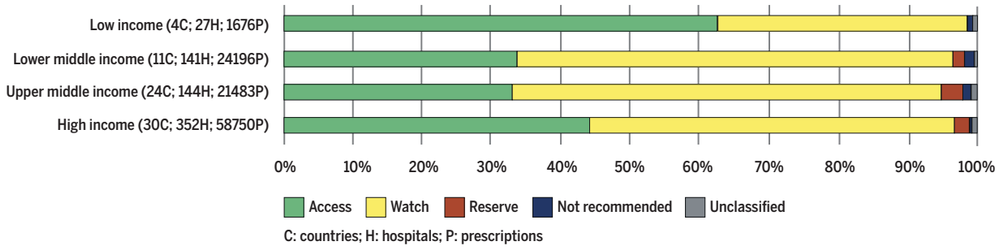


C: countries; H: hospitals; P: prescriptions

Table 1: Overall use of five Watch antibiotics and most common indications for treatment using them in adult inpatients.
Reprinted with permission from Oxford University Press. Supplementary Table S3, Pauwels I, *et al. J Antimicrob Chemother.* 2021;76(6):1614-1624. Copyright 2023.

Antibiotic	Total antibiotic use worldwide (%)	Region with the highest use (%)	Most common indication worldwide	Use for this indication (%)*
Ceftriaxone	13.3%	Africa (19.7%)	Pneumonia	20%
Ciprofloxacin	6.2%	Europe (8.2%)	Lower urinary tract infection	13.6%
Meropenem	4.3%	Asia (5.2%)	Pneumonia	27.9%
Parenteral vancomycin	3.7%	North America (8.1%)	Pneumonia	15.7%
Azithromycin	2.0%	North America (3.7%)	Pneumonia	54.5%

* percentage of total prescriptions for respective antibiotics that are being used for the most common indication.

"Although considerable interregional differences were observed, a large proportion of prescriptions for key Watch antibiotics were issued for indications other than those for which they were included in the Essential Medicine List."

KEY FINDINGS

- This was the first worldwide analysis of hospital AWaRe prescribing in adults.
- There are considerable differences in proportional use of **Access, Watch**, and **Reserve** antibiotics between regions and countries and between countries with low- versus middle- and high-income level.
- Important insights into the indications for the use of **Watch** antibiotics were gained.

Baseline Studies

These studies measure **the baseline of antimicrobial use** in institutions in different healthcare settings worldwide, enabling the definition **of tailor-made targeted AMS interventions.**

ANTIMICROBIAL RESISTANCE AND INFECTION CONTROL
2020;9(1):13

Point prevalence survey of antimicrobial use and healthcare-associated infections in Belgian acute care hospitals: results of the Global-PPS and ECDC-PPS 2017.

Vandael E, Latour K, Goossens H, Magerman K, Drapier N, Catry B, Versporten A; Belgian Point Prevalence Survey Study Group.

OBJECTIVE

The objective of this study was to present the main results of the second European Centre for Disease Control (ECDC)-PPS and Global-PPS of antimicrobial use and healthcare-acquired infections (HAIs) in acute care hospitals in Belgium.

STUDY DESIGN

Two cross-sectional studies, the ECDC-PPS and the Global-PPS, were simultaneously carried out in Belgian acute care hospitals in 2017.

Systematic sampling design was applied to include a representative sample of hospitals for the ECDC-PPS. All remaining hospitals were invited to participate in the Global-PPS.

ECDC-PPS data were imported in the Global-PPS tool to enable combined analysis and reporting of results. For the HAI component, results were reported separately due to different methodology. Several antimicrobial quality indicators were collected using the Global-PPS methodology only.

RESULTS

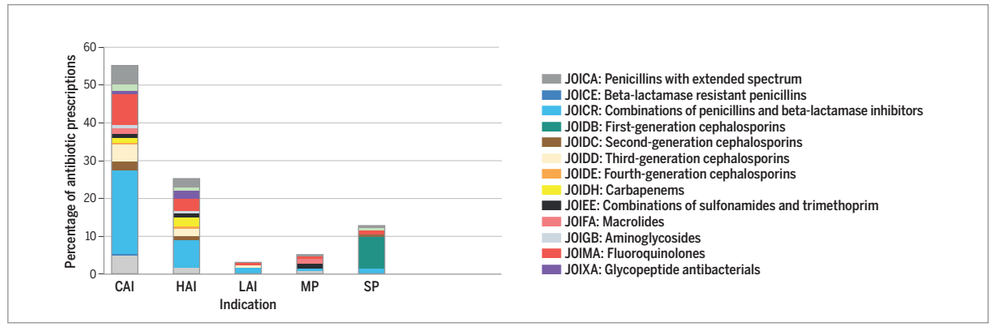
- A total of 110 acute care hospital sites participated in the Global-PPS and ECDC-PPS survey in 2017. The study included 28,007 patients, of whom 16,207 in the Global-PPS and 11,800 in the ECDC-PPS. More than 93% of patients surveyed were adults. The prevalence of patients on at least one antimicrobial was 27.1%; whilst 18.2% patients were treated with multiple antimicrobials.
- In the ECDC-PPS, the prevalence of patients with at least one HAI was 7.3% (95%CI 6.8–7.7%), of which pneumonia (21.6%) and urinary tract infections (21.3%) were the most frequently reported.
- Antimicrobials were prescribed most frequently for community-acquired infections (CAI) (51.7%), whilst 25.3% were prescribed for a healthcare-associated infection (HAI), 2.7% for an infection related to a long-term care facility (LAI), 5.9% for medical and 11.2% for surgical prophylaxis.
- Amongst all antimicrobials, 91.5% were antibacterials for systemic use. Penicillins with beta-lactamase inhibitors and fluoroquinolones were used most commonly for CAIs, HAIs, and LAIs. For medical prophylaxis, combinations of sulphonamides and trimethoprim were most used. First-generation cephalosporins (mainly cefazolin) were prescribed most frequently for surgical prophylaxis (**Figure 1**).
- The top three most frequent diagnoses treated with antibacterials were pneumonia (23.2%), lower and upper urinary tract infections (15.2%) and skin and soft tissue infections (11.9%).
- The reason for antimicrobial use was recorded for 81.9% and the stop/review date for 40.8% of the prescriptions. For antibiotic prescriptions, compliance with local antibiotic guidelines was 76.6%; for surgical prophylaxis, this compliance was 73.2%. The duration of surgical prophylaxis was a single dose in 35.1% of the cases, 1 day (multiple doses) in 39.7% and more than 1 day in 25.2%.

CONCLUSIONS

The overall prevalence of antimicrobial use and HAI, as well as most results for the antimicrobial quality indicators remained similar to those found in previous surveys. Local targets for improving antimicrobial prescription practices and reducing HAI rates should be set.

"...the number of patients who develop a HAI in Belgian acute care hospitals remains high. The reasons for these high rates of HAIs should be further investigated."

Figure 1: Percentage of antibiotic prescriptions per antibiotic subclass and indication as determined by the Global-PPS and ECDC-PPS in Belgium in 2017.



