



Paediatric Results from the GLOBAL Point Prevalence Survey of Antimicrobial Consumption and Resistance (GLOBAL-PPS) in 335 Hospitals Worldwide

Ann Versporten¹, Véronique Nussenblatt¹, Nico Drapier¹, Peter Zarb², Isabelle Caniaux³, Marie Françoise Gros³, Mark Miller³, Vincent Jarlier⁴, Dilip Nathwani⁵ and Herman Goossens¹

¹Laboratory of Medical Microbiology, VAXINFECTIO, Faculty of Medicine and Health Science, University of Antwerp, Antwerp, Belgium; ²Mater Dei Hospital, Msida, Malta; ³bioMérieux, Marcy l'Etoile, France; ⁴Laboratoire De Bactériologie-Hygiène, Faculté de Médecine Pitié-Salpêtrière, Paris, France; ⁵Ninewells Hospital and Medical Scholl Dundee, Dundee, Scotland

BACKGROUND

The Global Point Prevalence Survey (Global-PPS), conducted in Febr.-Sept. 2015, monitored antimicrobial prescribing and resistance in 335 hospitals (H) from 53 countries (C) using a standardized and validated method (www.global-pps.com) (Figure 1). We aimed to describe the antibiotic treatment and antibiotic quality indicators for the management of infections in children in six continental regions.

METHODS

We extracted data on children 1 month to 17 year. Mandatory data included age, gender, weight, antimicrobial agent, dose, reason and indication for treatment or prophylaxis, prescription based on biomarker; and microbiology data used for targeted treatment. Mandatory quality indicators of antimicrobial use included reason to treat and stop/review date recorded in the notes, existence and compliance to local guidelines; and duration of surgical prophylaxis. Denominator included children admitted on paediatric wards. Data were entered online using a web-based system for data-entry, validation and reporting.

RESULTS

- A total of 9,612 children were admitted on a paediatric ward of which 40.7% (n=3,914) received at least one antimicrobial on the day of the PPS. Mean antimicrobial prevalence rates varied between continents (highest in Africa:59.0%) and countries (highest in Ghana, Africa: 100%) (Figure 2).

Figure 1. Worldwide distribution of countries that participated in the GLOBAL-PPS

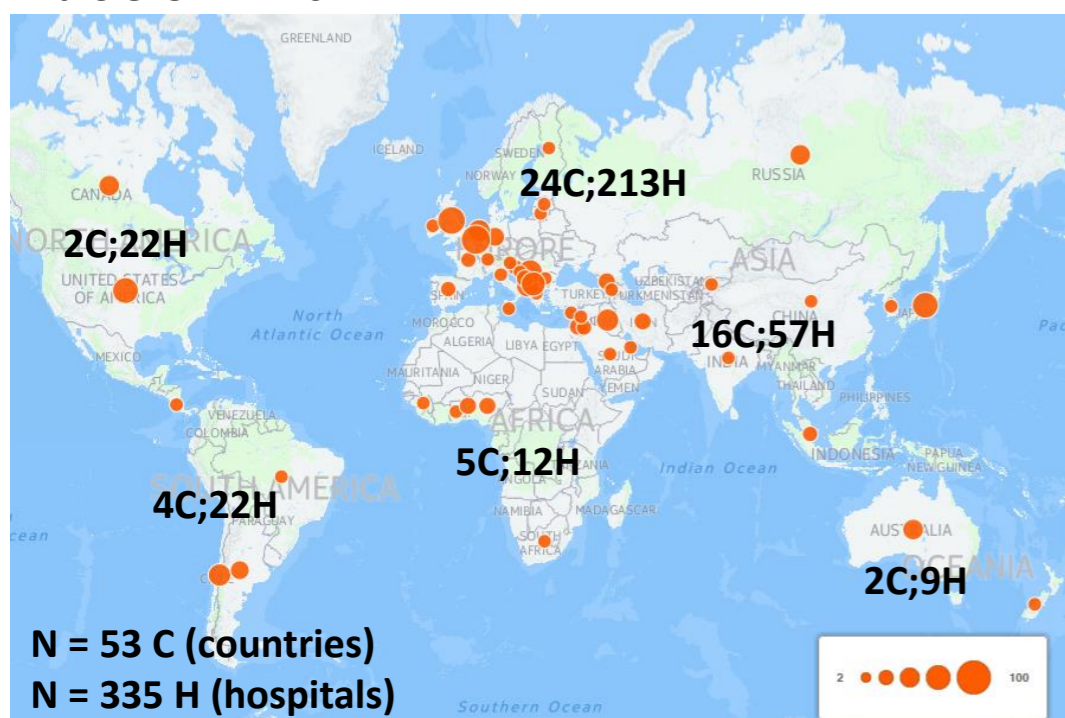


Figure 2. Mean paediatric antimicrobial prevalence rates by UN-region (country-ranges)

