The Global Point Prevalence Survey of Antimicrobial Consumption and Resistance in 335 Hospitals Worldwide

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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.”

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- Degree of participation
- Antimicrobial prevalence rates worldwide
- Antibiotic therapeutic prescribing (%)
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Global-PPS Aims

- Monitor rates of antimicrobial prescribing in hospitalized adults, children and neonates.
- Determine the variation in drug, dose and indications of antimicrobial prescribing across continents.
- Identify targets to improve quality of antimicrobial prescribing.
- Help designing hospital interventions to promote prudent antimicrobial use.
- Increase public health capacity.

Methods

- Any hospital welcome to join the Global-PPS network.
- Data-collection : February-June 2015
- All wards of the hospital were included “once”
- Denominator collected at ward level
  - ✓N patients admitted
  - ✓N available beds

Essential data to collect: numerator

For each patient receiving an antimicrobial:

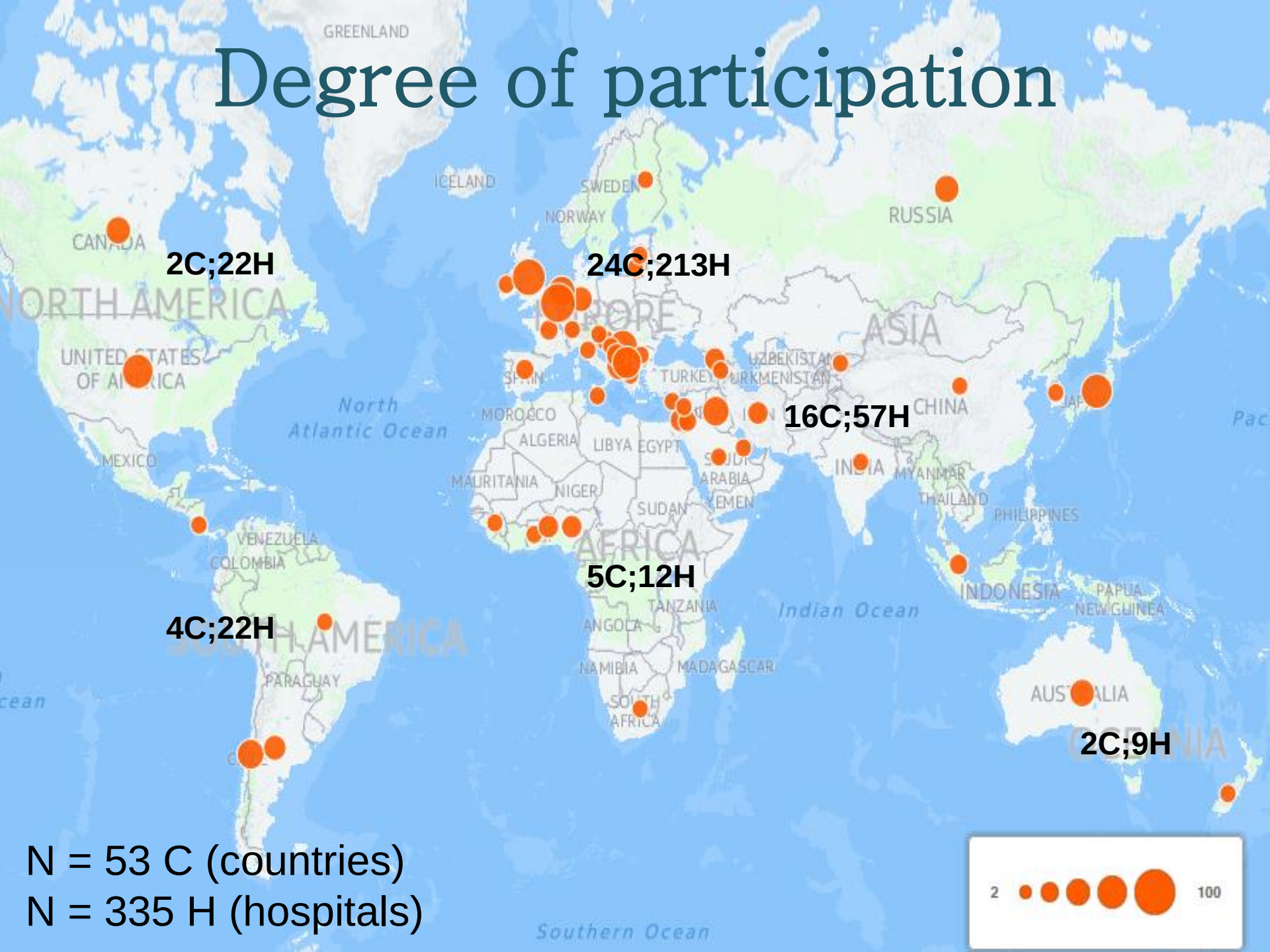
- age, gender and weight

For each antimicrobial prescription:

- Antimicrobial agent/s (substance level) with dose per administration - N doses/day - route of administration
- Reasons for treatment: what the clinician tends to treat
- Indication for therapy (CAI, HAI; Medical/Surgical Prophylaxis)
- Extra quality indicators:
  - ✓ Reason of prescription written in notes
  - ✓ Stop or review date written in notes
  - ✓ Prescription compliant with local guidelines
- Treatment based on biomarker and which one
- Microbiology data (if targeted treatment)

Worldwide RESULTS

Degree of participation



N = 53 C (countries)
N = 335 H (hospitals)

