GLOBAL POINT PREVALENCE SURVEY

Scientific Publications

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WHAT IS THE GLOBAL POINT PREVALENCE SURVEY?

The **Global Point Prevalence Survey of Antimicrobial Consumption and Resistance (Global-PPS)** offers a simple, freely available web-based tool to monitor antimicrobial prescribing and resistance in hospitals worldwide.

The tool provides quantifiable measures to **assess and compare quantity and quality of antibiotic prescribing and resistance** in hospitalized adults, children and neonates worldwide.

The Global-PPS aims **to change antimicrobial prescribing practices, to identify targets to improve the quality** of antimicrobial prescribing and **measure the impact of interventions** through repeated Point Prevalence Surveys.

The survey further enables to investigate **healthcare-associated infections (HAI)**, with an emphasis on the presence of invasive devices.

The tool is instrumental in planning and supporting **local and national stewardship interventions** in a range of resource and geographical settings.

WHAT ARE THE BENEFITS FOR HOSPITALS AND PATIENTS?

The Global-PPS:

- Provides a standardized method and easy tool for assessing hospital antimicrobial prescribing
- Helps to identify targets for antimicrobial stewardship interventions
- Assesses the burden of HAI
- Helps identify potential risk factors for HAI.

WHO CAN PARTICIPATE?

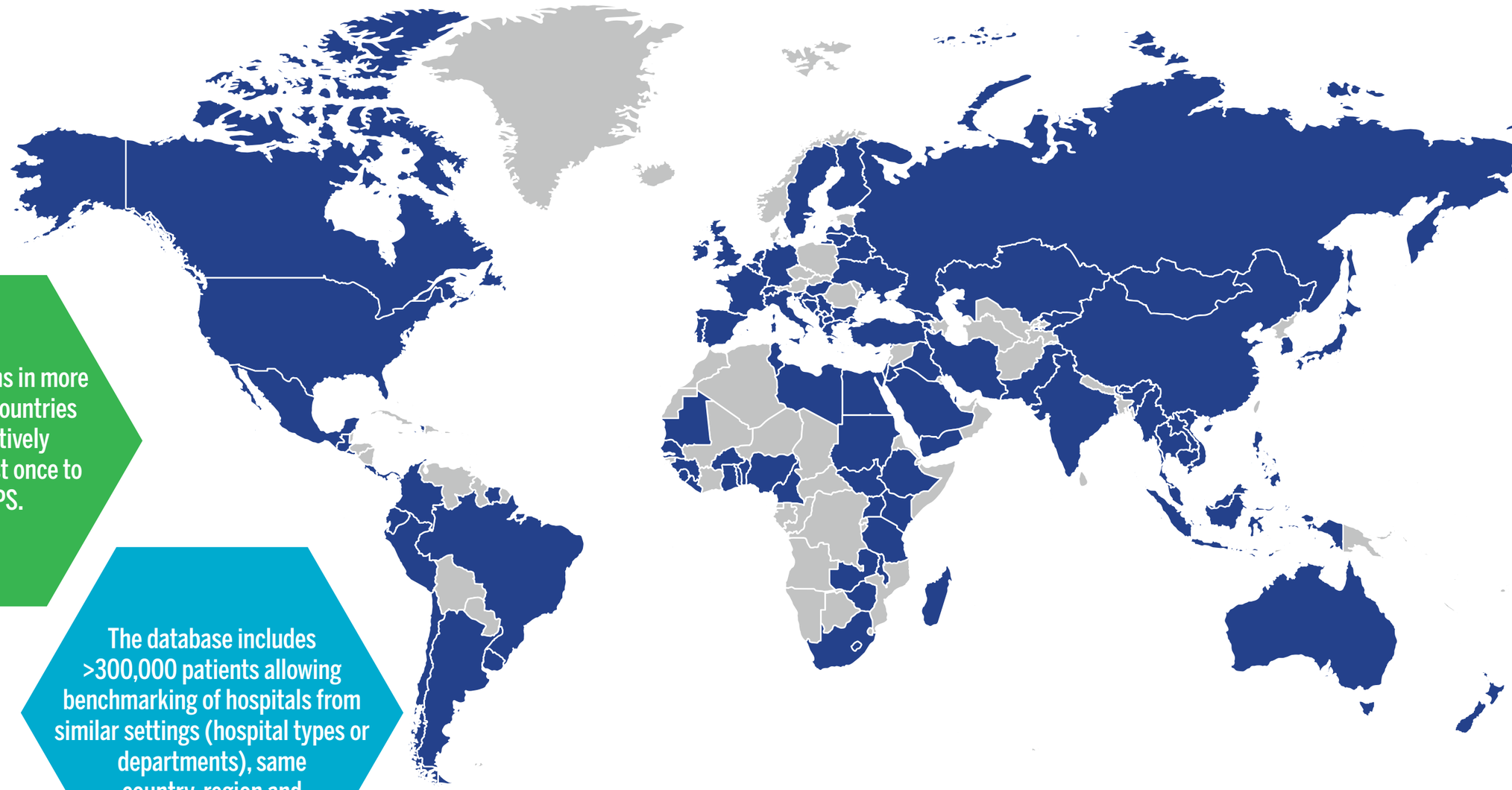
Any hospital worldwide is welcome to participate.

Bigger hospitals who have previously participated in the Global-PPS are able to participate with a sub-sample of the hospital whereby only a set of certain ward types are covered (e.g. all ICUs, all surgical or all pediatric wards).

Three surveys are available each year to allow investigation of seasonal variation (January-April, May-August and September-December).

The Global-PPS is led by the Laboratory of Medical Microbiology at the University of Antwerp, Belgium. The main coordinators are Prof. Herman Goossens, Ann Versporten and Ines Pauwels.

bioMérieux is the sole private sponsor of the Global-PPS.
The company has no role in study design, data collection, data analysis and data interpretation.
Data are strictly confidential and stored anonymously at the coordinating center of the University of Antwerp.



Over 800 institutions in more than 80 different countries worldwide effectively participated at least once to the Global-PPS.

The database includes >300,000 patients allowing benchmarking of hospitals from similar settings (hospital types or departments), same country, region and time periods.

SCIENTIFIC PUBLICATIONS

CONTENTS

CLICK TO ACCESS ARTICLE

LANCET GLOBAL HEALTH
2018;6(6):e619-e629

Antimicrobial consumption and resistance in adult hospital inpatients in 53 countries: results of an internet-based global point prevalence survey.

Versporten A, Zarb P, Caniaux I, Gros MF, Drapier N, Miller M, Jarlier V, Nathwani D, Goossens H; Global-PPS network.

OBJECTIVE

This article presents the findings of the first Global Point Prevalence Survey (Global-PPS) conducted in 2015. The aim of this Global-PPS was to assess antimicrobial prescribing practices and resistance among adult patients in hospitals worldwide, including in low-income and medium-income countries (LMICs) which often lack tools to monitor hospital prescribing practices.

STUDY DESIGN

A cross-sectional audit of hospital antimicrobial prescribing practices was conducted. Data were collected from patient records on a single day between January and September 2015 in hospitals grouped by UN region. Hospital-based doctors, pharmacists and nurses completed the survey and input data using the web-based application. Information was recorded for patients receiving at least one antimicrobial on the day of the survey: patient characteristics, antimicrobials received, diagnosis, therapeutic indication.

Quality indicators were also reported: documentation of reason for prescription and stop/review date in patient notes; existence of local prescribing guidelines; compliance with guidelines. Although the survey included adults, children and neonates, findings were based only on data for adult patients.

RESULTS

This study analyzed data from 303 hospitals in 53 countries, including 8 lower-middle-income and 17 upper-middle-income countries. A total of 29,891 out of 86,776 adult inpatients (34.4%) received at least one antimicrobial on the day of the survey. A total of 41,213 antimicrobials were prescribed, primarily for systemic use (89.3%).

As shown in **Table 1** (page 10), prevalence of antibiotic use varied by region and country, with Africa reporting the highest use rates (50%) and Eastern Europe the lowest (27.4%). It also varied by ward type, ranging from 29% in medical wards to 77% in transplant wards.

Worldwide, the three antibiotics most frequently prescribed were penicillins with ß-lactamase inhibitors, third-generation cephalosporins (mainly ceftriaxone), and fluoroquinolones (mainly ciprofloxacin and levofloxacin) as shown in **Figures 1 and 2** (page 10). Carbapenems were prescribed most often in Latin America and in West and Central Asia. Pneumonia was the most frequent indication for antibiotics (19.2% of treated patients), followed by urinary tract infections.

As illustrated in **Table 2** (page 11), quality indicators showed that:

- The reason for antimicrobial treatment was recorded for 76.9% of prescriptions;
- A stop/review date was documented for 38.3% of prescriptions;
- Local antibiotic guidelines were lacking for 19.2% of 36,792 antibiotic prescriptions;
- Overall compliance with guidelines reached 77.4%;
- Prolonged surgical prophylaxis (over 24h) was common.

CONCLUSIONS

The data gathered during this Global-PPS allowed both a quantitative and qualitative comparison of antimicrobial prescribing and resistance. These findings show that it is feasible to conduct a Global-PPS using a simple, affordable method in hospitals worldwide.

