Burden and current global management on GNB infections: Lessons from the Global-PPS of Antimicrobial Consumption and Resistance in 335 Hospitals Worldwide



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For the Global-PPS network



BSAC Spring Conference: The Global Challenge of Multi-drug Resistant Gram Negative Bacterial Infections; London; March 14, 2017

### Disclosures



**bioMérieux** is the sole sponsor of the GLOBAL-PPS. The funder has no role in study design, data collection, data analysis, data interpretation, or writing the report. Data are strictly confidential and stored anonymous at the coordinating centre of the University of Antwerp.





Aims **Method General results** Degree of participation Global antimicrobial prevalence rates Targeted prescribing **Results on GNB infections** Indications Which antibiotics Quality indicators Discussion

Aims of the current study on Gram Negative Bacterial (GNB) infections

- Determine rates of hospitalized patients receiving an antibiotic treatment targeting a GNB infection
- Determine indications and prescribed antibiotics for GNB infections
- Examine outcomes of antibiotic quality indicators for GNB infections

## Methods



- Any hospital was welcome to join the Global-PPS network
- Data-collection : February-June 2015
- All wards of the hospital were included "once"
- Predefined ward types
- Denominator collected at ward level : N patients admitted
- Analyses at patient and antibiotic level



## Methods Analyses by United Nations region

North America Latin America Africa North Europe West Europe South Europe East Europe West & Central Asia East & South Asia Australia & New Zealand

#### GLOBAL-PPS PATIENT Form (Please fill in one form per patient on antimicrobial treatment/prophylaxis)

Ward Name/code	Activity <sup>1</sup> (M, S, IC)	Patie	ent Identifier	. 2	Survey Number <sup>3</sup>		Years (if≥2 years)	Patient Mont (1-23 m	Patient Age <sup>4</sup> Months Days (1-23 month) (if <1 month		th)	Weight In kg, 2 decimals	Gender M or F	
	-													
Antimicrobial Name <sup>5</sup>		1.		2.			3.		4.			5.		
Single Unit Dose <sup>8</sup> Un	it (g, mg, or IU)	)7												
Doses/ day <sup>8</sup> Ro	ute (P, O, R, I	) 9												
Diagnosis <sup>10</sup> (see appendi	x II)													
Type of indication <sup>11</sup> (see	appendix III)	_	► CAI,	HAI,	SP.	, MP, ot								
Reason in Notes (Yes or	No) <sup>12</sup>		<u> </u>											
Guideline Compliance (Y	, N, NA, NI) <sup>13</sup>													
Is a stop/review date doo	umented?(Yes	s/No)												
Treatment (E: Empirical;	T: Targeted)													
The next section is to be	filled in only	if the	treatment o	choice is b	ased	on microbiol	logy data (	Treatment=tar	geted) AN	D the (	organism is	one of	the followi	ing
MRSA (Yes or No) <sup>14</sup>														
MRCoNS (Yes or No) <sup>15</sup>														
VRE (Yes or No) <sup>16</sup>		_												
ESBL-producing Enterobac (Yes or No) <sup>17</sup>	teriaceae													
3rd generation cephalospor Enterobacteriaceae non-ES ESBL status unknown (Yes	rin resistant BL producing o or No)	r												
Carbapenem-resistant Ente or No) <sup>18</sup>	robacteriaceae	(Yes												
ESBL-producing non ferme bacilli (Yes or No) <sup>19</sup>	nter Gram-nega	tive												
Carbapenem-resistant non negative bacilli (Yes or No)	fermenter Gram	-												
Targeted treatment against organisms (Yes or No) <sup>21</sup>	other MDR													
Treatment based on biomar	ker data (Yes or	No)	0 Yes -	- 0 No										
If yes, which biomarker //	CRP_PCT or oth	har) <sup>22</sup>			Type of biological				Mostr	Most relevant value of biomarker Value U			on the day o it (in µg/L,	of the PPS mg/L,) <sup>23</sup>
n yes, which biomarker (		P, PCT or other)**			fluid sample (Blood/urine/other)									



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Data entry Click here for data-entry, validation and reporting.



Documents

Download here study protocol and other documents.



Acknowledgements

Click here to see the people and networks who contributed to this project.

#### Latest news



50+ countries for Global-PPSI More than 50 countries worldwide are now participating to the 2017 Global-PPS. Don't hesitate to join us. See also the item Supporting organisations.