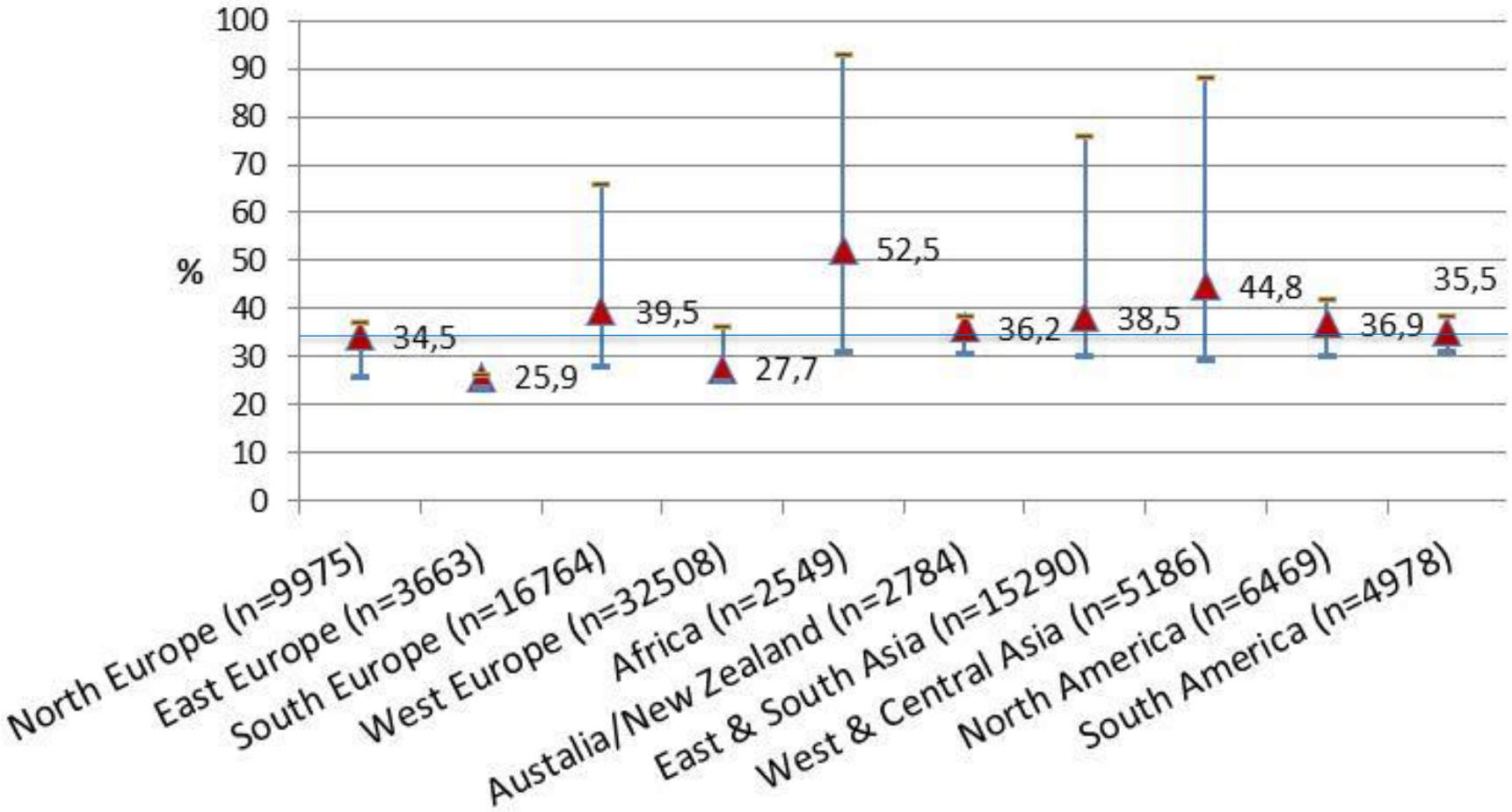
Collected and recorded data

100,166 admitted inpatients
34,726 patients treated with at least one antimicrobial

48,565 antimicrobial prescriptions

- 43,513 (**89.6%**) antibacterials for systemic use (ATC J01)
- 2,062 (**4.3%**) antimycotics for systemic use (ATC J02)
- 1,137 (**2.3%**) drugs to treat tuberculose (ATC J04)
- 932 (**1.9%**) nitroïmidazole derivatives (ATC code P01AB)
- 781 (**1.6%**) intestinal anti-infectives (ATC code A07)
- 126 (**0.3%**) neuraminidase inhibitors (ATC code J05AH)

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



Worldwide mean AM prevalence rate= 34.7%

Top 10 most prescribed antibiotics (ATC J01) for therapeutic use, by UN region

Antimicrobial name N antibiotics (ATC J01)	North Europe % (n=3441)	East Europe % (n=651)	South Europe % (n=4909)	West Europe % (n=8074)	Africa % (n=1366)	Austalia & New Zealand % (n=1021)	East & South Asia % (n=4785)	West & Central Asia % (n=2088)	North America % (n=2392)	South America % (n=1964)	All Regions % (n=30691)