Several hospitals participating in the survey were located in LMICs, where the tools to monitor antibiotic prescribing are often lacking. For many of them, this was the first time they had gathered antibiotic resistance data about their own practices and patients. These data are essential to develop local antimicrobial stewardship programs. Through the survey, these hospitals were also able to obtain comprehensive feedback reports for their performance and benchmark with other hospitals/wards by country/region. Survey data will contribute to improving the quality of antibiotic prescribing through education and changing current practices in these countries.

Table 1. Antimicrobial use in adult hospital patients, by UN region, 2015
Adapted from Versporten A, et al. *Lancet Glob Health* 2018;6:e619-e629

	Countries (n)	Hospitals (n)	MEDICAL WARDS		SURGICAL WARDS		INTENSIVE-CARE UNITS		TOTAL	
			Admitted (n)	Antimicrobial use (%)	Admitted (n)	Antimicrobial use (%)	Admitted (n)	Antimicrobial use (%)	Admitted (n)	Antimicrobial use (%, country range)
Eastern Europe	2	8	778	11·6%	1,381	33·2%	107	67·3%	2,382	27·4% (23·7-27·8)
Northern Europe	5	36	4,959	29·8%	2,371	37·7%	370	55·9%	8,094	34·4% (29·0-37·8)
Southern Europe	13	53	6,443	32·6%	5,475	40·0%	1,010	64·1%	14,187	39·0% (27·2-62·0)
Western Europe	5	118	17,483	23·4%	8,851	28·0%	1,467	56·0%	30,049	28·1% (25·1-37·1)
Africa	5	12	619	49·9%	1,101	49·0%	64	64·1%	1,798	50·0% (27·8-74·7)
East and South Asia*	6	29	6,644	33·0%	5,663	34·2%	702	65·5%	14,411	37·2% (29·6-78·5)
West and Central Asia	9	27	1,873	42·0%	1,249	44·7%	396	47·7%	3,677	43·8% (22·4-85·7)
Oceania	2	9	1,781	29·8%	604	52·5%	76	69·7%	2,516	37·0% (33·3-38·5)
Latin America	4	19	1,942	31·8%	1,571	37·3%	468	55·1%	4,122	36·8% (32·5-43·4)
North America	0	24	3,605	32·4%	1,136	44·2%	524	59·4%	5,540	38·6% (30·9-44·8)

*Includes South, East, and Southeast Asia.

Figure 1. Proportion of prescribed antibiotics for systemic use for health-care-associated infections among adult inpatients, 2015 (n = 9,261)
Adapted from Versporten A, et al. *Lancet Glob Health* 2018;6:e619-e629

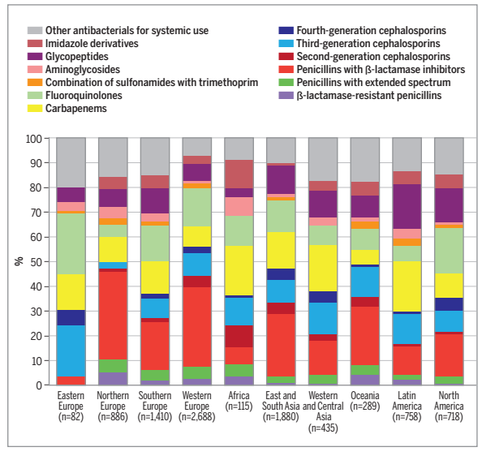


Figure 2. Proportion of prescribed antibiotics for systemic use for community-acquired infections among adult inpatients, 2015 (n = 13,226)
Adapted from Versporten A, et al. *Lancet Glob Health* 2018;6:e619-e629

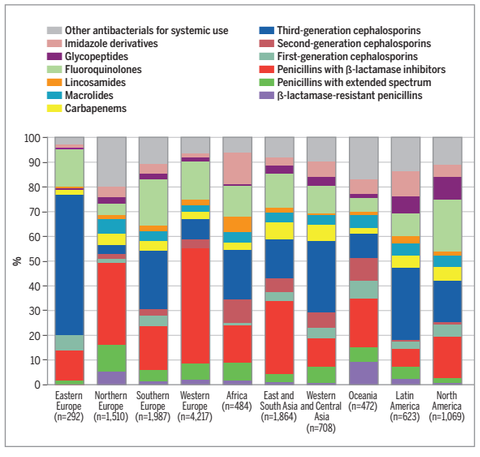


Table 2. Overview of antimicrobial and antibiotic quality indicators for adult inpatients by region, 2015.
Adapted from Versporten A, et al. *Lancet Glob Health* 2018;6:e619-e629

	Antimicrobial prescriptions	Antibiotic prescriptions	Targeted treatment*	Targeted treatment (resistant organisms)*	Reason recorded †	Stop or review date recorded †	Parenteral administration ‡	Guidelines available $	Compliant to local guidelines ¶	No guidelines available ll
Eastern Europe (n=653)	747	708	51 (7·8%)	42 (6·4%)	64·3%	50·5%	87·6%	79·8%	85·7%	19·2%
Northern Europe (n=2,783)	3,880	3,536	396 (14·2%)	80 (2·9%)	81·4%	51·6%	62·2%	90·0%	83·4%	6·5%
Southern Europe (n=5,534)	7,674	6,837	838 (15·1%)	292 (5·3%)	69·5%	29·1%	80·0%	60·5%	70·8%	29·6%
Western Europe (n=8,458)	10,612	9,485	2,204 (26·1%)	469 (5·5%)	80·5%	40·3%	64·0%	81·0%	78·7%	10·1%
Africa (n=899)	1,502	1,213	131 (14·6%)	25 (2·8%)	70·4%	36·6%	62·7%	49·5%	67·9%	26·7%
East and South Asia** (n=5,363)	7,607	6,781	938 (17·5%)	287 (5·4%)	74·6%	43·5%	71·8%	76·4%	81·5%	21·4%
West and Central Asia (n=1,612)	2,252	2,084	236 (14·6%)	153 (9·5%)	72·8%	19·8%	85·2%	53·4%	66·3%	40·5%
Oceania (n=932)	1,411	1,226	218 (23·4 %)	63 (6·8%)	85·1%	27·0%	60·5%	87·4%	73·2%	11·7%
Latin America (n=1,518)	2,403	2,170	403 (26·5%)	231 (15·2%)	81·4%	40·3%	84·4%	76·5%	64·1%	19·9%
North America (n=2,139)	3,125	2,752	511 (23·9 %)	127 (5·9%)	84·9%	39·6%	73·1%	77·3%	85·8%	18·5%
Total (n=29,891)	41,213	36,792	5,926 (19·8%)	1,769 (5·9%)	76·9%	38·3%	71·4%	74·3%	77·4%	19·2%

Data are n or %. *Patients receiving at least one antibiotic for systemic therapeutic use only (ie, health-care-associated or community-acquired infection). †Includes all antimicrobials; the total number of antimicrobial prescriptions was used to calculate percentages. ‡Patients who received at least one parenteral antibiotic for systemic use. $Antibiotic prescriptions for which guidelines were available to guide antibiotic choice (not route, dose, or duration), which was calculated as all antibiotic prescription for which a local guideline was available/all antibiotic prescription. ¶The number of antibiotic prescriptions for which guidelines were available was used as the denominator to calculate percentages. llThe total number of antibiotic prescriptions was used as the denominator to calculate percentages. **Includes South, East, and Southeast Asia.

"The Global-PPS showed that worldwide surveillance can be accomplished with voluntary participation."

"…. [it] not only contributes to continued worldwide awareness about antibiotic use and resistance, but also helps participants to set targets to improve antibiotic prescribing, thereby driving improved prescribing behavior."

KEY FINDINGS

- Worldwide surveillance of antimicrobial prescribing and resistance can be achieved based on voluntary participation using an easy-to-follow study protocol.
- The Global-PPS tool can help build a sustainable hospital surveillance framework with a focus on LMICs, which often have the highest prevalence of antibiotic prescribing and resistance.

CLICK TO ACCESS ARTICLE

LANCET GLOBAL HEALTH
2019;7(7):e861-e871

Use of the WHO Access, Watch, and Reserve classification to define patterns of hospital antibiotic use (AWaRe): an analysis of paediatric survey data from 56 countries.

Hsia Y, Lee BR, Versporten A, Yang Y, Bielicki J, Jackson C, Newland J, Goossens H, Magrini N, Sharland M; GARPEC and Global-PPS networks.

OBJECTIVE

This paper presents data from the first global, collaborative study of patterns of antibiotic use among hospitalized children and neonates based on the WHO AWaRe antibiotic classification. The survey combined Point Prevalence Survey (PPS) data from 56 countries to support the development of clear pediatric stewardship guidance for hospitals worldwide.

AWaRe: Access, Watch, and Reserve antibiotics

The AWaRe classification is a system developed in 2017 by the WHO Essential Medicines List (EML) Working Group to optimize the use of antibiotics in hospital settings. The AWaRe antibiotics listed on the EML for Children (EMLc) fall into 3 groups:

- Access: generally narrow-spectrum antibiotics recommended as first and second choice for most common clinical infection syndromes
- Watch: generally broader spectrum antibiotic classes corresponding to the highest priority agents on the list of critically important antimicrobial drugs for human medicine
- Reserve: last-resort antibiotics for targeted use in multidrug-resistant infections

STUDY DESIGN

The authors combined one-day PPS antibiotic prescription data from two independent global networks, GARPEC* and Global-PPS**. The study included hospital inpatients younger than 19 years who received at least one antibiotic on the day of the survey.