CAI = community-acquired infection, HAI = acute-hospital-acquired infection, LAI = infection acquired in long-term care facility or chronic-care hospital, MP = medical prophylaxis, SP = surgical prophylaxis. * sum of the % prescriptions CAI – HAI – LAI – MP – SP = 100%

KEY FINDINGS

- Overall, the degree of participation was high (81.4%) and comprised 28,007 inpatients. The overall antimicrobial use prevalence was 27.1%.
- High prescribing of fluoroquinolones is a concern and should be a target for intervention.
- Further improvements regarding antimicrobial quality indicator performance are needed to reach the targets established by the Belgian Antibiotic Policy Coordination Committee (90% by 2019 for all indicators).

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CANADIAN MEDICAL ASSOCIATION JOURNAL OPEN
2021;9(4):E1242-E1251

The 2018 Global Point Prevalence Survey of antimicrobial consumption and resistance in 47 Canadian hospitals: a cross-sectional survey.

German GJ, Frenette C, Caissy JA, Grant J, Lefebvre MA, Mertz D, Lutes S, McGeer A, Roberts J, Afra K, Valiquette L, Émond Y, Carrier M, Lauzon-Laurin A, Nguyen TT, Al-Bachari H, Kosar J, Peermohamed S, Science M, Landry D, MacLaggan T, Daley P, McDonald G, Ang A, Chang S, Lin YC, Tong B, Malfair S, Leung V, Katz K, Pauwels I, Goossens H, Versporten A, Conly J, Thirion DJG.

OBJECTIVE

The main objective was to describe antimicrobial usage based on patient-level data in Canadian hospitals collected as part of the Global-PPS in 2018. Furthermore, the study evaluated antimicrobial use against resistant organisms and practice appropriateness based on quality indicators for the three different regions (West, Central, Atlantic).

STUDY DESIGN

Between June and December 2018, Global-PPSs were performed in 47 Canadian hospitals, ranging from primary care to tertiary and specialized centers. They include 18% of Canadian acute care beds and are situated in 8 of 10 provinces.

RESULTS

- In 47 Canadian hospitals, data on 13,272 inpatients was reviewed, of whom 4,447 (33.5%) received antimicrobials, which varied from 26.4% in the Atlantic to 36.9% in the West region.
- The majority of antimicrobials were prescribed for therapeutic use (74.1%) and accounted for: 74.7% prescriptions in adults, 65.1% in children and 58.2% in neonates. In 39.4% of these cases, the prescribed antimicrobial was targeted, based on a microbiological result.
- A total of 29.6% of antimicrobials were prescribed to treat respiratory tract infections, 11.5% to treat urinary tract infections, and 11.0% to treat intra-abdominal infections.
- Regarding surgical prophylaxis (SP), single dose medication accounted for 37.9% of antibiotic prescriptions, whilst 31.1% was prescribed for more than 1 day.
- ~84% of antimicrobials prescribed were antibiotics: penicillins with β-lactamase inhibitors (19.1%), first-generation cephalosporins (13.4%), third generation cephalosporins (11.1%) and fluoroquinolones (10.7%). Last-line antibiotics were more commonly prescribed to treat healthcare-associated infections (**Figure 1**).
- Overall, a diagnosis or indication was documented for 87.3% of prescriptions; 62.9% of antimicrobials had a stop or review date; and 72.0% of prescriptions were guided by local guidelines. In the Atlantic region however, local guidelines were not available in 52.8% of antimicrobial prescriptions.
- The most frequent reported multidrug-resistant organism was methicillin-resistant *Staphylococcus aureus* (MRSA) in 5.6% of patients receiving MRSA treatment.

CONCLUSIONS

The study provided valid and reliable information on antimicrobial prescribing practices in participating Canadian hospitals and revealed that these were similar to those previously published in Canada. Canadian hospitals should be further incentivized to create and adapt local guidelines on the basis of recent antimicrobial resistance data.

"Future areas of consideration could include the use of more detailed diagnostic codes, graded appropriateness and collection of data regarding allergies to antimicrobials."

Figure 1: Top 15 antimicrobials used to treat community- or healthcare-acquired infections.
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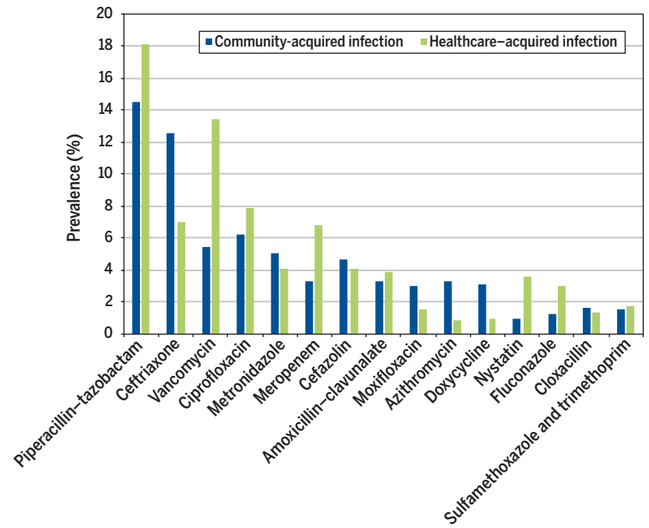

KEY FINDINGS

- Differences were observed between regions with respect to the quantity and quality of antimicrobial prescribing with lowest antimicrobial prevalence seen in the Atlantic region and highest in the West region.
- Future Global-PPS should be performed across Canadian hospitals to evaluate the impact of existing antimicrobial stewardship interventions on trends in antimicrobial prescribing.

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TROPICAL MEDICINE AND INFECTIOUS DISEASE
2022;7(5):75

Antimicrobial Prescribing Patterns in Patients with COVID-19 in Russian Multi-Field Hospitals in 2021: Results of the Global-PPS Project.

Avdeev S, Rachina S, Belkova Y, Kozlov R, Versporten A, Pauwels I, Goossens H, Bochanova E, Elokhina E, Portnjagina U, Reshetko O, Sychev I, Strelkova D; Russian Global-PPS Project Study Group.

OBJECTIVE

The objective of this study was to assess the patterns of prescribing antimicrobials in patients with COVID-19 and to evaluate the quality indicators related to the prescriptions in a set of multi-field hospitals in Russia.

STUDY DESIGN

Between June and December 2021, a point prevalence survey was conducted in COVID-19 wards of six multi-field hospitals from different regions of the Russian Federation (Krasnoyarsk, Moscow, Omsk, Saratov, Smolensk and Yakutsk).

