

# The 2015 Global Point Prevalence Survey of Antimicrobial Consumption and Resistance (Global-PPS) in 335 Hospitals Worldwide : Usefulness of Survey Data in the Evaluation and Management of Sepsis



Ann Versporten<sup>1</sup>, Peter Zarb<sup>2</sup>, Isabelle Caniaux<sup>3</sup>, Marie Françoise Gros<sup>3</sup>, Mark Miller<sup>3</sup>, Dilip Nathwani<sup>4</sup> and Herman Goossens<sup>1</sup>

<sup>1</sup>Laboratory of Medical Microbiology, VAXINFECTIO, Faculty of Medicine and Health Science, University of Antwerp, Antwerp, Belgium;

<sup>2</sup>Mater Dei Hospital, Msida, Malta; <sup>3</sup>bioMérieux, Marcy l'Etoile, France; <sup>4</sup>Ninewells Hospital and Medical Scholl Dundee, Dundee, Scotland

## INTRODUCTION AND PURPOSE

The Global-PPS ([www.global-pps.com](http://www.global-pps.com)) monitored antimicrobial prescribing and resistance in hospitals worldwide. We analyzed a sub-group of patients who received antibiotics for sepsis. Sepsis is a life-threatening condition requiring appropriate antibiotic treatment. We aimed to determine antibiotic treatment regimens, use of biomarkers, resistance rates and antibiotic quality indicators for the management of sepsis worldwide.

## METHODS

A standardized and validated method to conduct a point prevalence survey of antimicrobial prescribing was used. The survey was carried out in February-September 2015 in 335 hospitals (H) in 53 countries (C): Europe (24C;214H); Africa (5C;12H), Asia (16C;57H), South America (4C;21H), North-America (2C;22H), and Oceania (2C;9H). Data included treated patients admitted to adult wards (denominator); receiving systemic antibiotics (ATC code J01) for sepsis on the day of the survey (numerator). Presented are quality indicators, resistance rates and overall antibiotic prescribing rates for sepsis among patients admitted to adult wards, by united nation region. Results for East-Europe are not shown (< 5 sepsis cases).

## RESULTS

Indicator \ UN region (N=patients admitted to adult wards)	North Europe (N=2783)	South Europe (N=5534)	West Europe (N=8458)	Africa (N=945)	Australia & New Zealand (N=932)	East & South Asia (N=5363)	West & Central Asia (N=1612)	North America (N=2139)	South America (N=1518)	Total (N=29937)
N treated for sepsis	110	119	208	34	7	157	74	84	43	837
% treated for sepsis	4.0	2.2	2.5	3.6	0.8	2.9	4.6	3.9	2.8	2.8
Community acquired sepsis (CAI; %)	64.8	41.3	53.9	78.8	42.9	33.1	40.6	58.1	39.5	49.2
Health care associated sepsis (HAI; %)	35.2	58.7	46.1	21.2	57.1	66.9	59.4	41.9	60.5	50.8
Intervention related sepsis (%)	9.1	56.8	31.3	25.0	60.0	11.3	10.0	28.9	22.0	23.6
Other HAI (%)	68.2	32.9	52.1		40.0	70.7	66.0	60.0	68.3	57.9
Sepsis from LTCF°/nursing home (%)	6.8	5.1	5.2			13.5	8.0		7.3	7.4
Based on biomarker data (%)*	68.9	81.2	63.2	2.2	55.6	51.5	27.6	12.4	58.0	52.4
Targeted treatment (%)*	20.0	57.9	47.5	24.4	44.4	27.2	19.5	28.6	23.2	34.0
Methicillin-resistant <i>Staphylococcus aureus</i> (%)	3.0	8.3	1.8			5.7	1.5	1.9	1.4	3.0
Methicillin-resistant coagulase neg. Staph. (%)		2.3	3.1	2.2		8.4	1.1	1.9	1.4	3.2
Vancomycin-resistant enterococci (%)	0.7	4.5	0.4			1.5		2.9	1.4	1.5
ESBL-producing <i>Enterobacteriaceae</i> (%)	1.5	6.8	4.9	2.2		2.0	8.0	4.8	4.3	4.2
3 <sup>rd</sup> gen. cephalosporin resistant <i>Enterobact.</i> (%)**	0.7	1.5	1.8			0.5		3.8	2.9	1.4
Carbapenem-resistant <i>Enterobacteriaceae</i> (%)			0.9			3.0				0.8
ESBL-producing non fermenter Gram neg. (%)						4.0	2.3	4.8		1.5
Carbapenem-resistant non fermenter Gram neg. (%)		6.0				3.5	3.4			1.8
Targeted against other MDR organisms (%)	0.7	4.5	2.7			1.0	4.6	4.8		2.4

**Table 1. Indicators of antibiotics (ATC J01) prescribed for sepsis to patients admitted on adult wards (\*CAI+HAI only; \*\*3<sup>rd</sup> gen. cephalosporin resistant *Enterobacteriaceae* non-ESBL producing or ESBL status unknown; °Long-term care facilities)**