Both overall antibiotic use and condition-specific patterns of the use of AWaRe antibiotics were analyzed for two groups: children and neonates. Overall antibiotic use was assessed by looking at variations in the prescription of Access, Watch, and Reserve antibiotics. Condition-specific patterns were identified by determining the most common clinical indications treated with antibiotics.

Data were collected from 23,572 hospitalized patients in 56 countries: 18,305 children (77.7%) and 5,267 neonates (22.3%).

RESULTS

The study revealed substantial variation in the use of AWaRe antibiotics prescribed to children and neonates in different regions of the globe, as illustrated in **Figure 1**.

The three antibiotics most frequently prescribed for children in hospitals were:

- ceftriaxone (Africa, the Eastern Mediterranean, Europe, and South-East Asia),
- sulfamethoxazole-trimethoprim (the Americas),
- azithromycin (Western Pacific region).

In children, lower respiratory tract infection was the most common indication treated with antibiotics, followed by prophylaxis for medical problems and prophylaxis for surgical disease. Neonates received antibiotics for diagnoses of sepsis, newborn prophylaxis for newborn risk factors, and lower respiratory tract infection, as illustrated in **Table 1** (see page 16).

The countries where antibiotic use was greatest in hospitalized children included Slovenia, which had the highest percentage of Access antibiotic use (61.2%), followed by Spain (59.8%) and Chile (59.0%). China had the lowest percentage of Access antibiotic use (7.8%) among the countries included in the study, as shown in **Figure 2** (see page 16). Watch antibiotic use was highest in Iran (77.3%) and lowest in Finland (23%). Reserve antibiotic use was low in all countries.

One original feature of this study is that it drew on data on antibiotic use in children from high-income countries (HICs) as well as low-income and middle-income countries (LMICs). HICs are typically the main source of information for surveys of this type, while data tend to be in short supply in LMICs.

* GARPEC: Global Antimicrobial Resistance, Prescribing, and Efficacy in Neonates and Children
** Global-PPS: Global Point Prevalence Survey on Antimicrobial Consumption and Resistance

Figure 1. Regional patterns of AWaRe antibiotic prescribing to children by drug utilization 90%
Adapted from Hsia Y. et al. *Lancet Glob Health* 2019;7:e861-e871

Africa
5 countries; 12 hospitals; 906 prescriptions

Ceftriaxone	109 (12·0%)
Gentamicin	91 (10·0%)
Ampicillin	69 (7·6%)
Sulfamethoxazole-trimethoprim	66 (7·3%)
Amoxicillin	58 (6·4%)
Metronidazole	50 (5·5%)
Cefuroxime	48 (5·3%)
Amoxicillin and inhib	44 (4·9%)
Meropenem	41 (4·5%)
Ciprofloxacin	34 (3·8%)
Vancomycin	25 (2·8%)
Cloxacillin	23 (2·5%)
Cefotaxime	23 (2·5%)
Amikacin	23 (2·5%)
Ertapenem	20 (2·2%)
Azithromycin	19 (2·1%)
Benzylpenicillin	15 (1·7%)
Clindamycin	13 (1·4%)
Chloramphenicol	13 (1·4%)
Erythromycin	12 (1·3%)
Sulfamoxole–trimethoprim	11 (1·2%)
Piperacillin and inhib	10 (1·1%)

Americas
6 countries; 63 hospitals; 13,610 prescriptions

Sulfamethoxazole–trimethoprim	1,510 (11·1%)
Ceftriaxone	1,329 (9·8%)
Vancomycin	1,284 (9·4%)
Piperacillin and inhib	865 (6·4%)
Cefepime	844 (6·2%)
Clindamycin	810 (6·0%)
Cefazolin	746 (5·5%)
Metronidazole	641 (4·7%)
Meropenem	570 (4·2%)
Amoxicillin	443 (3·3%)
Azithromycin	431 (3·2%)
Ampicillin	370 (2·7%)
Erythromycin	363 (2·7%)
Ceftazidime	323 (2·4%)
Amoxicillin and inhib	321 (2·4%)
Tobramycin	296 (2·2%)
Ciprofloxacin	283 (2·1%)
Ampicillin and inhib	276 (2·0%)
Gentamicin	223 (1·6%)
Amikacin	192 (1·4%)
Levofloxacin	173 (1·3%)

Eastern Mediterranean
6 countries; 10 hospitals; 817 prescriptions

Ceftriaxone	198 (24·2%)
Vancomycin	69 (8·5%)
Metronidazole	60 (7·3%)
Cefotaxime	55 (6·7%)
Amikacin	47 (5·8%)
Piperacillin and inhib	39 (4·8%)
Meropenem	38 (4·7%)
Azithromycin	28 (3·4%)
Ampicillin	27 (3·3%)
Gentamicin	26 (3·2%)
Clindamycin	25 (3·1%)
Sulfamethoxazole–trimethoprim	24 (2·9%)
Cefuroxime	21 (2·6%)
Amoxicillin	19 (2·3%)
Penicillins combination	15 (1·8%)
Ciprofloxacin	13 (1·6%)
Teicoplanin	12 (1·5%)
Imipenem and inhib	11 (1·4%)
Clarithromycin	11 (1·4%)

Europe
28 countries;160 hospitals; 7,092 prescriptions

Ceftriaxone	714 (10·1%)
Amoxicillin and inhib	646 (9·1%)
Ampicillin	69 (7·6%)
Sulfamethoxazole–trimethoprim	481 (6·8%)
Piperacillin and inhib	395 (5·6%)
Cefuroxime	343 (4·8%)
Meropenem	333 (4·7%)
Gentamicin	303 (4·3%)
Cefotaxime	289 (4·1%)
Metronidazole	263 (3·7%)
Vancomycin	260 (3·7%)
Amoxicillin	254 (3·6%)
Azithromycin	242 (3·4%)
Amikacin	234 (3·3%)
Cefazolin	218 (3·1%)
Ciprofloxacin	205 (2·9%)
Ceftazidime	205 (2·9%)
Ampicillin	194 (2·7%)
Clarithromycin	156 (2·2%)
Teicoplanin	121 (1·7%)
Trimethoprim	103 (1·5%)
Flucloxacillin	102 (1·4%)
Tobramycin	89 (1·3%)
Clindamycin	89 (1·3%)
Colistin	80 (1·1%)
Ampicillin and inhib	72 (1·0%)

South-East Asia
2 countries; 10 hospitals; 995 prescriptions

Ceftriaxone	153 (15·4%)
Meropenem	99 (10·0%)
Amoxicillin and inhib	89 (8·9%)
Cefotaxime	79 (7·9%)
Amikacin	74 (7·4%)
Metronidazole	50 (5·0%)
Vancomycin	35 (3·5%)
Sulfamethoxazole–trimethoprim	34 (3·4%)
Piperacillin and inhib	33 (3·3%)
Cefoperazone combination	30 (3·0%)
Colistin	25 (2·5%)
Ciprofloxacin	25 (2·5%)
Amoxicillin	25 (2·5%)
Ofloxacin	24 (2·4%)
Cefazolin	23 (2·3%)
Cefuroxime	19 (1·9%)
Ceftazidime	19 (1·9%)
Azithromycin	19 (1·9%)
Cefixime	12 (1·2%)
Levofloxacin	11 (1·1%)
Ampicillin	10 (1·0%)
Piperacillin	9 (0·9%)

Western Pacific
7 countries; 44 hospitals; 3,863 prescriptions

Azithromycin	455 (11·8%)
Ceftriaxone	333 (8·6%)
Latamoxef	258 (6·7%)
Sulfamethoxazole–trimethoprim	234 (6·1%)
Meropenem	207 (5·4%)
Amoxicillin and inhib	197 (5·1%)
Erythromycin	179 (4·6%)
Piperacillin and inhib	166 (4·3%)
Cefoperazone combination	164 (4·3%)
Vancomycin	136 (3·5%)
Ceftizoxime	130 (3·4%)
Cefazolin	114 (3·0%)
Cefuroxime	113 (2·9%)
Cefotiam	74 (1·9%)
Cefotaxime	64 (1·7%)
Mezlocillin	62 (1·6%)
Cefepime	61 (1·6%)
Imipenem and inhib	48 (1·2%)
Ceftazidime	48 (1·2%)
Mezlocillin–sulbactam	45 (1·2%)
Linezolid	45 (1·2%)
Cefmenoxime	44 (1·1%)
Gentamicin	42 (1·1%)
Ampicillin	42 (1·1%)
Metronidazole	40 (1·0%)
Ceftriaxone comb.	39 (1·0%)
Amoxicillin	37 (1·0%)
Cefoperazone	35 (0·9%)
Ampicillin and inhib	34 (0·9%)
Flucloxacillin	29 (0·8%)