RESULTS

- Data on 999 inpatients admitted to COVID-19 wards were acquired; 11.9% of the patients evaluated were in intensive care units (ICUs). The overall prevalence of antimicrobial use was 51.3% on the day of the PPS. A prominent variability in antimicrobial use prevalence was seen in the participating centers and ranged from 34.5% to 87.2%. The average use prevalence of antivirals and antibiotics was 30.6% and 35.1%, respectively, and up to 14.1% of patients received both types of drugs.
- Therapeutic antibiotics in patients in COVID-19 wards were prescribed most commonly for the indication of pneumonia (59.5%) and COVID-19 infection (25.8%). Nota bene, in this patient population, antibiotics were administered mostly for the treatment of secondary bacterial complications or bacterial co-infections although both the indications "pneumonia" and "COVID-19" were put on record. The third indication for antibiotic treatment was *Clostridioides difficile*-associated infection (5.3%).
- The top systemic antibiotics, administered to patients with lower respiratory tract infections in COVID-19 wards were ceftriaxone (31.5% on average), levofloxacin (19.1%), and cefoperazone/sulbactam (11%); less frequently, amoxicillin/clavulanic acid, cefepime, and cefepime/sulbactam were prescribed (5.6%, 5.4%, and 5.1%, respectively). Antibiotic prescription practice was mostly empirical (93.3%) and non-compliance with guidelines was high (29.9%).
- Faviparavir, remdesivir and umifenovir were the only systemic antivirals prescribed to Russian patients with suspected or confirmed COVID-19 in 2021. Faviparavir was most commonly prescribed antiviral (64.6%). Targeted therapy comprised 58.2% of antiviral prescriptions and the compliance with hospital guidelines was 100%.

CONCLUSIONS

Antimicrobial prescribing patterns in patients with COVID-19 varied considerably among the six surveyed hospitals in Russia. Systemic antibiotics were frequently prescribed, especially in ICUs. In some hospitals, a high rate of non-compliance to guidelines of antibacterial therapy was observed.

"Surveillance of antimicrobial use and stewardship should be applied to inpatient care during the COVID-19 pandemic and thereafter."

KEY FINDINGS

- The study revealed that overall, 51.3% of patients received at least one antimicrobial agent on the day of PPS with 73.3% of antibiotics belonging to the "Watch" group.
- On average, about 1/3 of patients received either antivirals or antibiotics, and 14.1% received a combination of both.
- Antibiotic prescriptions were predominantly empirical and about 30% of prescriptions were not compliant with hospital guidelines.

CLICK TO ACCESS ARTICLE

ANTIBIOTICS
2021;10(9):1122

Antibiotic Prescribing Patterns in Ghana, Uganda, Zambia and Tanzania Hospitals: Results from the Global Point Prevalence Survey (G-PPS) on Antimicrobial Use and Stewardship Interventions Implemented.

D'Arcy N, Ashiru-Oredope D, Olaoye O, Afriyie D, Akello Z, Ankrah D, Asima DM, Banda DC, Barrett S, Brandish C, Brayson J, Benedict P, Dodoo CC, Garraghan F, Hoyelah J Sr, Jani Y, Kitutu FE, Kizito IM, Labi AK, Mirfenderesky M, Murdan S, Murray C, Obeng-Nkrumah N, Olum WJ, Opintan JA, Panford-Quainoo E, Pauwels I, Sefah I, Sneddon J, St Clair Jones A, Versporten A.

OBJECTIVE

The objective of this study was to compare national data on antimicrobial use obtained from 17 hospitals across four countries (Ghana (10), Uganda (4), Zambia (2) and Tanzania (1)) and identify target points for improvement.

STUDY DESIGN

The Commonwealth Partnerships for Antimicrobial Stewardship programme (CwPAMS), conducted between May and December 2019 Global-PPSs in 12 hospitals across Ghana (6), Uganda (4), Zambia (1), and Tanzania (1). An additional four hospitals in Ghana and one in Zambia were also included in the study.

RESULTS

- Across the 17 hospitals in four countries, data on a total of 4,376 inpatients were included in the survey. The overall prevalence of antimicrobial use was 50% which varied amongst countries: 57% in Zambia, 55% in Ghana, 45% in Uganda, and 30% in Tanzania.
- Antibacterials for systemic use made up 83–99% of prescriptions in all countries. The most prescribed antimicrobial across Ghanaian hospitals was metronidazole for systemic use (12% of total prescriptions; 288/2435), compared to ceftriaxone which was prescribed most frequently in the thee other countries; Uganda 24% (173/710), Zambia 21% (83/402), and Tanzania 32% (94/290).
- Most antibiotics prescribed belonged to the WHO **"Access"** (52%-60%) and **"Watch"** (38-41%) and no **"Reserve"** category antibiotics were prescribed. In Uganda, a considerable amount of **"Not recommended"** antibiotics was prescribed (8%, mainly Ampiclox).
- Across all countries, antimicrobials were most often prescribed for prophylaxis in obstetrics and gynaecology units (12-18% of all prescriptions, mainly metronidazole (44%)), followed by pneumonia in all countries but Tanzania (15% of total).
- Prolonged surgical prophylaxis (SP) was common (97% of all prescriptions for SP in Tanzania, Uganda and Zambia, 75% in Ghana)
- The data and collective experience developed through the Global-PPS enabled to identify key targets for Antimicrobial Stewardship (AMS) interventions. The top 4 interventions implemented in 10 or more of the participating hospitals were: training session (15); catalyst for forming AMS committee (12); data communicated to clinicians (11); new guidelines developed (10).

CONCLUSIONS

Through CwPAMS partnerships, Global-PPS data became available for the first time in most participating hospitals, strengthening their commitment to improved antimicrobial surveillance. The Global-PPS allowed to set tailor-made structural AMS interventions.

"...CwPAMS health partnerships and hospitals [...] provided information regarding key AMS interventions taken as a result of the Global PPS undertaken at their institutions."

KEY FINDINGS

- Antibiotic prescribing patterns were associated with accessibility and affordability of antibiotics in the "Access" category such as metronidazole effective in the treatment of a broad range of anaerobic infections; and primarily prescribed for prophylaxis for obstetrics and gynecology.
- Prolonged surgical prophylaxis was the most common target for improvement identified.
- The joint effort between the Global-PPS and CwPAMS partnerships demonstrated the strengthening of healthcare workforce knowledge and capacity in the areas of antimicrobial use and AMS.

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JOURNAL OF HOSPITAL INFECTION
2020;104(2):165-171

Global point prevalence survey of antimicrobial consumption in Brazilian hospitals.

Porto APM, Goossens H, Versporten A, Costa SF; Brazilian Global-PPS Working Group.

OBJECTIVE

The objective of this study was to evaluate the variation in antibiotic use in Brazilian hospitals that joined the Global-PPS project.

STUDY DESIGN

In 2017, PPSs were conducted in 18 hospitals from six states across three regions (Northeast, South and Southeast) of Brazil.