Amoxicillin/enzyme inhibitor	**13.4**	**8.6**	**6.3**	**27.5**	**7.2**	**8.3**	**9.7**	3.0	1.8	0.6	12.4
Ceftriaxone	3.4	**24.9**	**17.4**	**5.9**	**16.1**	**10.2**	**9.3**	**18.3**	**13.6**	**14.4**	11.0
Piperacillin/enzyme inhibitor	**15.4**	0.5	**7.6**	**9.9**	0.2	**9.1**	**9.6**	**6.4**	**12.9**	**5.9**	9.2
Ciprofloxacin	3.7	**9.1**	**9.7**	**7.3**	**7.8**	3.7	4.2	**5.7**	**6.1**	**5.4**	6.4
Vancomycin	1.8	2.8	4.5	3.4	1.6	3.6	**6.4**	**5.7**	**12.0**	**11.1**	5.1
Meropenem	4.9	**5.1**	4.0	4.1	2.9	3.1	**7.8**	**5.9**	**5.8**	**5.9**	5.1
Metronidazole	**5.6**	2.3	4.5	2.5	**12.4**	**8.3**	3.0	**6.2**	**5.4**	**8.0**	4.7
Levofloxacin	0.9	2.0	4.0	3.1	1.8	/	**7.4**	0.7	**11.7**	1.3	3.9
Amoxicillin	**9.5**	1.8	2.5	3.9	**5.3**	**5.1**	1.0	4.3	1.7	1.1	3.6
Cefuroxime	2.9	0.6	1.8	4.2	**7.8**	**5.1**	2.4	4.5	0.5	0.3	3.0