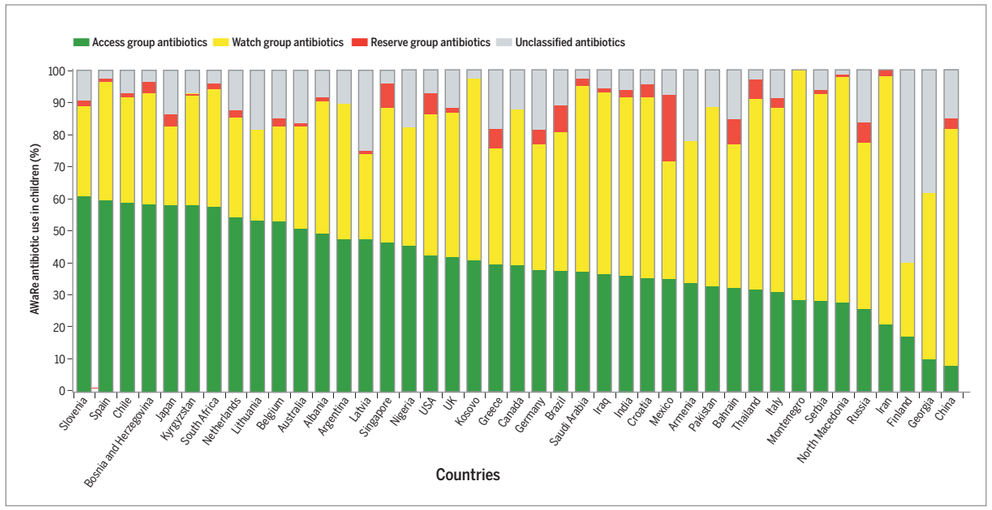
Access group antibiotics Watch group antibiotics Reserve group antibiotics Unclassified antibiotics

Table 1. Most frequently reported clinical indications for antibiotic prescribing to children and neonates
Adapted from Hsia Y. et al. *Lancet Glob Health* 2019;7:e861-e871

	CHILDREN (>1 MONTH)	NEONATES (≤30 DAYS)
Bacterial lower respiratory tract infection	21·3%	12·5%
Prophylaxis for medical problems	17·0%	8·1%
Prophylaxis for surgical disease	9·4%	6·5%
Other	7·0%	5·2%
Sepsis	6·0%	28·3%
Febrile neutropenia or fever	5·1%	-
Gastrointestinal tract infections	4·9%	4·2%
Skin or soft tissue infections*	4·7%	2·7%
Urinary tract infections	3·8%	-
Upper respiratory tract infections	3·3%	-
Newborn prophylaxis for newborn risk factors	-	12·8%
CNS infections	-	4·3%
Newborn prophylaxis for maternal risk factors	-	4·2%

*Includes surgical site infection and burns.

Figure 2. Percentage of total antibiotic use in children by WHO AWaRe classification by country
Adapted from Hsia Y. et al. *Lancet Glob Health* 2019;7:e861-e871



CONCLUSIONS

New and simpler methods are needed to monitor patterns of antibiotic use, especially for pediatric populations in hospitals. Based on the findings of this first global collaborative survey, a simple PPS method is feasible to assess patterns of AWaRe antibiotic use globally, and could address this need.

Moreover, the AWaRe classification could be adopted by pediatric antibiotic stewardship programs as an easy-to-use metric to monitor and compare antibiotic use between hospitals and within hospitals. It offers a framework for the assessment of patterns of both narrow- and broad-spectrum antibiotic use.

In addition, the AWaRe classification may potentially provide an indicator for clinicians and policy makers to identify inappropriate antibiotic use in order to develop and improve specific antibiotic stewardship guidance.

In LMICs, the use of a simple, relatively cheap, cross-sectional PPS method appears to facilitate data collection. This method could be used to improve surveillance and guidance in these countries, where stewardship programs are not typically available.

Finally, the WHO AWaRe classification could be adopted as a "traffic light" metric of antibiotic use, based on color codes for each antibiotic group:

- Green: Access
- Amber: Watch
- Red: Reserve

Using this tool, future efforts could focus on developing and evaluating pediatric antibiotic stewardship programs based on the AWaRe index.

"The use of a simple PPS method is feasible to assess patterns of AWaRe antibiotic use in hospitalized children globally."

"The AWaRe classification could potentially be used as a simple traffic light metric of appropriate antibiotic use."

KEY FINDINGS

- This is the first global, collaborative study of patterns of antibiotic use in hospitalized children using the WHO AWaRe classification.
- There is substantial variation in the proportion of AWaRe antibiotics used among neonates and children in hospital settings worldwide.
- The use of a simple, relatively cheap, cross-sectional PPS method makes it possible to collect data in low-income and middle-income countries (LMICs), where antibiotic surveillance and stewardship programs are not routinely available.
- Adopting the AWaRe classification as a "traffic light" metric of antibiotic use represents a valuable tool to improve antibiotic stewardship in hospitals in all regions of the globe.

CLICK TO ACCESS ARTICLE

THE PEDIATRIC INFECTIOUS DISEASE JOURNAL
2019;38(11):1104-1106

Global Divergence From World Health Organization Treatment Guidelines for Neonatal and Pediatric Sepsis.

Jackson C, Hsia Y, Basmaci R, Bielicki J, Heath PT, Versporten A, Goossens H, Sharland M.

OBJECTIVES

This study aimed to determine the treatment of sepsis in hospitalized neonates and children, and the level of adherence to World Health Organization (WHO) recommendations for first-line and second-line treatments.

The analysis used combined data from 2 global point prevalence surveys (PPSs) of antibiotic prescribing: the Global Antimicrobial Resistance, Prescribing and Efficacy in Neonates and Children (GARPEC) study and the Global Point Prevalence Survey (Global-PPS) on Antimicrobial Consumption and Resistance (year 2015).

STUDY DESIGN

Data collected in the above-mentioned PPSs was analyzed. These PPSs were conducted in 56 countries through 297 voluntarily participating hospitals reporting the numbers of children and neonates with an active antimicrobial prescription admitted on the day of the PPS.

The current analysis studied the prescription of antibiotics (excluding antifungals, antivirals and antituberculosis therapies) used to treat neonates (< 30 days of age) and children (≥ 30 days and ≤ 18 years) with a recorded diagnosis of sepsis. The percentages of neonates and children with sepsis who received a WHO-recommended first-line or second-line treatment were calculated. Data was also calculated separately for community- and hospital-acquired infections (CAI and HAI) and countries were stratified into high and low/middle income (HICs and LMICs).

RESULTS

This study provides data on antibiotic prescribing for neonatal and pediatric sepsis in 43 countries.

Overall, 185/824 (22.5%) neonates and 9/786 children (1.1%) received a WHO-recommended first-line treatment (ampicillin/gentamicin or benzylpenicillin/gentamicin). Of the remainder, 9/639 neonates (1.4%) and 102/777 children (13.1%) received the WHO-recommended second-line treatment (ceftriaxone).

Amongst neonates, 136/347 (39.2%) with CAI received a WHO-recommended first-line treatment, compared with 17/380 (4.5%) of those with HAI. Ceftriaxone alone was prescribed to 4 neonates with CAI and 4 with HAI. Amongst children, 6/360 (1.7%) with CAI received a WHO-recommended first-line treatment, compared with 2/384 children (0.5%) with HAI, and 91 (25.3%) with CAI received the recommended second-line treatment, compared with 10/384 children (2.6%) with HAI.

In HICs, WHO-recommended first-line treatments for neonates and WHO-recommended second-line treatment for children were the most commonly prescribed regimens. In LMICs, meropenem was found to be more frequently prescribed than the WHO-recommended treatments in both neonates and children **(Figure 1).**

CONCLUSION

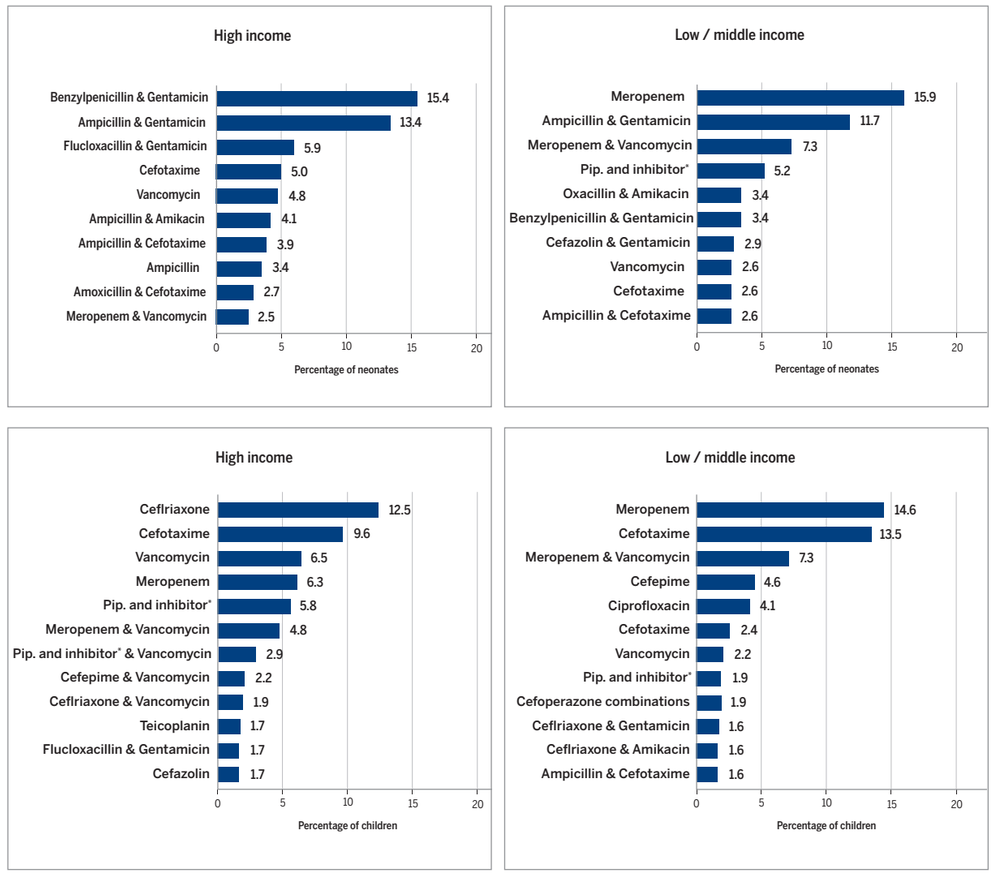
The treatment of neonatal and pediatric sepsis varied significantly among the HICs and LMICs included in the GARPEC and Global-PPS studies. Although WHO-recommended first-line and second-line treatments were the most commonly prescribed overall, most neonates and children with sepsis did not receive these treatments. Furthermore, a wide variety of antibiotics and antibiotic combinations were found to be used globally.