RESULTS

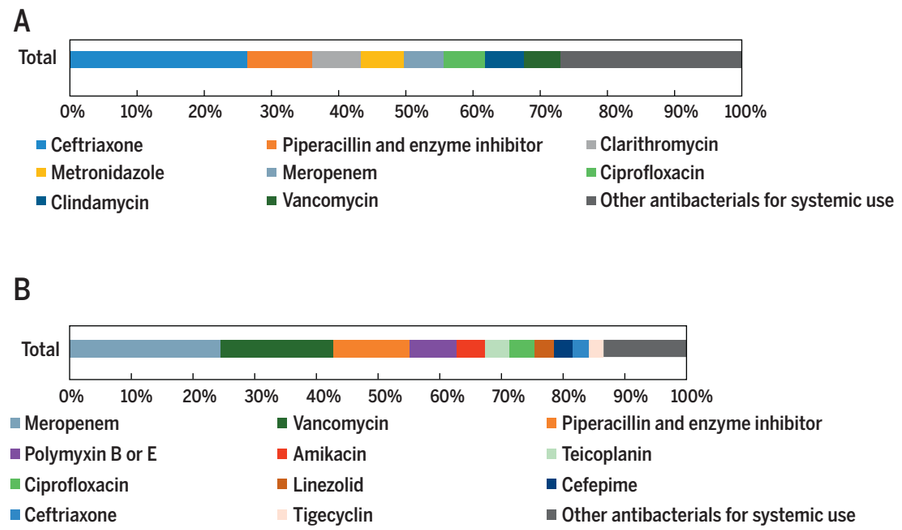
- During the PPS, 1,801 patients were evaluated (1,622 adults and 179 children and neonates) of which 941 (52.2%) were on antimicrobials ranging from 48.6% in the South to 60.4% in the Northeast.
- Intensive care units had the highest prevalence of antimicrobial use, 60.3% in adults and 71.1% in children; 42.5% of inpatients were receiving more than one antimicrobial on the day of the survey.
- Antibacterials for systemic use accounted for 89.9% of all antimicrobial prescriptions of which the top four prescribed were broad-spectrum antibiotics (44.6% of prescriptions). These were: ceftriaxone (12.8%), meropenem (12.3%), vancomycin (10.3%) and piperacillin with a beta-lactamase inhibitor (9.3%) (**Figure 1**).
- The three most common indications for the use of antibiotic therapy were pneumonia or lower respiratory tract infections (29.2%), intraabdominal sepsis (12.5%) and bone or joint infections (9.5%).
- Of the antimicrobials prescribed for systemic use, 39% were prescribed to treat community-acquired infections (CAI) and 40.5% to treat healthcare-acquired infections (HAI; mainly meropenem and vancomycin) and 18.8% for medical or surgical prophylaxis (SP). Cefazolin was most commonly prescribed for SP (62.4%).
- Empirical use was higher in CAIs than in HAIs (86.6% versus 65.9%). Out of 69 targeted therapies for CAI and 182 for HAIs, 29% and 83.5%, respectively, were targeting multidrug-resistant organisms (MDRO); mainly Gram-negative bacteria (75% of all MDROs for CAI and 78.2% of HAI)
- Compliance to guidelines was high in all regions (>80%).

CONCLUSIONS

This first large-scale Global-PPS showed that the prevalence of antimicrobial use in Brazil is high with considerable variations observed between regions. It is assumed that these results are partly related to a restrictive law on over-the-counter sales of antimicrobials, with a greater drop in sales observed in the South than in the Northeast.

"Participants should use these data as part of an antimicrobial stewardship programme to set tailor-made targets to improve antibiotic prescribing in their hospitals."

Figure 1. Overall distribution of antibiotic use to treat CAIs (A) and HAIs (B) in 18 Brazilian hospitals.



KEY FINDINGS

- In 18 hospitals in the Northeast, South and Southeast of Brazil, the prevalence of antimicrobial use is high.
- High proportions of broad-spectrum antibiotics are prescribed to treat HAI indicating the high burden on hospitals due to these infections.
- Only one third of treatments for HAI were guided by a microbiological result, suggesting the misuse of broad-spectrum antibiotics in Brazilian hospitals.

CLICK TO ACCESS ARTICLE

ANTIBIOTICS
2020;9(9):598

Antimicrobial Consumption and Resistance in a Tertiary Care Hospital in Jordan: Results of an Internet-Based Global Point Prevalence Survey.

Abu Hammour K, Al-Heyari E, Allan A, Versporten A, Goossens H, Abu Hammour G, Manaseer Q.

OBJECTIVE

The objective of this study was to assess antimicrobial prescribing and resistance in a teaching hospital in Jordan as part of the Global-PPS network.

STUDY DESIGN

In June–July 2018, a cross-sectional Global Point Prevalence Survey of antimicrobial prescribing practices and the presence of antimicrobial resistance was conducted at the 600 bed "Jordan University Hospital" in the Hashemite Kingdom of Jordan.

RESULTS

- Data included 488 admitted patients. The overall prevalence of antimicrobial use was 45.3% in adults, 30.6% in children, and 22.2% in neonates (of which all in neonatal intensive care unit, 44.4%).
- Amongst admitted patients, 7.4% were treated for at least one healthcare-associated infection (HAI).
- Cephalosporins and carbapenems were the most prescribed antibiotics (50.6% and 39.6%, respectively), followed by a group of other antibacterials accounting for ~22% of prescriptions (glycopeptide, polymyxins, steroid antibacterials, imidazole and nitrofuran derivatives) whereas the penicillins group was third.
- Most therapeutic antimicrobials were prescribed for community-acquired infections (CAI) (69.8%), of which 85.8% were for empiric treatment; whereas the remaining 30.2% were prescribed to treat an HAI, of which 62.3% empirically.
- The overall resistance prevalence based on microbiology data, was 26.0% (33/127 patients treated for a CAI or HAI); with methicillin-resistant *Staphylococcus aureus* (MRSA) (7.1%) and other multidrug-resistant organisms (8.7%) most often isolated.
- Of the antimicrobial quality indicators reviewed, the availability of the stop/review date documentation was low (8.4% of all prescriptions). Prolonged surgical prophylaxis (SP) was common (60.9% of antibiotic prescriptions for SP; **Figure 1**).

CONCLUSIONS

This study enabled for the first time to establish baseline data for the hospital on the quantity and quality of antimicrobials prescribed. The adherence to the WHO recommendations on surgical prophylaxis should take priority. The diagnostic tests to reliably support the selection of appropriate antibiotics should be enhanced. Future participation in the Global-PPS should include more training on appropriate antibiotic prescribing and implementation of strict infection prevention and control measures.

"The study should encourage the establishment of tailor-made antimicrobial stewardship interventions and support educational programs to enhance appropriate antibiotic prescribing."

Figure 1: Duration of surgical prophylaxis in adults and children stratified by type of surgical procedure.
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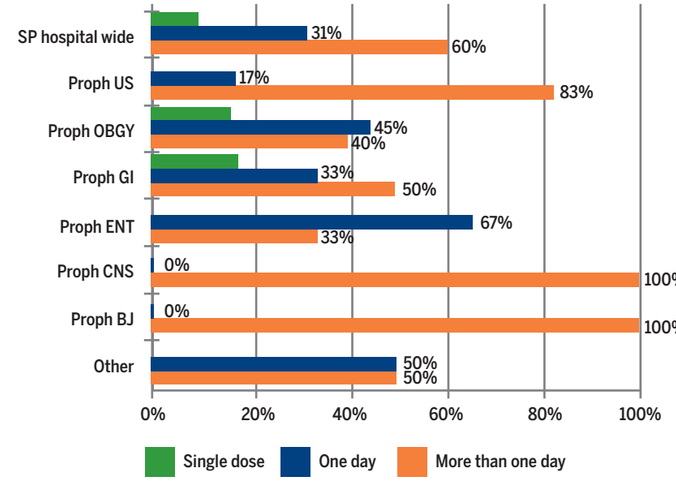

Proph US = Prophylaxis for urological surgery (including 2 children);
OBGY = obstetric or gynaecological surgery;
GI = gastrointestinal tract;
ENT = ear, nose, throat (including 2 children) CNS = central nervous system;
BJ = plastic or orthopaedic surgery (bone or joint).