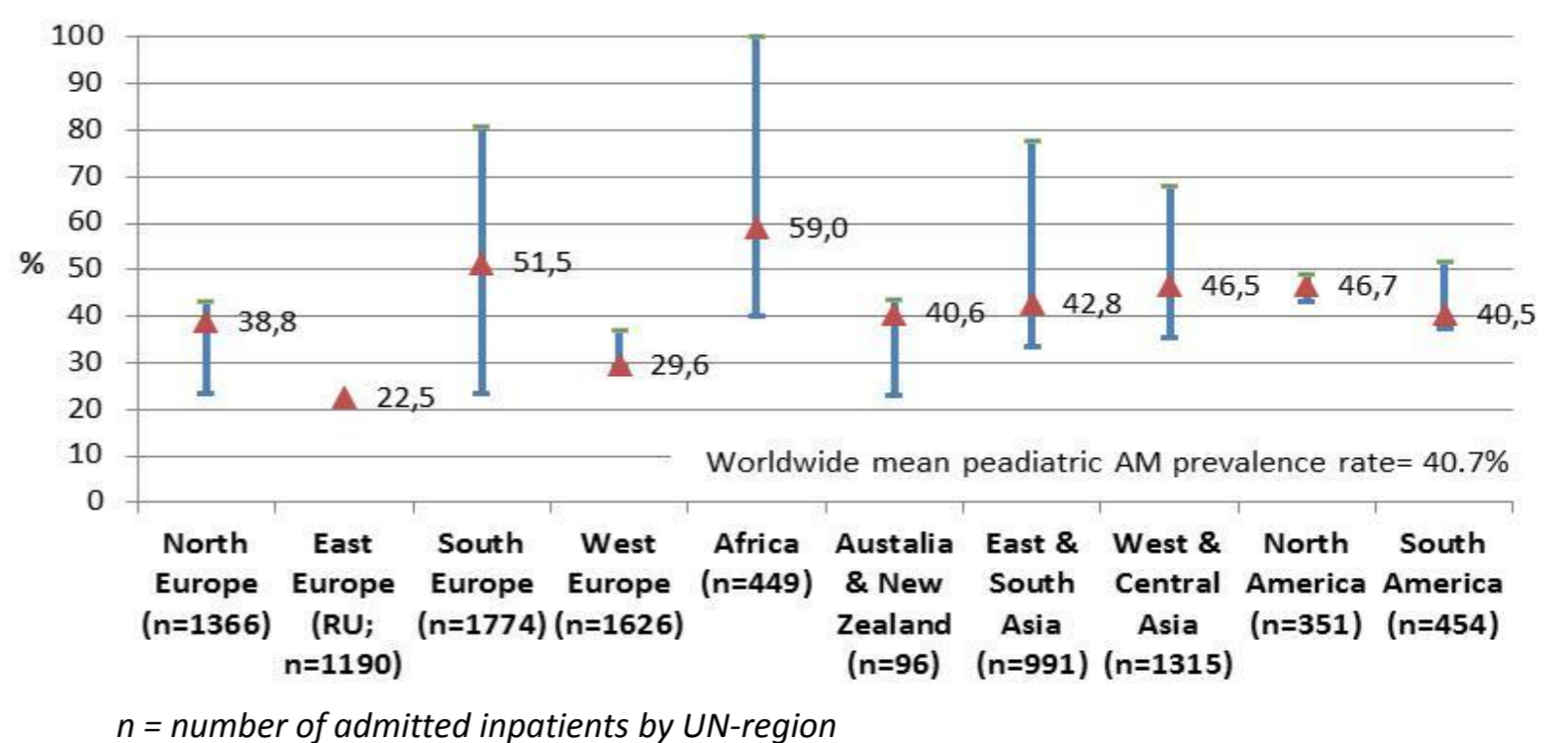


Table 1. Most prescribed antibiotics (ATC J01) for therapeutic use (HAI & CAI) by UN-region