Bold=proportional use >5%

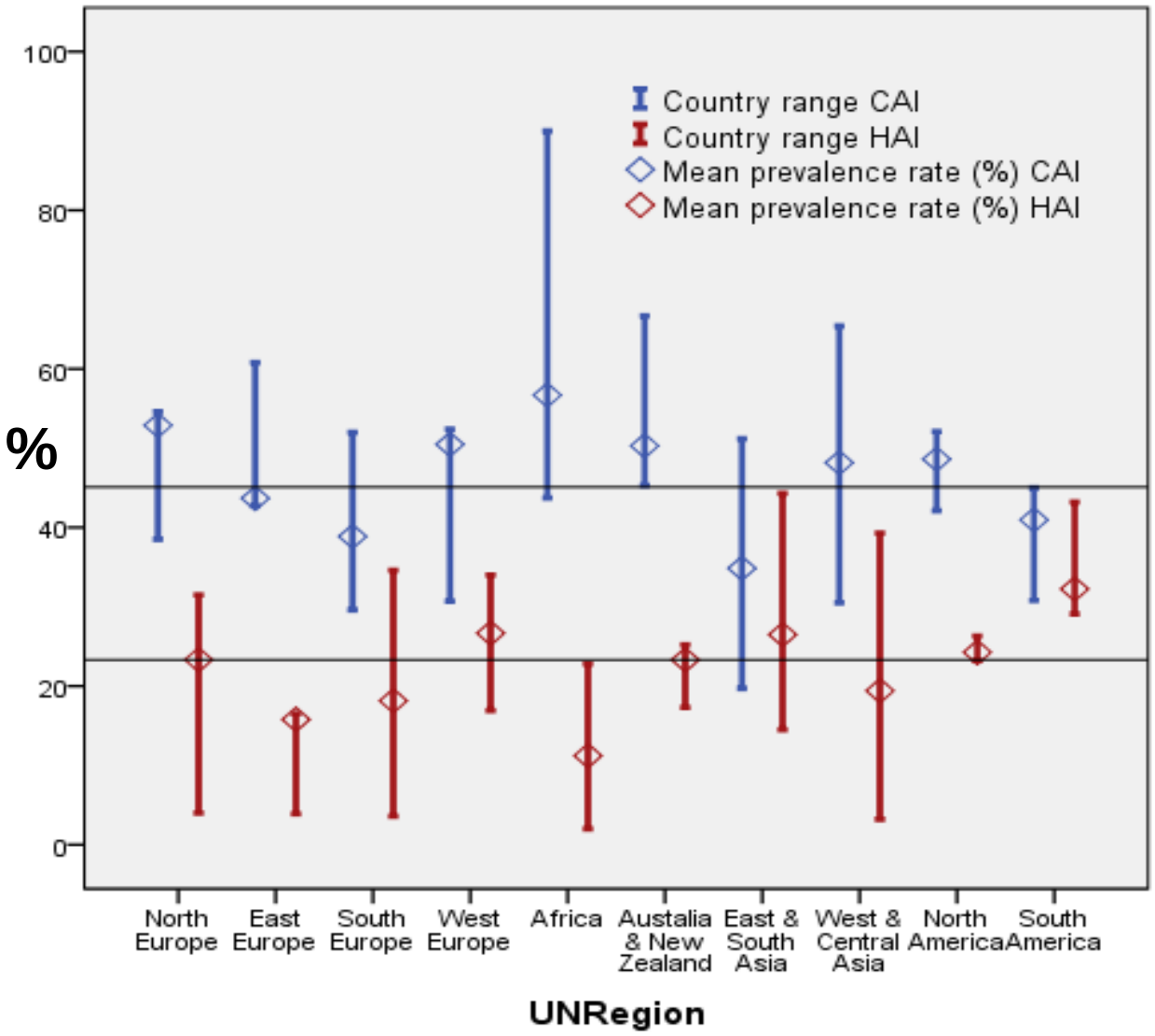
Overview of antibiotic prescribing rates for prophylactic use are provided in 2016 ECCMID-poster n° P1222 available at www.global-pps.be/dissemination