KEY FINDINGS

- High prevalence of antimicrobial use in adult wards (45.3%).
- High broad-spectrum antibiotic use including carbapenems, third-generation cephalosporins, vancomycin.
- High overall resistance rate among patients treated for a CAI or a HAI (26.0%) as compared to Europe (2.9-6.4%; 2015 data) and Canada (8.5%; 2017 data)
- High prevalence of MRSA infections (7.1%) is in line with high carriage rates of MRSA among healthy individuals.
- Analysis of antibiotic quality indicators showed poor documentation of reason for prescription and stop/review date.

CLICK TO ACCESS ARTICLE

INFECTION PREVENTION IN PRACTICE
2021;4(1):100197

Point-prevalence surveys of antimicrobial consumption and resistance at a paediatric and an adult tertiary referral hospital in Yangon, Myanmar.

Oo WT, Carr SD, Marchello CS, San MM, Oo AT, Oo KM, Lwin KT, Win HH, Crump JA.

OBJECTIVE

A point prevalence survey was performed to describe antimicrobial consumption in two hospitals and ultimately inform the development and maintenance of evidence-based antimicrobial stewardship programs.

STUDY DESIGN

Global-PPS was conducted in two public tertiary referral hospitals in Yangon, Myanmar: Yangon Children's Hospital (YCH) and Yangon General Hospital (YGH) in December 2019.

RESULTS

- A total of 1,980 patients were included in the survey: 74.4% at YGH. Prevalence of antimicrobial use was 60.4% at YCH and 64.4% at YGH.
- A total of 2,108 antimicrobials were prescribed overall: 506 (24.0%) at YCH and 1,602 (76.0%) at YGH. Antibacterials for systemic use accounted for 1,808 (85.8%) of all antimicrobial prescriptions. Third generation cephalosporins made up 722 (34.3%) antimicrobial prescriptions.
- A total of 44.6% of antimicrobials were prescribed for community-acquired infection, 6.8% for hospital-acquired infection, 12.5% for medical prophylaxis, and 34.3% for surgical prophylaxis. At YCH, 45.8% were given to patients for community-acquired infections and 32.0% for surgical prophylaxis. At YGH, 44.2% were prescribed for community-acquired infection and 35.3% for surgical prophylaxis.
- Overall, the three most common indications for antimicrobial prescriptions were gastrointestinal tract prophylaxis (15%), skin, soft tissue, bone and joint prophylaxis (14.5%) and treatment of pneumonia (14.4%).
- A reason for antimicrobial prescription and a stop or review date was recorded in the medical notes for 64.5% and 16.6% of antimicrobial prescriptions, respectively. A total of 31.9% of antimicrobial prescriptions were compliant with local guidelines. Up to 53.9% of prescriptions for therapeutic use were based on biomarker data, exclusively C-reactive protein (CRP), and 20.4% of prescriptions were given as targeted therapy. Amongst antimicrobials prescribed for surgical prophylaxis, 5.4% were given as a single dose, 16.6% for ≤1 day, and 78.0% for >1 day.

CONCLUSIONS

The study demonstrated that antimicrobials are commonly prescribed at the two tertiary referral centers in Yangon, Myanmar, where the study was conducted. The results also showed that broad-spectrum antimicrobials were frequently used. The findings underline the need to increase the awareness and support for antibiotic stewardship programs at both hospitals.

"Dissemination of our findings may also encourage other hospitals in Myanmar to implement, or review and update, their own antibiotic stewardship programs."

KEY FINDINGS

- To the authors' knowledge, these are the first published PPS results from hospitals in Myanmar.
- Antimicrobials were prescribed to a large proportion (>60%) of patients at each hospital, with antibacterials for systemic use being the most prescribed group (>85%).
- Fewer than 25% of antimicrobial prescriptions had a stop or review date recorded in the patient notes, local antimicrobial treatment guidelines were often not available, and most antimicrobials prescribed for surgical prophylaxis were given for a duration >1 day.

Impact Studies

Following an initial baseline Global-PPS, AMS activities are set up to **drive changes in antimicrobial prescribing** in the institution. The impact of the changes is then measured in **repeated Global-PPS.**

This creates a dynamic of **constant improvement** of the quality of care, resulting in **benefits that make a difference** for patients and public health.

CLICK TO ACCESS ARTICLE

JOURNAL OF GLOBAL ANTIMICROBIAL RESISTANCE
2021;26:157–165

Implementation of a multidisciplinary antimicrobial stewardship programme in a Philippine tertiary care hospital: an evaluation by repeated point prevalence surveys.

de Guzman Betito G, Pauwels I, Versporten A, Goossens H, De Los Reyes MR, Gler MT.

OBJECTIVE

The objective of this study was to evaluate the impact of a hospital-wide antimicrobial stewardship (AMS) program delivered by a multidisciplinary team and informed by five successive PPSs on antimicrobial use and quality of prescribing in a tertiary teaching hospital in the Philippines.

STUDY DESIGN

In September 2017, a baseline PPS was carried out on all wards of the 600-bed hospital, admitting patients of all age groups. Afterwards, a first set of AMS activities was implemented. This was followed by a second PPS in February 2018. Both PPSs informed a second set of AMS activities implemented in mid-2018.

The AMS program combined restrictive, persuasive, and structural strategies. Repeated PPSs were performed in September 2018, March 2019, and October 2019. Quality indicators for therapeutic antibiotic prescriptions and for surgical antibiotic prophylaxis (SAP) were analyzed. Antibiotic prescriptions were also categorized according to the WHO AWaRe classification.

RESULTS

- Over five rounds of PPSs, a total of 2,135 hospitalized patients were analyzed over a period of 2 years; 49.5% (1,057) patients were on antimicrobial therapy on the day of PPS. A total of 1,495 prescriptions were reviewed, the majority of which (85.1%) were for systemic antibiotics, of which 74.9% were given for therapeutic use. SAP accounted for 17.3% of all antibiotic prescriptions.
- Pneumonia was the most common reason for antibiotic prescribing (45.9%), followed by skin and soft tissue infections (10.0%), and lower urinary tract infections (8.4%).
- A significant decrease in overall antimicrobial use prevalence and prophylactic prescriptions for >24 hours in surgery patients was observed (both $p<0.001$) over the study period (**Figure 1**). There was also a significant increase ($p<0.001$) for several quality indicators (documentation of reason for prescribing, and stop or review date).
- Use of **"Access"** antibiotics of the AWaRe classification remained around 25% of all systematic antibiotics prescribed for therapeutic use. Correlatively, a high use of antibiotics of the **"Watch"** group was noted (~74%) and mainly represented by piperacillin/tazobactam and cefuroxime. The use of **"Reserve"** antibiotics was low (1.6% of therapeutic prescriptions).