Reasons for the low adherence to guidance need to be explored, including whether prescribed treatments are appropriate, given the global diversity of sepsis pathogens, and whether WHO guidance should be updated to take into account varying antimicrobial resistance patterns worldwide.

KEY FINDINGS

- This analysis used data from two global point prevalence studies on antimicrobial prescribing: the GARPEC and Global-PPS studies.
- It shows a lack of compliance with WHO-recommended antibiotic treatments for sepsis in neonates and children, with substantial differences in antibiotic prescribing between high-income and low/middle income countries.
- The reasons behind the lack of compliance require further investigation.

Figure 1. Ten most commonly prescribed antibiotic regimens amongst hospitalized neonates and children with sepsis, by country income status. (The graphs for children in both HICs and LMICs includes 12 regimens as there were equal numbers of prescriptions for some regimens.) Numbers show the percentage of patients.
Adapted from Jackson C. et al. *Pediatr Infect Dis J.* 2019;38(11):1104-1106



* Pip. and inhibitor = piperacillin and beta lactamase inhibitor

"There is substantial variation in the treatment of neonatal and pediatric sepsis amongst the HICs and LMICs included in the GARPEC and Global-PPS studies."

CLICK TO ACCESS ARTICLE

JOURNAL OF ANTIMICROBIAL CHEMOTHERAPY
2017;72(10):2906-2909

Is there any difference in quality of prescribing between antibacterials and antifungals? Results from the first global point prevalence study (Global PPS) of antimicrobial consumption and resistance from 53 countries.

Yusuf E, Versporten A, Goossens H.

OBJECTIVE

This study aimed to compare the quality of antibacterial prescribing with antifungal prescribing worldwide.

STUDY DESIGN

Data were used from the first Global-PPS of antimicrobial consumption and resistance, which took place in 2015 and was based on voluntary participation. This study collected data on patient demographics (age, gender, body weight) and prescription characteristics (dose per administration, dosing frequency, route of administration, diagnosis and whether the infection was community- or hospital-acquired).

For this study, specific quality indicators were analyzed: reason for prescription and treatment, stop/review date documented in patient notes, and compliance with local guidelines. Logistic regression analysis was used to assess differences in the quality of antibiotic and antifungal prescriptions.

RESULTS

Data from 335 hospitals in 53 countries concerned 48,565 antimicrobial prescriptions for 34,731 patients taking part in the 2015 Global-PPS. Antimicrobial prescriptions included 43,513 antibacterials (89.6%) and 2,062 antifungals for systematic use (4.3%).

The findings revealed several differences in the quality of prescribing between antibacterials and antifungals (**Table 1**). Regional differences were observed for all quality indicators worldwide.

CONCLUSIONS

This comparative study highlighted clear differences in the quality of antibacterial and antifungal prescription using the best estimates of antimicrobial treatment of around 35,000 patients in the world on a single day.

The authors put forward several hypotheses for these differences, including:

- In patient notes, mentioning the reason for antibacterial prescription more often than for antifungals may be due to the fact that, for antifungals, the reason is considered obvious, and antifungals are more often prescribed in compliance with guidelines;
- Indications for antifungal prescriptions are more limited than for antibacterials;
- The diagnosis of fungal infections is more difficult than the diagnosis of bacterial infections;
- From a cost perspective, antifungals are more expensive than antibacterials and prescribers tend to make a more informed decision when costs are higher;
- The duration of antibacterial therapy is more clearly established than that of antifungal therapy, which may explain why a treatment stop/review date was mentioned more often for antibacterials;
- Higher prescription of oral antifungals may be due to their more frequent use for prophylaxis.

To date there have been few publications on the quality of antifungal prescriptions, and this study supports the availability of this type of information to allow the assessment and improvement of antimicrobial stewardship implementation.

KEY FINDINGS

➔ **This study shows clear differences in quality of prescribing between antimicrobials and antifungals. These differences provide opportunities to improve the quality of antimicrobial prescribing.**

Table 1. Differences in quality of prescribing between antibacterials and antifungals
Adapted from Yusuf E, et al. *JAC* 2017;2906-2909

QUALITY INDICATORS	ANTIBACTERIALS	ANTIFUNGALS
Reason for prescribing	77.7%	71.8%
Treatment stop/review date*	38.3%	31.9%
Compliance with local guidelines	57%	71%
Oral administration	55.2%	73.1%

**Stop/review date documentation was low overall (37.9%)*

"We show that there are differences in quality of prescribing between antimicrobials and antifungals. The identified indicators, which are mostly already known, can be used to improve the quality of prescribing antimicrobials."

CLICK TO ACCESS ARTICLE

EPIDEMIOLOGY AND INFECTION
2018;146(8):985-990

Longitudinal point prevalence survey of antibacterial use in Northern Ireland using the European Surveillance of Antimicrobial Consumption (ESAC) PPS and Global-PPS tool.

Al-Taani GM, Scott M, Farren D, Gilmore F, Mccullagh B, Hibberd C, Mccorry A, Versporten A, Goossens H, Zarb P, Aldeyab MA.

OBJECTIVE

This study aimed to evaluate prescribing patterns of antimicrobials in three major secondary care hospitals in Northern Ireland by conducting repeated point prevalence surveys (PPS) at three time points. Additionally, progress in reaching specific targets was measured as part of quality improvement in antimicrobial prescribing practices.

STUDY DESIGN

Three PPSs were conducted over a six-year period to collect data at the three hospitals. The dates and surveys were:

- June 2009: PPS European Surveillance of Antimicrobial Consumption (ESAC)
- June 2011: PPS ESAC repeat of 2009 survey
- May 2015: Global-PPS on Antimicrobial Consumption and Resistance

On a single day, data were collected regarding the prevalence and patterns of antibiotic use. Quantity and quality indicators of the prescriptions were obtained by reviewing patient case notes.

RESULTS

Among a population of 3,605 patients, 1,239 (34.4%) were treated with an antibiotic, and this percentage rose slightly over time. The most frequently prescribed antibiotic groups were a combination of penicillins including ß-lactamase inhibitors, followed by macrolides and penicillins with extended spectrum. The most common clinical indications for prescribing antimicrobials were community-acquired infection (64.6% of patients); hospital-acquired infections (21.3%); surgical prophylaxis (8.9%); and medical prophylaxis (4.4%). The most frequent infection sites were respiratory (33.5%), skin and soft tissue and bone and joint (16.3%), and gastrointestinal sites (15.8%).

In terms of quality indicators, the general trend showed an improvement in compliance with guidelines and duration of surgical prophylaxis over the three study time points (**Table 1**):

- A rise in compliance with hospital antibiotic policies, from 54.5% in 2009 to 79.9% in 2015;
- An increase in recording indications for treatment in patient notes, reaching 90.6% by 2015;
- Consistent reduction in number of prescriptions >24 hours for surgical prophylaxis from 3.9% in 2009 to 0.7% in 2015.

CONCLUSIONS

The findings of this longitudinal study suggest consistent improvement in the quality of prescribing practices with respect to the type of antibiotic, compliance with guidelines and documentation of prescriptions. Repeated PPS also led to increased education and awareness of the importance of single-dose surgical prophylaxis.

The findings indicate that the PPS tool may be used as a convenient, inexpensive surveillance system of antimicrobial consumption, as opposed to continuous surveillance. This tool should be considered an essential component to establish and maintain informed antibiotic stewardship in hospitals.

KEY FINDINGS

- **These results support the hypothesis that repeated PPS allow the identification of targets for quality control relevant to the prescribing of antimicrobials.**
- **This study shows that PPS allows hospitals to benchmark their antibiotic use, both internally and externally, which can lead to optimized antibiotic use and improved clinical practices.**

Table 1. Quality indicators at three time points (2009, 2011 and 2015) in the study hospitals
Adapted from Al-Taani G.M. et al, *Epidemiology and Infection* 2018;12:77-82

INDICATOR		MAY 2009 [a]	JUNE 2011 [b]	MAY 2015
Compliance with the hospital antibiotic guidelines	Compliant	250/459 (54.5%)	414/579 (71.5%)	641/802 (79.9%)
	Not compliant	67/459 (14.6%)	68/579 (11.7%)	104/802 (13.0%)
	Non-assessable	142/459 (30.9%)	97/579 (16.8%)	57/802 (7.1%)
	No information	73/532 (13.7%)	39/618 (6.3%)	16/818 (2.0%)
Indication for treatment was recorded	Yes	471/532 (88.5%)	542/618 (87.7%)	741/818 (90.6%)
Surgical prophylactic antibiotic prescriptions for >24 h	Yes	3.9% [c]	3.2%	0.7%
Treatment based on biomarker data (e.g. C reactive protein)	Yes	NA	NA	61.5%

a One patient's data are missing.
b Includes data collected from Craigavon Area Hospital in Southern Health and Social Care Trust (SHSCT) in February 2012.
c This figure includes data from Altnagelvin Hospital in Western Health and Social Care Trust (WHSCT).