Antibiotic (ATC J01) quality indicators for therapeutic use

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=3441)	7.1	83.9	89.5	52.7	68.0	15.9
East Europe (n=651)	1.1	90.0	77.0	38.6	85.1	15.7
South Europe (n=4909)	25.1	77.3	75.9	30.2	82.3	25.8
West Europe (n=8074)	10.1	80.4	86.4	37.2	67.0	32.1
Africa (n=1366)	22.0	71.3	74.2	30.2	78.5	16.8
Austalia & New Zealand (n=1021)	19.0	74.5	94.5	26.9	65.9	27.0
East & South Asia (n=4785)	18.2	84.9	89.8	49.3	80.2	25.9
West & Central Asia (n=2088)	43.3	69.2	79.3	19.7	83.8	17.7
North America (n=2392)	17.2	87.2	93.2	34.2	79.3	25.0
South America (n=1964)	22.2	70.4	91.2	42.4	87.8	31.0
All Regions (n=30691)	17.7	80.3	85.5	38.0	75.9	25.5

Overview of quality indicators of antibiotic prescribing for prophylactic use are provided in 2016 ECCMID-poster n° P1222, available at www.global-pps.be/dissemination

Antibiotic prevalence rates (%) for a CAI versus HAI by UN region

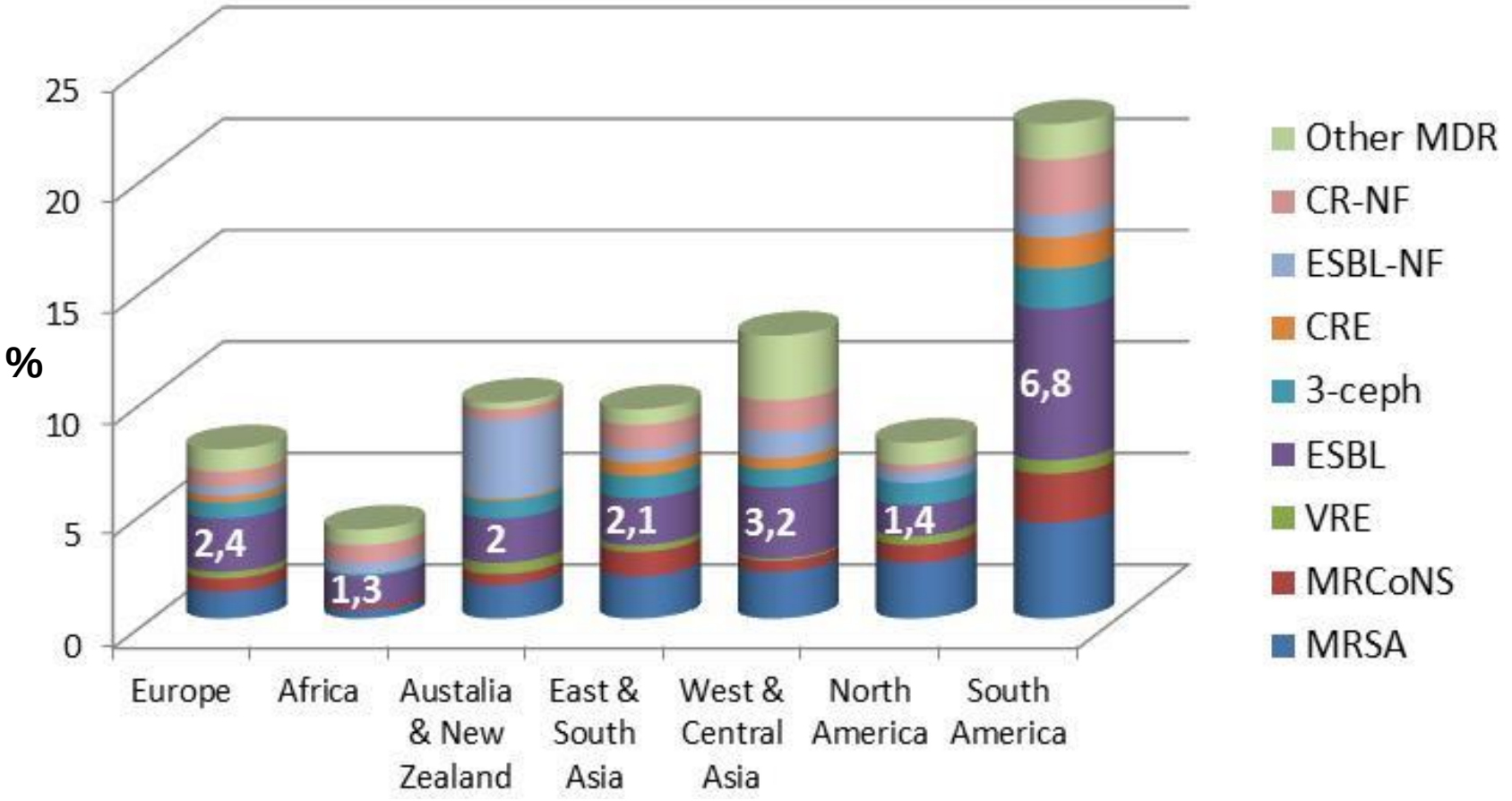


Mean CAI = 46.6%

Mean HAI = 22.1%

Includes only systemic antibiotics for therapeutic use
Numerator=N patients with CAI/HAI
Denominator=All treated patients

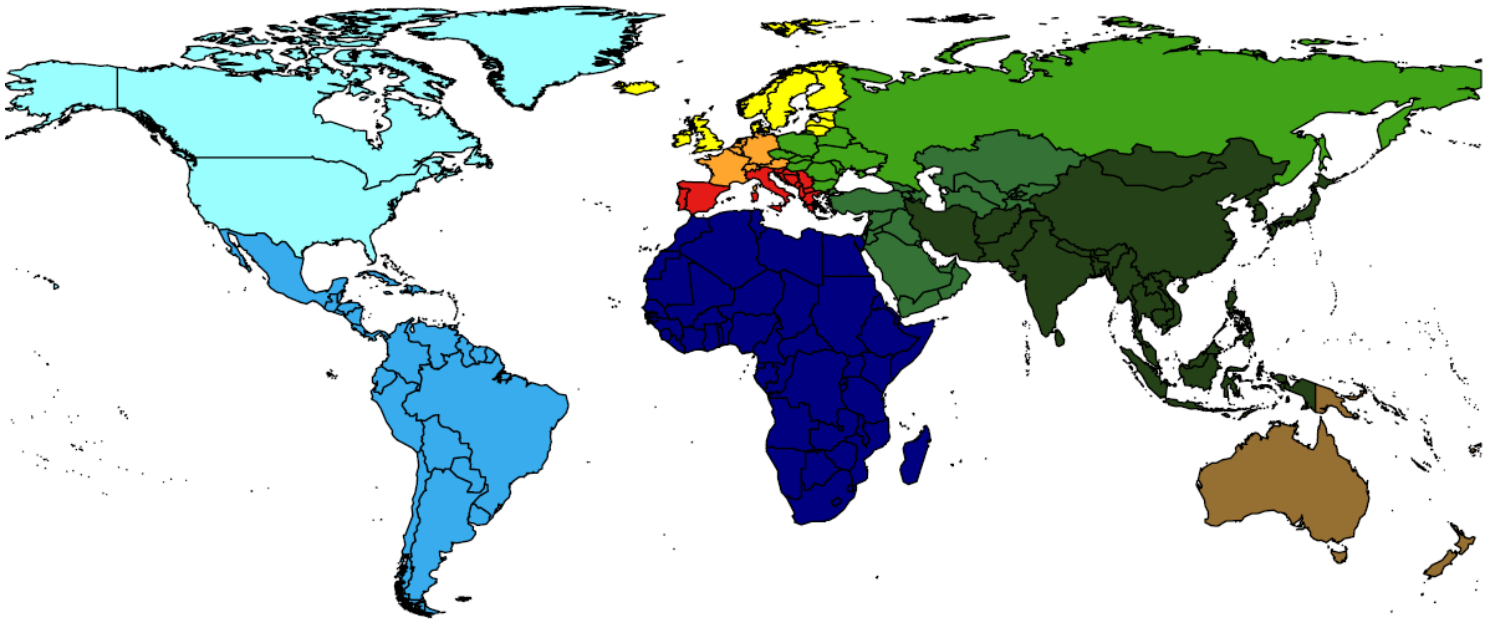
Antibiotic treatment based on microbiology data