CONCLUSIONS

Antibiotic prescribing practices were positively influenced by the implementation of a multidisciplinary AMS program. Further research will assess the long-term trends in antibiotic prescribing, establish if AMS activities led to a sustained change in prescribing behavior, and evaluate the impact on clinical outcomes and antimicrobial resistance rates.

"... repeated PPS are a valuable method to identify targets for quality improvement of antibiotic prescribing and to monitor these indicators, once they have been embedded in the hospital's AMS strategy."

Figure 1: Evolution of the duration of the surgical antibiotic prophylaxis duration in the period September 2017–October 2019.
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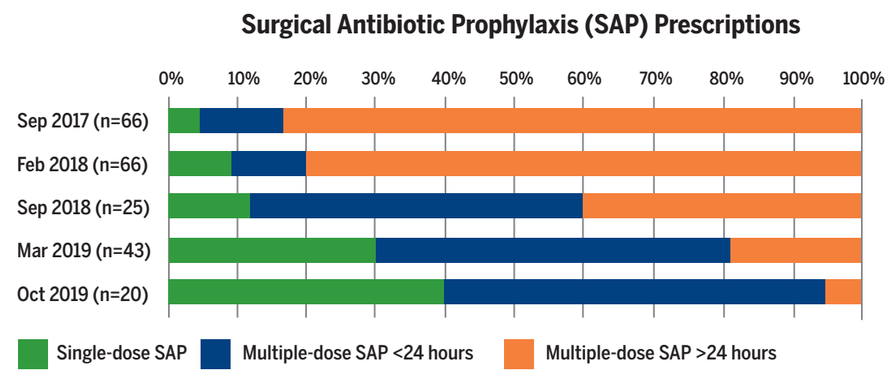

KEY FINDINGS

- Over a 2-year period, the quality of antibiotic prescribing substantially improved and the use of antibiotics for surgical prophylaxis was reduced following the implementation of a multidisciplinary AMS program.
- Future efforts might be directed at optimizing the use of the available diagnostic capacity to guide prescribing and further reduce the proportion of empirical prescriptions.

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AFRICAN JOURNAL OF CLINICAL AND EXPERIMENTAL MICROBIOLOGY
2021;22(2):260-272

Roll-out of a successful antimicrobial stewardship programme in Lagos University Teaching Hospital Nigeria using the Global-Point Prevalence Survey.

Oshun PO, Roberts AA, Osuagwu CS, Akintan PE, Fajolu IB, Ola-Bello OI, Odukoya OO, Akodu B, Okunowo AA, Versporten A, Pauwels I, Goossens H, Busari AA, Olusanya AW, Nwaiwu O, Temiye EO, Osibogun AO, Bode CO, Antimicrobial Stewardship Committee, and Oduyebo OO.

OBJECTIVE

The objective of this study was to describe the roll-out of an antimicrobial stewardship (AMS) program consisting of education, training and an antibiotic policy, and to measure its impact using the Global-PPS at the Lagos University Teaching Hospital, a tertiary care hospital in Nigeria.

STUDY DESIGN

A baseline Global-PPS was conducted in 2015 to inform AMS interventions aimed at promoting rational use of antimicrobials. AMS interventions included education of prescribers, dissemination of PPS results, and formulation of a hospital-wide antibiotic policy.

Global-PPSs were repeated in 2017 and 2018 to monitor antimicrobial use prevalence and quality indicators and to measure the impact of the AMS interventions. Antimicrobials were classified according to the WHO AWaRe classification list.

RESULTS

- A total of 746 eligible inpatients were surveyed in the three time periods (2015, 2017, and 2018); 573 admitted to adult wards and 173 to pediatric/neonatal wards.
- Antimicrobial use prevalence decreased significantly ($p<0.00001$) over time (82.5% in 2015, 65.5% in 2017, and 51.1% in 2018) both in adult and pediatric/neonatal wards (**Figure 1**).
- The three most prescribed antibiotic groups were third-generation cephalosporins, imidazole derivatives, and quinolones. Antibacterials for systemic use accounted for most of the antimicrobial prescriptions.
- There was a significant improvement ($p<0.0001$) in the documentation of the reason for antimicrobial prescription (from 53.4% in 2015 to 97.2% in 2018) and stop-review date (from 28.7% in 2015 to 70.2% in 2018).
- Prescription for surgical prophylaxis for >24 hours was significantly reduced from 93.3% in 2015 to 65.7% in 2018 ($p=0.002$), mainly in the pediatric wards, even though this rate is still high.
- The overall **"Access"/"Watch"** ratio increased from 0.62 in 2015 and 0.72 in 2017 to 0.77 in 2018, and no **"Reserve"** list antibiotics were prescribed during the study.

CONCLUSIONS

The study showed that AMS interventions had a clear impact on antimicrobial prescribing patterns in the hospital in Lagos. The study confirmed the usefulness of Global-PPS to set quality improvement targets and for the monitoring and evaluation of AMS programs in a limited-resource setting.

"We successfully rolled out AMS interventions and evaluated their effectiveness on antimicrobial prescribing patterns and quality indicators using the Global-PPS."

Figure 1: Antimicrobial use prevalence in adult and pediatric/neonatal wards between 2015 and 2018.
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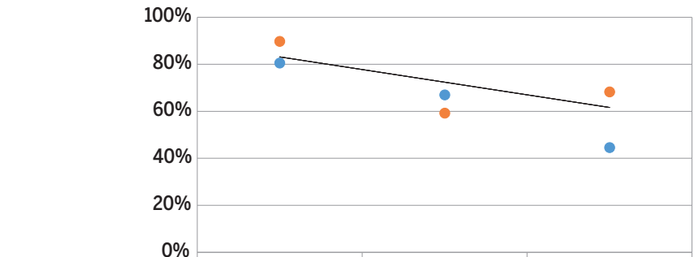

	2015	2017	2018
AMU% - Adult wards	80.6%	67.0%	44.5%
AMU% - Paediatric & Neonatal wards	89.7%	59.2%	68.2%

AMU: antimicrobial use

KEY FINDINGS

- The Global-PPS can be used as an inexpensive and convenient monitoring system for antimicrobial use.
- The introduction of AMS based on education and dissemination of Global-PPS results led to a significant reduction in antimicrobial use prevalence and related quality indicators between 2015 and 2018.

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INFECTION CONTROL & HOSPITAL EPIDEMIOLOGY
2020;41(S1):S523-S523

Point Prevalence Surveys and Customized Interventions are Good Strategies to Improve Antimicrobial Use: The Brazilian Experience.

Porto APM, Boszczowski I, Versporten A, Pauwels I, Thais T, Girão E, Esteves P, Carrilho C, Ferraz TL, Donini C, Goossens H and Figueiredo S.

OBJECTIVE

The objective of this study was to describe the impact of two Global-PPSs and tailored interventions on antimicrobial use in eight hospitals from three regions of Brazil.