Antibiotic name (n=number of antibiotics for systemic use)	North Europe (n=137)	South Europe (n=153)	West Europe (n=226)	Africa (n=46)	Australia & New Zealand (n=9)	East & South Asia (n=206)	West & Central Asia (n=101)	North America (n=120)	South America (n=69)	Grand Total (n=1067)
Piperacillin and enzyme inh.	44.5	11.1	15.5	2.2	11.1	14.1	9.9	23.3	11.6	17.8
Vancomycin	2.2	10.5	12.4	6.5	11.1	12.6	13.9	22.5	23.2	12.5
Meropenem	11.7	11.1	8.0	6.5	11.1	18.6	15.8	10.0	11.6	12.1
Ceftriaxone	0.7	8.5	5.8	41.3	11.1	7.8	10.9	6.7	7.2	8.1
Amoxicillin and enzyme inh.	7.3	3.3	18.1	4.3	33.3	7.8	1.0			7.3
Ciprofloxacin	0.7	4.6	4.9	6.5		6.3	4.0	2.5		3.9
Imipenem and enzyme inh.	0.7	7.8	1.8	2.2		2.4	6.9		5.8	3.2
Levofloxacin	0.7	3.3	2.7	8.7		2.4	1.0	5.8	1.4	2.8
Metronidazole	1.5	2.0	1.3	8.7	11.1	1.0	5.9	5.0	4.3	2.8
Gentamicin	8.8	2.0	0.4	2.2		1.5	5.0	0.8		2.4
Colistin		4.6	0.9			2.9	4.0	1.7	5.8	2.3
Flucloxacillin	1.5	3.9	5.8				1.0			2.1
Teicoplanin	5.8	1.3	0.4			4.4	1.0			2.0
Linezolid	0.7	2.6	0.9			1.0	4.0	4.2	2.9	1.9

**Table 2. Antibiotic (ATC J01) prescribing rates for sepsis worldwide (adult wards)**

Out of 29,937 treated adults, 837 (2.8%) were treated for sepsis. Proportions varied between continents (range: 0.8% in Oceania to 4.6% in West-Central Asia) and countries (range: 0% in Bulgaria and Ghana to 10.0% in Saudi Arabia). Out of patients treated for a community acquired (CA) or hospital acquired (HA) sepsis, 50.8% had a HA sepsis (range: 21.2% in Africa to 66.9% in South-East Asia). Intervention related HA-sepsis accounted for 23.6% (e.g. catheter related sepsis). Biomarkers were used in the decision to prescribe 52.4% of antibiotics (range: 2.2% in Africa to 68.9% in North-Europe). CRP was most used (89.2%). Overall targeted treatment for sepsis was 34.0% of which 4.2% targeted an ESBL-producing *Enterobacteriaceae* (highest in West-Central Asia; 8.0%). Rates of carbapenem-resistant non fermenter gram-negative bacilli and MRSA was 1.8% and 3% (highest in South-Europe: 6.0% and 8.3% respectively) (**Table 1**).

There were 54 different kind of antibiotics prescribed, involving very different combination therapies worldwide. Top 3 included piperacillin/enzyme inhibitor (17.8%; range 2.2% in Africa to 44.5% in North-Europe); vancomycin (12.5%; range 2.2% in North-Europe to 23.2% in South-America) and meropenem (12.1%; range 6.5% in Africa to 18.4% in South-East Asia). Ceftriaxone was mainly prescribed in Africa (41.3%), colistin in South-America (5.8%) and South-Europe (4.6%) (**Table 2**).

## Quality Indicators

The reason for treatment was highly documented (87.2%). A stop/review date was less often recorded (38.7%). There were no local guidelines (referring to choice of the drug) in 22.0% of antibiotic prescriptions (range 1.5% in North-Europe to 47.5% in West-Central Asia). Overall guideline compliance was 82.7% (**Table 3**).

UN-region \ Quality indicator	Reason in notes (%)	Stop/review date documented (%)	Missing guidelines (%)	Compliance to guidelines (%)
North Europe (n=137)	92.0	51.8	1.5	82.1
South Europe (n=153)	75.8	30.7	26.1	82.3
West Europe (n=226)	88.9	31.9	18.1	82.2
Africa (n=46)	76.1	28.3	37.0	45.0
Australia & New Zealand (n=9)	100	22.2	11.1	75.0
East & South Asia (n=206)	93.2	60.2	24.3	84.3
West & Central Asia (n=101)	69.3	11.9	47.5	75.0
North America (n=120)	97.5	35.0	21.7	92.2
South America (n=69)	94.2	43.5	14.5	86.2
Grand Total (n=1067)	87.2	38.7	22.0	82.7

**Table 3. Quality indicators for treatment of sepsis (only antibiotics prescribed to patients admitted to adult wards are considered)**

## CONCLUSION

These data provide important insights into the management of sepsis in adults worldwide, especially the lack of review dates in >60% of cases and the lack of local prescribing guidelines. This tool helps identifying targets for quality improvement of antibiotic prescribing, the development of local guidelines, education and practice changes, and for measuring the impact of stewardship programmes through repeated PPS.