Antimicrobial name	North Europe (n=472)	East Europe (n=228)	South Europe (n=916)	West Europe (n=478)	Africa (n=399)	East & South Asia (n=396)	West & Central Asia (n=707)	North America (n=183)	South America (n=258)	Total (n=4076)
Ceftriaxone	8.9	21.9	27.7	5.6	16.3	18.9	17.4	24.6	11.2	17.5
Cefotaxime	4.9	7.5	7.1	6.3	3.8	10.1	6.5	3.3	6.6	6.4
Amoxicillin/enz. inhib.	14.0	5.3	2.9	23.0	2.5	2.0	2.1	2.7	0.4	6.3
Amoxicillin	11.4	3.1	1.2	12.6	5.5	1.8	8.1	3.3	1.2	5.6
Vancomycin	3.0	1.8	4.1	2.3	2.8	9.1	6.6	11.5	10.5	5.2
Ampicillin	0.8	0.0	4.1	7.1	9.5	5.6	5.9	3.3	5.0	4.9
Gentamicin	5.7	1.8	5.7	0.8	10.8	2.5	4.0	1.1	4.7	4.6
Cefuroxime	9.3	1.8	2.7	6.5	8.8	2.8	4.5	0.0	0.4	4.5
Meropenem	4.7	5.7	3.8	2.9	2.8	6.1	4.7	4.9	6.2	4.3
Metronidazole	5.5	1.8	2.4	2.1	9.8	2.0	4.0	2.7	3.5	3.8
Piperacillin/enz. inhib.	6.6	0.4	1.9	6.1	0.0	3.0	5.2	7.1	1.9	3.6
Benzylpenicillin	0.6	0.4	1.2	0.2	0.8	0.3	0.4	0.0	0.0	0.7

Bold=proportional use >5%

Australia and New Zealand are not displayed, too few antibiotics for systemic use (n=39)

- Six percent of children got a targeted treatment, among which 28.0% (highest in Asia: 48.5%) received an antibiotic targeting a multidrug resistant organism. ESBL-producing Enterobacteriaceae were most often reported (highest in Asia: 15.3%).
- The documentation of a stop/review date for therapeutic prescribing was overall frequently missing (34.5%). Guidelines were most frequently missing in West/Central Asia (47.7%). Guideline compliance was lowest in Africa (72.2%) (Table 3).

Table 3. Antibiotic quality indicators for therapeutic use (HAI & CAI) by UN-region

Antibiotic quality indicators (N antibiotics for CAI and HAI)	No guidelines	Guideline compliant	Reason in notes	Stop/review date documented	Parenteral RoA	Targeted treatment
North Europe (n=472)	20.1	86.6	91.9	51.5	79.2	16.1
East Europe (n=228)	0.0	92.4	91.2	21.5	80.3	14.9
South Europe (n=916)	29.3	80.1	71.2	32.2	88.9	27.2
West Europe (n=478)	15.5	85.2	91.6	32.8	81.4	21.8
Africa (n=399)	15.3	72.2	78.2	27.8	84.2	12.5
East/South Asia (n=396)	20.2	86.9	86.6	62.1	86.6	21.2
West/Central Asia (n=707)	47.7	69.6	81.5	19.9	82.0	11.9
North America (n=183)	16.9	88.7	95.6	21.9	82.0	20.2
South America (n=258)	15.9	80.6	96.1	43.4	89.5	36.0
Total (n=4,076)	25.1	82.0	84.0	34.5	84.2	20.1

Australia and New Zealand are not displayed, too few antibiotics for systemic use (n=39)

- Out of 6,268 antimicrobials administered to children of 1 month up to 17 years old, 4,076 antibiotics for systemic use (ATC J01) were administered for therapeutic use. Ceftriaxone was most frequently recorded (17.5%). Meropenem represented 4.3% of all therapeutic prescribing with highest proportional use observed in South-America: 6.2% (Table 1).
- The highest number of patients treated for a Hospital Acquired Infection (HAI) was observed in South America (29.9% of patients got at least one antibiotic to treat a HAI). In Africa, most patients were treated for a Community Acquired Infection (CAI; 68.5%) (Table 2).

Table 2. Antimicrobial prescribing by indication: Proportion of 'patients treated' with at least one antibiotic for a HAI or a CAI

UN-region	% HAI	% CAI	% Proph.
South America	29.9	52.1	18.0
East Europe	25.1	47.4	28.9
East/South Asia	18.0	37.7	44.0
North America	17.9	59.2	24.0
West/Central Asia	17.1	61.1	25.0
West Europe	13.5	67.9	22.1
North Europe	12.9	58.7	32.1
Australia/New Zealand	12.2	49.0	46.9
South Europe	10.3	63.3	24.5
Africa	10.3	68.5	22.9
Total	15.3	58.3	27.7

Table is sorted on % patients with a HAI. % Proph=proportion of patients receiving at least one antimicrobial for medical or surgical prophylaxis. Patients can be counted more than once if they received antimicrobials for several indications.

CONCLUSION

The Global-PPS provided quantifiable outcome measures to assess and compare quantity and quality of antimicrobial prescribing and resistance in hospitalized children worldwide. Antimicrobial prevalence and resistance rates were high, especially in Asia and South-America. These data serve to identify targets for quality improvement of antimicrobial prescribing, the development of local guidelines, education and practice changes.