STUDY DESIGN

Eight tertiary-care Brazilian hospitals conducted a Global-PPS in 2017. Following a discussion of the results obtained and of possible intervention strategies, hospitals adapted interventions, such as feedback to prescribers, discussions with pharmacists, and antimicrobial use data in the accreditation process and conducted a second Global-PPS in 2018. The antimicrobial use prevalence from the two PPSs were compared and shown as risk ratios.

As a main outcome, the study assessed antimicrobial use in the hospitals, overall and in intensive care units (ICUs).

RESULTS

- A total of 1,716 patients were evaluated (800 in 2017 and 916 in 2018). In 2017 and 2018, respectively, 420/800 (52.5%) and 429/916 (46.8%) were prescribed antimicrobials (p=0.02). At the same time points in ICUs, 170/800 (61.4%) and 204/916 (56.8%) patients, respectively, were on antimicrobials.
- The overall prevalence of use decreased significantly for vancomycin (from 11% to 7%; p=0.01), meropenem (from 12% to 9%; p=0.04), and linezolid (from 1.5% to 0.33%; p=0.01), while there was no significant increase in any single drug or class of drugs. Within ICUs, the prevalence of use decreased significantly for vancomycin (from 19% to 11%; p=0.005), linezolid (from 2.9% to 0.3%; p=0.01), colistin (from 4.3% to 1.7%; p=0.05), and metronidazole (from 6.5% to 2.8%; p=0.03).
- The most frequent infectious diagnoses were pneumonia (27%), intra-abdominal sepsis (14%), skin and soft-tissue infection (SSTI) (9.4%), urinary tract infection (9.1%), and sepsis and septic shock with no identified focus (SSNIF) (7.4%). There was a significant increase in SSTI (from 7.6% to 11.4%; p=0.03) and a significant decrease in SSNIF (from 10.7% to 4.1%; p=0.00002). In 2018, there were significantly fewer antimicrobial prescriptions for healthcare-acquired infections (from 52.6% to 43.6%; p=0.0007).
- No difference in the use of antimicrobials for medical or surgical prophylaxis was detected.

CONCLUSIONS

The study showed that feedback on prescription practices might have had an impact on local policies of antimicrobial use. This was demonstrated by the overall and ICU-specific decrease in antimicrobial use prevalence in the second PPS.

"Although antimicrobial stewardship is recommended by the Brazilian government, data regarding prescription practices in the country are scarce."

KEY FINDINGS

Following the two point-prevalence surveys performed in 2017 and 2018:

- significantly fewer patients were prescribed antimicrobials (52.5% in 2017 vs. 46.8% in 2018) (p=0.02);
- significantly fewer antimicrobials were prescribed for healthcare-acquired infections (from 52.6% to 43.6%; p=0.0007);
- a significant decrease could be observed in the prevalence of use of antibiotics such as vancomycin, meropenem or linezolid.

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AFRICAN JOURNAL OF CLINICAL AND EXPERIMENTAL MICROBIOLOGY
2021;22(2):252-259

Point prevalence survey of antimicrobial consumption and resistance: 2015-2018 longitudinal survey results from Nigeria.

Umeokonkwo CD, Oduyebo OO, Fadeyi A, Versporten A, Ola-Bello OI, Fowotade A, Elikwu CJ, Pauwels I, Kehinde A, Ekuma A, Goossens H, Adedosu AN, Nwafia IN, Nwajiobi-Princewill P, Ogunsola FT, Olayinka AT, Iregbu KC.

OBJECTIVE

The objective of this study was to report of antimicrobial prescribing trends and quality indicators longitudinally.

STUDY DESIGN

The Global-PPS was conducted in 2015, 2017 and 2018. Results of the 3 data collection periods were compared.

The study involved 13 hospitals across Nigeria.

RESULTS

- In 2018, 13 hospitals participated in the PPS. Seven hospitals participated in at least 2 PPSs since 2015. A total of 5,174 inpatients were included in the PPS. The mean weighted antimicrobial use prevalence was 70.7%. It was the highest in 2015 (71.7%) and the lowest (59.1%) in 2018 (p<0.001). There was an important variability of the prevalence data in participating centers. Prevalence of antimicrobial use declined amongst adult inpatients, both medical and surgical, but not in pediatric and intensive care patients.
- The main indications for therapeutic prescribing were skin and soft tissue infections (20.8%), sepsis (15.9%) and pneumonia (11.6%), while the top three antibiotics for therapeutic use were ceftriaxone (18.2%), metronidazole (15.3%) and ciprofloxacin (10.4%).
- Over the three-year period, the documentation of the stop/ review date showed some improvement and increased from 27.9% in 2015 to 48.5% in 2018, (p<0.001), however, it remained below 50% average. There was an improvement in documentation of the reason for antimicrobial prescription in notes at the start of the prescription (2015: 62.2%; 2017: 74.5%; 2018: 70.9%; p=0.008).
- Laboratory services to guide antibiotic prescription were rarely used. The proportion of targeted prescriptions was highest in 2015 (12%) and declined over the three-year period (2015: 12.0%; 2017: 2.9%; 2018: 5.2%; p<0.001).

CONCLUSIONS

The prevalence of antimicrobial use in Nigerian public hospitals remained high. The documentation of reasons for antimicrobial prescribing and the stop/review date showed slight improvements. Prescribers preferred broad-spectrum antibiotics and parenteral route of administration. A suboptimal use of the available laboratory services and general lack of antibiotic guidelines amongst the hospitals was observed.

"This study, to our knowledge, represents the largest collections of longitudinal data collection on AMU [antimicrobial use] from multiple hospitals across regions in Nigeria over a three-year period."

KEY FINDINGS

- The prevalence of antimicrobial use declined, especially among the hospitals that had initiated AMS programs. However, the overall weighted antimicrobial prevalence rate remained high with wide variations within and amongst the participating hospitals.
- Community-acquired infections were the most common indications for antimicrobial use over the period studied, which might be connected to the high level of infectious diseases in the tropics due to poor personal hygiene, low environmental sanitation and poor housing.

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FRONTIERS IN TROPICAL DISEASES
2022;3:843509

Comparing Patterns in Antimicrobial Use During Global Point Prevalence Study at a Single Tertiary Hospital in Ghana: Implications for Antimicrobial Stewardship Programme.

Enimil A, Agbedinu K, Yeboah M, Pauwels I, Goossens H, Ansong D, Mensah N and Versporten A.

OBJECTIVE

The objective of this study was to assess the trends in antimicrobial usage and quality indicators in antimicrobial prescriptions at the tertiary health care facility Komfo Anokye Teaching Hospital (KATH), located in the Ashanti Region of Ghana.

STUDY DESIGN

The results of two Global-PPSs conducted in September 2015 and September 2019 were compared, including all admitted adults, children and neonates.