Anonymous data-entry through the web-based Global-PPS program designed for data-entry, validation and reporting



# RESULTS









#### Child wards

4,774 treated patients

737 patients with targeted AB treatment (15.4%)

989 antibiotics (ATC J01)

157 ABs targeting GNB

#### Mean antimicrobial prevalence rates (%) by UN-region (country-ranges)



N=100,591 admitted patients; worldwide mean AM prevalence rate = 34.5%Worldwide prevalence rate of patients treated with ABs targeting GNB = 1.4%(range: 0.4% in Africa to 4.1% in South America) Number of patients (%) been prescribed at least one antibiotic (ATC code J01) based on a microbiological result (targeted prescribing)



% targeted therapy on adult wards

% targeted therapy on child wards

Proportion of patients (%) treated with antibiotics (ATC J01) targeting GNB (red bar) out of all patients receiving targeted therapy against any resistant organism



% patients treated with ABs targeting resistant organisms
% patients treated with ABs targeting GNB

n = Total patients receiving at least one antibiotic targeting a resistant micro-organism Denominator = all treated patients admitted on adult wards Proportion of patients (%) treated with antibiotics (ATC J01) targeting GNB (red bar) out of all patients receiving targeted therapy against any resistant organism



% patients treated with ABs targeting resistant organisms
% patients treated with ABs targeting GNB

n = Total patients receiving at least one antibiotic targeting a resistant micro-organism Denominator = all treated patients admitted on child wards Number of antibiotics (J01, %) prescribed on adult wards, based on a microbiological result and targeting a GNB, by region



Denominator=all targeted antibiotics (n=7300 antibiotics worldwide) prescribed to patients admitted on adult wards

Antibiotics (J01, N=1214) targeting GNB are mainly prescribed to treat HAI (denominator = therapeutic prescribing for a CAI or HAI)



No GNB cases for Autralian & New Zealand child wards

### Number of patients (%) treated with targeted ABs for GNB by reason to treat & region



				Intra-			Bone-			
	LRTI	Ηυτι	LUTI	abdo	SST	SEPSIS	Joint	BAC	CVS	CNS
East Europe (n=37)	43.2	8.1		10.8	24.3		2.7			2.7
North Europe (n=39)	17.9	20.5	12.8	7.7	10.3	7.7	5.1	5.1	2.6	2.6
South Europe (n=173)	20.2	19.7	6.9	13.9	15.5	8.1	2.9	0.6		1.7
West Europe (n=276)	22.1	20.3	20.7	8.7	8.0	4.3	3.6	2.2	2.5	
Africa (n=15)	33.3	13.3	6.7	6.7	20.0	6.7				
East & South Asia (n=174)	20.1	19.0	6.3	15.5	6.3	9.2	3.4	3.4	2.3	2.3
West & Central Asia (n=84)	15.5	14.3	17.9	6.0	9.5	9.5	7.1	6.0		3.6
Austalia & New Zealand (n=47)	31.9	4.3	19.1	12.8	21.3		2.1	6.4		
South America (n=152)	20.4	14.5	7.2	15.8	15.8	2.6	2.0	4.6	3.9	1.3
North America (n=48)	25.0	8.3	27.1	12.5	12.5	8.3		4.2		
Total (n=1045)	22.0	16.8	12.8	11.9	11.7	5.9	3.3	3.1	1.7	1.3

**LRTI**=mainly carbapenems (29.2% of which 18% in combination with P or I colistin); followed by polymyxins (18.8%); 11.4% comb. penicillins with enz. inh; 10.7% fluoroquinolones **HUTI & LUTI**=mainly monotherapy: 39.8% carbapenems;11.8% fluoroquinolones; 11.5% comb. penicillins with enz. inh

# Most prescribed antibiotic subclasses (J01, ATC4) targeting GNB in adult wards, by region



	East	North	South	West		East &	West &	Australia	South	North	
	Europe	Europe	Europe	Europe	Africa	South	Central	New	America	America	Total
	%	%	%	%	%	Asia	Asia	Zealand	%	%	%
N antibiotics J01 (ATC4)	(n=71)	(n=46)	(n=254)	(n=314)	(n=22)	% (n=247)	% (n=127)	% (n=59)	(n=211)	(n=61)	(n=1412)
Carbapenems (J01DH)	23.9	54.3	25.2	31.8	45.5	31.2	40.9	23.7	43.1	47.5	34.0
Polymyxins (J01XB)	15.5	6.5	15.7	4.8	13.6	15.8	18.9	1.7	15.6	4.4	12.2
Fluoroquinolones (J01MA)	18.3	8.7	9.1	14.3	18.2	10.5	9.4	16.9	7.1	11.5	11.3
Comb. of Penicillins/β-lactam inh. (J01CR)	8.4	8.7	9.8	13.4		10.5	9.4	16.9	8.5	14.8	10.8
Aminoglycosides (J01GB)	5.6	2.2	8.3	3.2	13.6	6.1	4.7	16.9	10.4	1.6	6.6
Penicillins/extended spectrum (J01CA)	1.4	2.2	1.2	15.0		1.2	3.1		1.4		4.4
3rd-gen. Cephalosporins (J01DD)	15.5	2.2	4.7	1.9	4.5	4.9	4.7	5.1	3.3	1.6	4.2
4th-gen. Cephalosporins (J01DE)	4.2		5.1	3.8	4.5	3.2	1.6	5.1	1.4	13.1	3.8
Tetracyclines (J01AA)	1.4	2.2	7.1	2.5		1.2	1.6		2.4	3.3	2.8
Glycopeptides (J01XA)	1.4		3.1	1.6		6.9	0.9		1.9		2.5