"Improvements were identified in key antimicrobial-related quality-of-service outcomes and attributed to evidence-based, clinical pharmacist-led, antimicrobial stewardship programmes in the study hospitals."

CLICK TO ACCESS ARTICLE

ANTIMICROBIAL RESISTANCE & INFECTION CONTROL
2020;9:13

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

Two Point Prevalence Surveys (PPS) were conducted in 2017 in Belgian acute care hospitals using international standardized methodologies:

- **ECDC-PPS**: A survey of healthcare-associated infections (HAIs) and antimicrobial use organized by the European Centre for Disease Prevention and Control;
- **Global-PPS**: The Global Point Prevalence Survey of antimicrobial consumption developed by the University of Antwerp.

This article presents the combined findings of these surveys.

STUDY DESIGN

Acute care hospitals in Belgian were invited to take part in either survey. Data were collected for all patients present at 8 am on a single day between September and December 2017.

For the ECDC-PPS, one form per admitted patient was completed with patient demographic information, risk factors, antimicrobials received, presence of HAIs and microbiological testing results. For a selected group, antimicrobial susceptibility test results were recorded.

For the Global-PPS, detailed information on patient demographics, antimicrobials, diagnosis, presence of HAIs and resistance data were collected for those patients receiving at least one antimicrobial. Quality indicators were also reported.

RESULTS

A total of 110 Belgian acute care hospital sites accepted the invitation to take part in one of the surveys. Data were collected for 28,007 patients (81.4% participation countrywide): 16,207 patients in the Global-PPS and 11,800 patients in the ECDC-PPS.

Concerning consumption of antimicrobials, 27.1% of all patients were given at least one antimicrobial on the day of the survey and 18.2% multiple antimicrobials. Out of all prescribed antimicrobials, 91.5% were antibacterials for systemic use.

As shown in **Figure 1**, the reasons for antibiotic prescriptions were:

- 51.7%: CAI (Community-Acquired Infections)
- 25.3%: HAI (Healthcare-Associated Infections)
- 11.2%: surgical prophylaxis
- 5.9%: medical prophylaxis
- 2.7%: LAI (Infections present on admission from long-term care facility or chronic-care hospital)

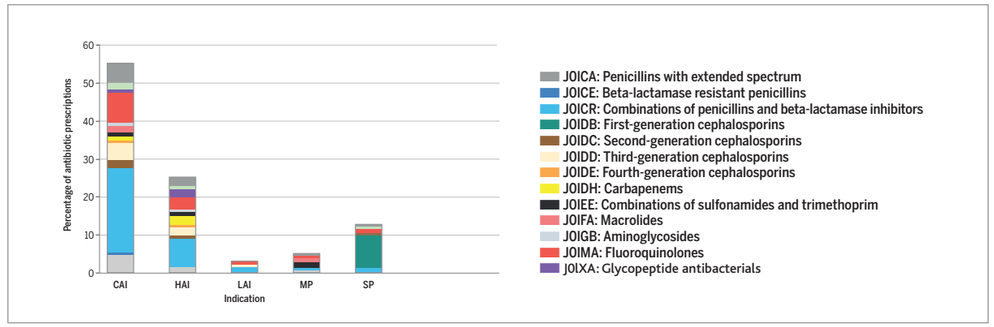
The most commonly-prescribed antibiotics were:

- penicillins with ß-lactamase inhibitors and fluoroquinolones for therapeutic indications (CAI, HAI, LAI);
- combinations of sulfonamides and trimethoprim for medical prophylaxis;
- 1st-generation cephalosporins (especially cefazolin) for surgical prophylaxis.

The most frequent indications for antimicrobial use were pneumonia (23.2%), urinary tract infections (15.2%) and skin and soft tissue infections (11.9%), followed by intra-abdominal sepsis (10.6%) and acute bronchitis (7.1%).

Concerning quality indicators, the reason for using antimicrobial treatment was recorded for 81.9% of prescriptions. A stop/review date was documented for 40.8% of prescriptions and 76.6% complied with local antibiotic guidelines. (This does not meet the Belgian Antibiotic Policy Coordination Committee (BAPCOC) action plan target, which states that 90% of antibiotic prescriptions should comply with local guidelines by 2019.) For surgical prophylaxis, a single dose was given in 35.1% of cases; prophylaxis lasted for one day in 39.7% of cases (multiple doses); and for more than one day in 25.2% of cases.

Figure 1. Percentage of antibiotic prescriptions per antibiotic subclass and indication, total results for Global and ECDC-PPS 2017
Adapted from Vandael E. et al. *ARIC* 2020;9:13



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%

While 17.9% of HAIs were present when the patient was admitted, most (88.9%) were linked to the current hospital setting and 20.9% were associated with an invasive device. For the ECDC-PPS (47 hospital sites / 11,800 patients), the crude prevalence of patients with at least one HAI was 7.3%. Pneumonia (21.6%) and urinary tract infections (21.3%) were the most commonly reported HAIs. The prevalence of patients with at least one HAI in the Global-PPS (64 hospital sites / 16,207 patients) was 6.8%.

CONCLUSIONS

Pooling data from both PPS gives a more complete "snapshot" of current practices and allows for international comparisons. Given the differences between the studies (i.e., more detailed HAI data in the ECDC-PPS and more quality indicators in the Global-PPS), combining information from both surveys resulted in a large database, to which more than 80% of all Belgian acute care hospitals contributed data.

Findings from the 2017 survey were similar to those of previous surveys. The 2017 PPS showed HAI prevalence of 7.3% (ECDC-PPS) and overall antibiotic use of 27.1%. The rates thus remained stable over time (7.1% and 27.4% in 2011 and 2015, respectively).

"In comparison with previous PPS, the prevalence of antimicrobial use and HAI and most results for the antimicrobial quality indicators remained status quo."

KEY FINDINGS

- Combined data from over 80% of Belgian acute care hospitals indicate that the number of patients who develop a HAI remains high.
- Widespread prescribing of fluoroquinolones for therapeutic indications is a cause for concern. Reducing fluoroquinolone prescription rates should be a target for intervention.
- Improved compliance with local guidelines is required to achieve the 2019 BAPCOC target of 90% for all antimicrobial quality indicators.
- The authors recommend encouraging Belgian hospitals to take part in PPS on a regular basis and set local targets to improve antibiotic prescribing and reduce HAI.

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BMC HEALTH SERVICES RESEARCH
2018;18(1):849

Comparative point prevalence survey of antimicrobial consumption between a hospital in Northern Ireland and a hospital in Jordan.

Elhajji FD, Al-Taani GM, Anani L, Al-Masri S, Abdalaziz H, Qabba'h SH, Al Bawab AQ, Scott M, Farren D, Gilmore F, Versporten A, Goossens H, Aldeyab MA.

OBJECTIVE

This study assessed and compared antimicrobial prescribing practices at two secondary-care hospitals with different profiles in two different regions, Western Europe and the Middle East.

STUDY DESIGN

The Global-PPS tool was used to gather information about antibiotic prescription practices and quality control indicators on a single day in 2015 at the Antrim Area Hospital (AAH) in Northern Ireland and the Specialty Hospital (SH) in Amman, Jordan. AAH is a teaching hospital handling acute/emergency hospitalizations, whereas SH is a private teaching hospital which receives emergency and elective admissions from Jordan and nearby Arab countries.

RESULTS

A total of 444 patients at the AAH and 112 patients at the SH were included in this study. Overall, antibiotics were prescribed for 46.2% of patients in the AAH and 78.2% in the SH.

With regard to the frequency of use and type of antibiotics, the survey population was divided into two groups: medical and surgery patients. In the AAH medical group, the most frequently prescribed antibiotics were a combination of penicillins (18.8%) and penicillins with extended spectrum (18.8%), followed by macrolides (9.6%), tetracyclines (8.8%) and imidazole derivatives (7.5%). In the AAH surgery group, the most frequently prescribed antibiotics were imidazole derivatives (24.2%), a combination of penicillins (19.7%), aminoglycosides (19.7%) and extended spectrum penicillins (13.6%). For both medical and surgery patients at the SH, more broad-spectrum antibiotics were used, in particular third-generation cephalosporins (26.2% and 37.5% respectively), fluoroquinolones and carbapenems.

For medical patients, community-acquired infection was the most frequent clinical indication for prescribing antibiotics at both hospitals (71.1% for AAH vs. 60% in SH). For surgery patients at the SH, surgical prophylaxis was the most common indication (89.2%).

Regarding compliance with quality indicators, as illustrated in **Table 1**, overall compliance with prescribing guidelines among medical patients reached 92.2% at the SH in Jordan and 72.0% at AAH Northern Ireland. Compliance for surgical patients was 92.7% at the SH, compared to 81.8% at AAH. Reasons for antibiotic prescription were documented in 100 and 94.1% of the notes for medical patients, and 98.2 and 83.3% for surgical patients in SH and AAH, respectively. The stop/review date was documented in the medical notes for approximately half of the inpatients in both SH and AAH. Biomarker data was used to guide the choice of antimicrobial therapy in 70.3% of AAH medical patients, compared to 53.8% at the SH, and 42.4% of AAH surgical patients versus 28.6% of SH patients.