RESULTS

- Data on 386 and 630 inpatients were obtained in 2015 and 2019, respectively. The proportion of patients on at least one antimicrobial was 64% (247/386) and 58.4% (368/630) in 2015 and 2019, respectively. The neonatal medical unit had the highest antimicrobial use (68.4%).
- The most common indication for antimicrobial prescriptions was pneumonia which accounted for 16.9% of prescriptions in 2015 and 23.0% in 2019, followed by skin and soft tissue infections (~15% in both surveys) and, in third position, obstetric/gynecological infections (10.7%) in 2015 and tuberculosis (8.9%) in 2019 (**Table 1**).
- During 2015 and 2019 PPSs, 81.0% and 88.1% of prescriptions were for antibacterials for systemic use, most frequently, from the category of other beta-lactams, i.e., cefuroxime and ceftriaxone.
- Amongst the antibiotics prescribed, **"Access"/"Watch"** ratio remained the same in the two surveys (47% **"Access"** versus 53% **"Watch"** antibiotics).
- There was a decrease in hospital-acquired infections from 6.2% to 4.8% due to the action of a robust infection prevention and control committee.
- The use of biomarkers increased from 4.9% to 7.6%.

CONCLUSIONS

The trends in antimicrobial usage in the KATH over the four years (2015-2019) remained high. Even though no AMS interventions were introduced, following the 2015 survey, most of the quality indicators slightly improved. The imminent introduction of the antimicrobial stewardship (AMS) program will improve antimicrobial usage practice and clinical outcomes.

"We hope to further increase the diagnostic capacity in the future and also move towards the possibility of antimicrobial susceptibility testing."

Table 1: Top ten medical conditions treated with antimicrobials during 2015 and 2019 PPSs.
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PPS 2015		PPS 2019	
Medical conditions	**n %**	**Medical conditions**	**n %**
Pneumonia	30 (16.9)	Pneumonia	44 (23.0)
Skin and soft tissue	27 (15.2)	Skin and soft tissue	30 (15.7)
Obstetric/gynaecological infections	19 (10.7)	Tuberculosis	17 (8.9)
Bone/joint infections	14 (7.9)	Lower urinary tract infection	15 (7.9)
Sepsis	13 (7.3)	Sepsis	13 (6.8)
Lower urinary tract infection	12 (6.7)	HIV	11 (5.8)
Tuberculosis	11 (6.2)	Infection of the central nervous system	10 (5.2)
Intra–abdominal sepsis	10 (5.6)	Gastrointestinal infections	9 (4.7)
Infection of the central nervous system	9 (5.1)	Obstetric/gynaecological infections	7 (3.7)
Ear, nose and throat infections	8 (4.5)	Malaria	6 (3.1)

n=individual contributions; %=percentages.
Count on the number of diagnoses treated with at least one antimicrobial. This implies that a patient with multiple diagnoses can be counted several times.
Prophylactic prescribing and patients admitted to neonatal intensive care unit (NICU) or neonatal medical ward (NMW) are excluded from this analysis.

KEY FINDINGS

- **Over four years (2015-2019), the prevalence of antimicrobial usage decreased but remained high (>50%).**
- **The 2 successive Global-PPS favoured the creation of an AMS committee in July 2021 with the mandate to perform a broad set of strategic AMS activities.**

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ANTIBIOTICS
2020;9(8):446

Longitudinal Point Prevalence Survey of Antimicrobial Consumption in Russian Hospitals: Results of the Global-PPS Project.

Rachina S, Belkova Y, Kozlov R, Versporten A, Pauwels I, Goossens H, Bochanova E, Domanskaya O, Elokhina E, Ezhova L, Mishchenko V, Ni O, Popov D, Portnjagina U, Shchetinin E, Shegimova V, Strezh Y, Vityazeva V, Zubareva N and Russian Global-PPS Project Study Group.

OBJECTIVE

The study aimed to evaluate antimicrobial prescribing patterns and assess progress in quality indicators in Russian hospitals using three repetitive PPSs over a 4-year period.

STUDY DESIGN

Three PPSs were carried out from February-April 2015, September-November 2017, and September-November 2018 in multidisciplinary hospitals in various regions of the Russian Federation using the Global-PPS methodology.

RESULTS

- Fifteen hospitals totalizing 13,595 patients participated in the PPSs. Four hospitals took part twice and one took part in all three surveys. In the initial survey, 63.9% of patients were adults, compared with ~95% in the other two surveys.
- The average antimicrobial use prevalence on the day of the PPS was 26.1% and varied <5% in different years and age groups. This indicator was the lowest in medical wards (<20%). In surgical wards, antimicrobial use prevalence reached 23.9%–38.1%, and was the highest (56.6%–100%) in intensive care units.
- Most antimicrobials were prescribed to treat pneumonia/lower respiratory tract infections. Most systemic antibacterials prescribed were ß-lactams (73.2%, 65.4%, and 55.1%, for the 3 surveys respectively), followed by quinolones (10.2%, 15.8%, and 16.5%) and "other antibacterials" (7.5%, 9.9%, and 8.7%), mainly metronidazole, vancomycin, and nitrofurans.
- For the majority of prescriptions, the selection of the antimicrobial complied with the hospital antibiotic guidelines (74.8%, 66.8%, and 74.3%). The rate of surgical prophylaxis >24h decreased over time, although it remained very high (92%, 84%, and 81% of cases), while single-dose prophylaxis increased (**Figure 1**).
- In the group of four hospitals that repeated the Global-PPS, a positive dynamic of the quality indicators (up to 15%) was observed, and compliance with hospital antibiotic guidelines improved. In two of them, an increase was observed in the documentation of the reason for therapeutic prescription and the stop/review date. In three of them, biomarker data were used more often to support antimicrobial prescribing decisions.

CONCLUSIONS

The results of the Russian Global-PPS study in 2015, 2017, and 2018 revealed the most common anomalies in antimicrobial use in inpatients. These results can be used to develop appropriate antimicrobial stewardship programs adapted to local practices in each participating hospital.

"Increasing the frequency of targeted therapy, compliance with the local antibiotic guidelines, documenting the rationale for antimicrobial administration, and the timing of its discontinuation or drug change remain key priorities that should be considered in antimicrobial stewardship programs for Russian hospitals."

Figure 1: Duration of surgical prophylaxis.
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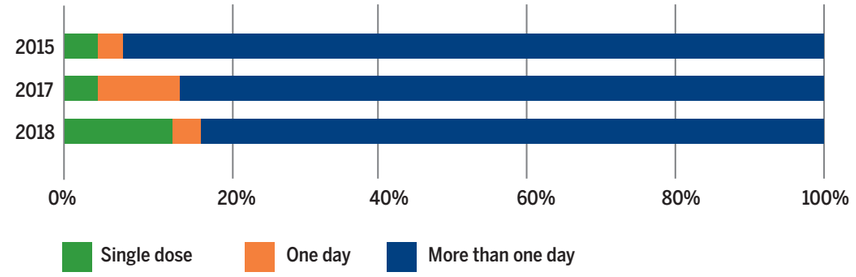

KEY FINDINGS

- Compliance with the quality indicators for antimicrobial prescribing in Russian hospitals needs to be improved, although it corresponds to average levels for all regions of the world.
- The results of the project can be used in each participating hospital to inform the improvement of antimicrobial prescribing and to monitor the effectiveness of antimicrobial stewardship interventions.

GLOBAL POINT PREVALENCE SURVEY OF ANTIMICROBIAL CONSUMPTION AND RESISTANCE (GLOBAL-PPS)

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The Global-PPS is coordinated by the University of Antwerp and supported by bioMérieux

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