Sorted from highest to lowest overall worldwide antibiotic (ATC J01) use Bold=proportional use >10%



						East &	West &	Australia			
	East	North	South	West		South	Central	New	South	North	
	Europe	Europe	Europe	Europe	Africa	Asia	Asia	Zealand	America	America	Total
	%	%	%	%	%	%	%	%	%	%	%
N antibiotics (ATC J01)	(n=71)	(n=46)	(n=254)	(n=314)	(n=22)	(n=247)	(n=127)	(n=59)	(n=211)	(n=61)	(n=1412)
Meropenem	19.7	45.7	12.0	28.0	13.6	19.8	24.4	22.0	21.3	42.6	22.9
Colistin	9.9	6.5	15.7	4.8	13.6	11.7	18.9	1.7	15.2	4.9	11.1
Ciprofloxacin	14.1	6.5	5.5	9.6	18.2	3.6	9.4	13.6	6.2	4.9	7.5
Piperacillin/enz. inh.	1.4	6.5	8.7	8.6		5.7	6.3	15.3	6.6	11.5	7.4
Imipenem/enz. inh.	4.2	2.2	7.1	3.5	9.1	3.2	13.4		12.3		6.1
Ertapenem		6.5	5.1	0.3	22.7	7.3	3.1	1.7	9.0	4.9	4.9
Amikacin	4.2		6.7	1.3	13.6	4.5	1.6		10.0		4.3
Cefepime	4.2		5.1	3.8	4.5	3.2	1.6	5.1	10.0	13.1	3.8
Temocillin				14.3							3.2
Levofloxacin		2.2	3.5	2.5		6.5			0.5	6.6	2.8
Tigecycline	1.2	2.2	6.3	2.5			1.6		2.4	3.3	2.5
Amoxicillin/enz. inh.	7.0	2.2	1.2	4.8		2.0	2.4			1.6	2.3
Ceftazidime	5.6	2.2	1.0	1.3		0.8	0.8	5.1	1.9	1.6	1.8
Polymyxin b	5.6					4.0			0.5		1.1
Tobramycin			0.4	1.0		0.4		15.3			1.0

Sorted by highest to lowest overall worldwide antibiotic (ATC J01) use Bold=proportional use >5%

# Antibiotic quality indicators for treatment of GNB infections in adult wards, by region



				Stop review	
	No	compliant to		date	
	guidelines	guidelines	Reason in	documented	
	(%)	(%)	notes (%)	(%)	
East Europe (n=71)	0	94.4	95.8	62.0	
North Europe (n=46)	10.9	90.2	91.3	60.9	
South Europe (n=254)	24.4	86.0	68.1	37.0	
West Europe (n=314)	9.6	87.4	89.2	43.6	
Africa (n=22)	40.9	100	90.9	27.3	
East & South Asia (n=247)	11.7	92.6	95.5	71.3	
Australia & New Zealand (n=59)	10.2	94.3	94.9	42.4	
West & Central Asia (n=127)	39.4	86.4	76.4	32.3	
South America (n=211)	17.1	78.5	95.7	44.5	
North America (n=61)	42.6	100	96.7	44.3	
Total Gram neg (n=1,412)	17.9	88.2	87.3	47.6	
Total for therapeutic use (n=30,691)	17.7	80.3	85.5	38.0	



# Discussion

### Summary - discussion



- Targeted prescribing is higher on adult wards (highest in South America, lowest in East-Europe)
- Number of patients (%) been prescribed ABs for a GNB inf. is highest in South America, followed by East-Europe and Asia
- Most GNB inf. were health care associated
- Most frequent reason to treat patients with ABs targeting a GNB inf. were UTI and LRTI
- Most commonly prescribed: carbapenems and polymyxins
- Antibiotic quality indicators regarding treatment of GNB score only slightly better as compared to overall antibiotic therapeutic prescribing



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## ANY HOSPITAL IS WELCOME TO PARTICIPATE !

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