CONCLUSIONS

This comparative PPS revealed a general trend to prescribe broad-spectrum antibiotics at the SH and the use of a combination of pencillins at the AAH.

The higher prescribing rate observed in the SH compared to the AAH could be attributed to a higher proportion of surgical patients at SH, increasing surgical prophylaxis prescriptions.

Overall, a higher level of compliance with quality indicators was observed in the SH than in the AAH. The very high level of compliance in both hospitals with documenting the reason for antibiotic prescription could be attributed to the availability of antimicrobial stewardship programs in the AAH and local guidelines in the SH.

Performed in two different hospital settings, this survey enabled benchmarking of current prescribing practices, which could be improved through the implementation of antibiotic stewardship programs.

Table 1. Targets for quality control among study hospitals
Adapted from Elhajji F.D. et al, *BMC Health Serv Res*. 2018;18:849

GROUP		MEDICAL			SURGICAL		
		Antrim Area Hospital (239 antibiotic prescriptions); n (%)	Specialty Hospital (65 antibiotic prescriptions); n (%)	p value	Antrim Area Hospital (66 antibiotic prescriptions); n (%)	Specialty Hospital (56 antibiotic prescriptions); n (%)	p value
Compliance with guidelines (% of prescribed antibiotics)	Compliant	172/239 (72.0%)	59/64 (92.2%)	< 0.001	54/66 (81.8%)	51/55 (92.7%)	0.012
	Not compliant	45/239 (18.8%)	1/64 (1.6%)		10/66 (15.2%)	0	
	Non assessable	22/239 (9.2%)	4/64 (6.3%)		2/66 (3.0%)	4/55 (7.3%)	
	No information	0	1/65 (1.5%)		0	1/56 (1.8%)	
Reason for prescribing antibiotic is documented		225 (94.1%)	65 (100%)	0.046	55 (83.3%)	55 (98.2%)	0.006
Stop/review date is documented		125 (52.3%)	31 (47.7%)	0.510	32 (48.5%)	36 (64.3%)	0.080
Treatment based on biomarker data (e.g. C reactive protein)		168 (70.3%)	35 (53.8%)	0.001	28 (42.4%)	16 (28.6%)	0.112

"The PPS proved useful for the collection of quality control data related to antimicrobial use and identifying targets for quality control."

KEY FINDINGS

- Compliance with antibiotic guidelines and documentation of reasons for prescribing antibiotics were found to be satisfactory in both hospitals in this study.
- A higher prescription rate and the use of more broad-spectrum antibiotics were observed in the Specialty Hospital (Jordan) compared with the Antrim Area Hospital (Northern Ireland).
- This point prevalence survey served as a benchmark for prescription practices to support improvement in antibiotic stewardship across both hospitals.

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JOURNAL OF INFECTION AND PUBLIC HEALTH
2019;12(1):77-82

Point prevalence survey of antibiotic use in 26 Saudi hospitals in 2016.

Al Matar M, Enani M, Binsaleh G, Roushdy H, Alokaili D, Al Bannai A, Khidir Y, Al-Abdely H.

OBJECTIVE

This paper presents the findings of the 2016 Global Point Prevalence Survey (Global-PPS) conducted in 26 Saudi Ministry of Health (MOH) hospitals, which provide nearly 60% of healthcare services in the country, with the aim of assessing antibiotic prescribing trends.

STUDY DESIGN

A cross-sectional, one-day survey was conducted in May 2016. Information about antibiotic use and infections was collected using the Global-PPS electronic tool.

RESULTS

Nearly half of the patients in the 26 participating hospitals were taking one or more antibiotics on the day of the survey. Among a total population of 4,535 patients, 2,128 (46.9%) received 3,240 antibiotic doses.

The most commonly prescribed antibiotic group was third-generation cephalosporins (17.2%), with ceftriaxone being the antibiotic used most often (11.7%). The most common indication by infection site was for respiratory tract infections (18.2%).

The indications for prescribing antibiotics included: community-acquired infections (31.3%); surgical prophylaxis (23.4%); healthcare-associated infections (16.4%); and medical prophylaxis (11.2%). Among patients on antibiotics, 24.0% were in ICU; 30.4% were receiving treatment for medical problems; and 45.7% were surgery patients.

Compliance with antibiotic prescription guidelines was low, with a 48.1% rate of adherence. Specifically, the indication for antibiotics was not documented in the patient's notes for 51.1% of the prescriptions. A request for a stop/review date was documented in 56.3% of cases. Among surgery patients, 78% received prophylactic antibiotics for more than 24 hours, despite the recommendation to use a single dose for most indications.

CONCLUSIONS

This Global-PPS addressed a lack of data and contributed to a better understanding of antibiotic prescribing practices across all regions of Saudi Arabia.

To strengthen the national antimicrobial stewardship program, a reduction in the use of broad-spectrum antibiotics, especially ceftriaxone, was identified as a key area for improvement.

Other areas for improvement include reducing the length of use of antibiotics for surgical prophylaxis, and increasing rates for documenting reasons for antibiotic use, as well as for defining a stop or review date.

"This national PPS provided a useful tool to identify targets for quality improvement in order to enhance the prudent use of antibiotics in hospital settings. This survey can provide a background to assess the quality of antibiotic utilisation after any intervention by administering it regularly."

KEY FINDINGS

- This was the first survey to assess antibiotic prescribing practices in hospitals across all regions of Saudi Arabia.
- This Global-PPS helps to identify targets to strengthen antibiotic stewardship in Saudi hospitals, where low compliance (48.1%) with antibiotic prescription guidelines was observed.
- The survey findings confirm the effectiveness of regularly conducting the Global-PPS to provide a benchmark for improved compliance with antibiotic prescription guidelines.

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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 on behalf of Brazilian Global-PPS working group.

OBJECTIVE

This study aimed to evaluate antimicrobial use across 18 Brazilian hospitals that joined the Global Point Prevalence Survey (Global-PPS) project in 2017.

STUDY DESIGN

In 2017, 18 Brazilian hospitals conducted a Global-PPS to collect data about antimicrobial use from patients' case notes and prescribing charts.

RESULTS

Data were collected from 1,801 patients, of whom 941 (52.2%) received antimicrobials on the day of the survey. Prevalence rates ranged from 48.6% in the south to 60.4% in the northeast. Four hundred patients (42.5%) were given two or more antimicrobials.

Ceftriaxone (12.8%), meropenem (12.3%) and vancomycin (10.3%) were the most frequently prescribed antimicrobials, followed by piperacillin with a beta-lactamase inhibitor (9.3%).

The highest prevalence rates were seen in adult and pediatric ICUs (60.3% and 71.1%, respectively). Antibiotics were prescribed for community-acquired infections or CAIs (39%), healthcare-associated infections or HAIs (40.5%) and as prophylaxis for medical and surgery patients (18.8%). For therapeutic use, the most frequent indication was pneumonia or lower tract respiratory infection (29.2%)

Compliance with guidelines for antimicrobial use was high: 82.7% for CAIs and 83.1% for HAIs.

C-reactive protein was the only biomarker used to guide treatment for CAIs (21.8%) and HAIs (33.8%). When the antimicrobial treatment choice was based on microbiological reports, information collected on the targeted multidrug-resistant organisms (MDRO) showed that gram-negative bacteria accounted for 75% of the MDRO of CAIs and 78.2% of HAIs.

Although adherence to guidelines was high, antibiotics were mainly prescribed empirically (81.2%). Broad-spectrum antibiotics were most frequently used with very high rates of intravenous administration, 88.7% for HAIs and 89.6% for CAIs.

CONCLUSIONS

This study showed a high prevalence of antimicrobial use (52.2%), as well as the high proportion of antibiotics prescribed for HAIs (40.5%) in Brazilian hospitals, compared with other low- and middle-income countries.

Many South American countries report a trend of increasing antimicrobial resistance in Gram-negative bacteria. The survey findings suggested inappropriate antibiotic prescribing patterns, and indicated that de-escalation strategies need to be stepped up to increase targeted treatment. In addition, regional variations may reflect differences in the impact of a 2010 law restricting over-the-counter sales of antimicrobial drugs (i.e., a drop in sales).

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

KEY FINDINGS

- This was the first large-scale PPS of antimicrobial use in Brazilian hospitals as part of an international study (the Global-PPS).
- The survey showed a high prevalence of antimicrobial use in Brazil, especially broad-spectrum antibiotics prescribed empirically, highlighting the need to strengthen de-escalation strategies.
- This study confirmed that Global-PPS data can be very useful to set targets to improve antibiotic prescribing practices and stewardship programs.

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JOURNAL OF HOSPITAL INFECTION
2019;103(3):280-283

Variations In Antibiotic Use Across India - Multicentre Study Through Global Point Prevalence Survey.

Singh SK, Sengupta S, Antony R, Bhattacharya S, Mukhopadhyay C, Ramasubramanian V, Sharma A, Sahu S, Nirkhiwale S, Gupta DS, Rohit A, Sharma S, Raghavan V, Barman P, Sood S, Mamtora D, Rengaswamy S, Arora A, Goossens H, Versporten A.

OBJECTIVE

This study aimed to assess antimicrobial prescribing patterns and variations in use among hospitals across India, a country which has a high burden of antimicrobial resistance and infectious diseases.

STUDY DESIGN

A Point Prevalence Survey (PPS) survey was conducted using the Global-PPS web-based application from October to December 2017 in 16 tertiary-care hospitals in India. Initially, 25 hospitals had planned to participate in the Global-PPS, but only 16 obtained approval from their ethics committee.

Two major categories were used: antibiotic prescribing for treatment of community-acquired and healthcare-associated infections, and prescribing for both surgical and medical prophylaxis. Quality indicators primarily included documentation of diagnosis in patient notes on treatment initiation, choice of antibiotic compliant with local guidelines, and documentation in notes of a treatment stop or review date.

RESULTS

Data were collected from all patients in medical wards, surgical wards, intensive care and critical care departments. Of 1,750 patients, 1,005 (57.4%) received at least one antimicrobial on the day of the survey.

The most common indications for prescribing antibiotics included community-acquired infections (26.9%), hospital-acquired infections (19.2%), medical prophylaxis (17.2%), and surgical prophylaxis (28.7%). The most frequent diagnoses to be treated with therapeutic antimicrobials were pneumonia/lower respiratory tract infection (19.9%) followed by skin and soft tissue infection (7.6%).

The most commonly prescribed antibiotics for surgical prophylaxis were cefuroxime (36%), amikacin (10%), and ceftriaxone (8%). For medical prophylaxis, the antibiotics prescribed most often were ceftriaxone (24%), piperacillin-tazobactam (8%) and meropenem (8%).

The use of quality indicators was not widespread, as shown in **Table 1**.

Contrary to recommendations for most surgical procedures in international guidelines, 77% of patients who received surgical prophylaxis were treated for more than one day.

For patients receiving specific antimicrobial treatment based on microbiology reports, a record was kept of one of the nine targeted multidrug-resistant organisms (MDROs). A total of 77 MDROs were found.

CONCLUSIONS

This PPS revealed high levels of antibiotic use in the 16 participating hospital centers. Antimicrobial prescriptions for both medical and surgical prophylaxis were higher than in many other studies: 57.4% prevalence in this study compared to 34.4% in a 2015 Global-PPS across 53 countries.

The authors recommend documenting the reason for prescribing antibiotics in the medical record as a key quality improvement target, to promote communication among healthcare providers and to facilitate antibiotic stewardship.

They also emphasize that prolonged prophylaxis (more than one day) must be addressed as a critical quality indicator to combat antimicrobial resistance.

KEY FINDINGS

- **This was the first PPS conducted in multiple hospitals (16 total) across India to assess antibiotic use patterns.**
- **Survey findings showed high levels of antibiotic use in hospitals across India (57.4% prevalence).**
- **The survey also highlighted a high level of non-compliance with international guideline recommendations regarding prescription of a single (one-day) dose of surgical prophylaxis.**
- **One of the strengths of this survey was the opportunity it created for real-time educational feedback with the participating centers.**

Table 1. Summary of quality indicators for antibiotic use
Adapted from Singh SK, et al. *J Hosp Infect*. 2019;30229-4

QUALITY INDICATORS	MEDICAL WARD		SURGICAL WARD		ICU	
	No.	%	No.	%	No.	%
Reason for prescribing documented in notes	188	45.5	178	47.3	245	37.9
Guidelines missing	85	20.6	91	24.2	103	15.9
Guideline compliant	167	70.2	142	70	276	79.5
Stop/review date documented	78	18.9	181	48.1	315	48.7

"The results of the survey underline the need for antibiotic stewardship in order to promote rational and evidence-based practice, and [...] help identify targets for quality improvement."

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ANNALS OF TROPICAL PATHOLOGY
2017;8(1):42-46

A Point Prevalence Survey of Antimicrobial Prescribing in Four Nigerian Tertiary Hospitals.

Oduyebo OO, Olayinka AT, Iregbu KC, Versporten A, Goossens H, Nwajiobi-Princewill PI, Jimoh O, Ige TO, Aigbe AI, Ola-Bello OI, Aboderin AO, Ogunsola FT.

OBJECTIVE

The aim of this study was to acquire baseline information about antimicrobial-prescribing practices in Nigeria.

STUDY DESIGN

From April to June 2015, the Global Point Prevalence Survey (Global-PPS) was conducted across all clinical departments at four tertiary hospitals in Nigeria.

Information was collected about the rate and characteristics of antibiotic use including prevalence, types of antibiotics prescribed, treatment indications, quality indicators and compliance with guidelines.

RESULTS

A total of 828 patients were included in the survey, of whom 69.7% received at least one antimicrobial on the day of the Global-PPS.

The most commonly prescribed antibiotics were third-generation antimicrobials, particularly cephalosporins (21.4% of prescriptions) and mainly ceftriaxone (18.9%), followed by metronidazole (18.0%) and quinolones (14.1%), especially ciprofloxacin (9.9%).

Antibiotics were most often prescribed in adult ICUs (88.9%), followed by pediatric medical wards (84.6%) and neonatal ICUs (76.7%). Just over half of prescriptions (51.2%) were based on therapeutic indications; of these, 89.5% were for community-acquired infections.

The survey showed low use of quality indicators:

- Compliance with local antibiotic guidelines was 7.1% for medical and 4.1% for surgical indications;
- Indication for antibiotic prescription in notes in 61.8% of cases;
- A stop/review date was documented for 27.8% of prescriptions;
- In 95% of cases, surgical prophylaxis was given for more than 1 day;
- Less than 1% of antibiotic prescriptions were based on the use of biomarkers.

CONCLUSIONS

Antibiotics are widely prescribed in Nigerian hospitals yet only half of prescriptions are based on clear therapeutic indications. Quality indicators are not used sufficiently. The authors observed that poor prescribing practices are exacerbated by reliance on broad-spectrum antimicrobials, particularly cephalosporins.

Insufficient use of laboratory guidance to determine antimicrobial treatment is related to a lack of laboratory infrastructure and human capacity in diagnostics laboratories.

The need for a cohesive national antimicrobial stewardship program is underlined by the authors.

"There is clearly a need to improve prescribing practices in the country by developing evidence-based guidelines, improving laboratories, and retraining prescribers on the importance of definitive or targeted therapy."

KEY FINDINGS

- This was the first time the Global-PPS has been performed in Nigeria. Data collected on antibiotic prescription practices showed high prevalence of antibiotic use (nearly 70%).
- Just over half of antibiotic prescriptions (51.2%) were based on clear therapeutic indications.
- It is essential to improve awareness among prescribers of the importance of targeted antimicrobial therapy and the use of evidence-based antibiotic guidelines in Nigeria.

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EXPERT REVIEW OF ANTI-INFECTIVE THERAPY
2019;17(4):285-293

A multicenter point prevalence survey of antibiotic use in Punjab, Pakistan: findings and implications.

Saleem Z, Hassali MA, Versporten A, Godman B, Hashmi FK, Goossens H, Saleem F.

OBJECTIVE

This multicenter study aimed to assess the prevalence of antibiotic use and determine antimicrobial prescribing patterns in hospitals in Pakistan.

STUDY DESIGN

This Point Prevalence Survey (PPS) was performed in 13 hospitals in 7 cities in Pakistan. The standardized Global-PPS survey method was used to document and evaluate antimicrobial prescribing patterns at hospital, ward and patient level. A web-based application was used for data entry, validation, and reporting. The survey included all inpatients receiving an antibiotic on the day of the PPS.

RESULTS

Out of 1,954 patients in 13 hospitals, 1,516 (77.6%) received antibiotic treatment on the day of the survey. A total of 2,483 antibiotics were prescribed, of which 961 (38.7%), 1,404 (56.5%) and 118 (4.8%) antibiotics were prescribed in surgical departments, medical departments, and ICU, respectively.

The top three most commonly prescribed antibiotics were ceftriaxone (35.0%), metronidazole (16.0%) and ciprofloxacin (6.0%).

The most common clinical indications for antibiotic use were prophylaxis for obstetrics or gynecological indications (16.5%), gastrointestinal indications (12.6%) and lower respiratory tract infections (12.0%).

Out of the total indications, 34.2% of antibiotics were prescribed for community-acquired infections (CAI), 5.9% for healthcare-associated infections (HAI), and 57.4% for either surgical or medical prophylaxis.

Out of the 1,426 antibiotics prescribed for prophylactic purposes, 893 (62.6%) were used for surgical prophylaxis and 533 (37.4%) were prescribed for medical prophylaxis.

Most of the antibiotics prescribed for surgical prophylaxis were given for more than one day (97.4%).

The reasons for prescribing antibiotics were not mentioned in the patient's medical file in the majority of cases (76.2%).

CONCLUSIONS

This study represents the first comprehensive PPS in Pakistan.

The study found that unnecessary prophylactic antibiotic use is extremely high, and prescription of broad-spectrum antibiotics is common in hospitals in Pakistan. These findings highlight the urgent need to develop guidelines and recommendations to improve antibiotic prescribing in hospitals as part of Pakistan's National Action Plan on antibiotic resistance.

"The first step to develop appropriate strategies as part of any National Action Plan (NAP) is to undertake point prevalence surveys (PPS) in hospitals."

KEY FINDINGS

- AMR is a growing concern especially in low- and middle income countries (LMICs) such as Pakistan.
- This first comprehensive PPS in Pakistan showed:
  - a high rate of antibiotic use, with high use of broad-spectrum antibiotics such as ceftriaxone,
  - concerns with the lack of documenting the rationale for the antimicrobial prescribed,
  - extensive use of antibiotics to prevent surgical site infections.
- A multifaceted approach is needed to address current antibiotic use and prescribing concerns in Pakistan.

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

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