4508	229	276	1238	370	598	608

Denominator= N Antibiotics (J01) targeted use

RESULTS for Iran compared to East-South Asia and Europe



	Number of countries	Number of hospitals
North America	2	22
South America	4	20
Africa	4	7
North Europe	5	36
West Europe	5	118
South Europe	13	52
East Europe	2	8
West & Central Asia	8	26
East & South Asia	6	29
Australia & New Zealand	2	9

Participation to the 2015 Global-PPS according to UN macro-geographical subregions

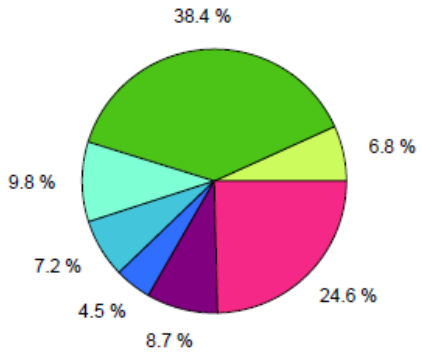
Overall antimicrobial prevalence by region and type of adult ward

	Total	AMW	HO−AMW	T−AMW	P−AMW	ASW	AICU
North America	38.6	32.4	55.4	66.7	58.8	44.2	59.4
South America	36.8	31.8	28.3	65.9	50.0	37.3	55.1
Africa	50.0	49.9	50.0	66.7	100.0	49.0	64.1
North Europe	34.4	29.8	49.6	60.8	53.5	37.7	55.9
West Europe	28.2	23.4	43.1	80.9	49.7	28.0	56.1
South Europe	39.1	32.6	33.6	76.9	60.2	40.0	64.2
East Europe	27.4	11.6	9.1	0.0	30.5	33.2	67.3
West & Central Asia	43.7	42.0	48.1	0.0	100.0	44.6	46.6
East & South Asia	37.2	33.0	54.0	86.3	46.2	34.2	65.5
Australia & New Zealand	37.0	29.8	54.3	0.0	77.8	52.5	69.7
Our hospital	63.8	69.0	0.0	0.0	0.0	58.6	100.0
IRAN, ISLAMIC REPUBLIC OF	58.7	51.6	56.6	91.4	0.0	56.1	81.6

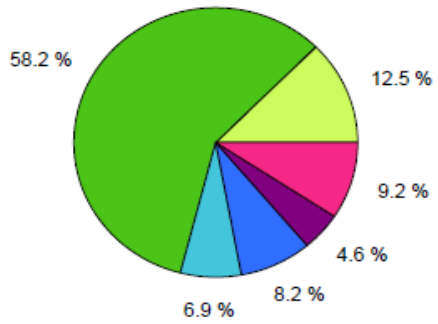
Antimicrobial prevalence (%): 100*(number of treated patients/number of registered patients according to UN macro−geographical subregions).
Total = Overall antimicrobial prevalence in adult wards; AMW = Adult Medical Ward; HO−AMW = Haematology−Oncology AMW;
T−AMW = Transplant (BMT/solid) AMW; P−AMW = Pneumology AMW; ASW = Adult Surgical Ward; AICU = Adult Intensive Care Unit.

Overall proportional antibiotic use

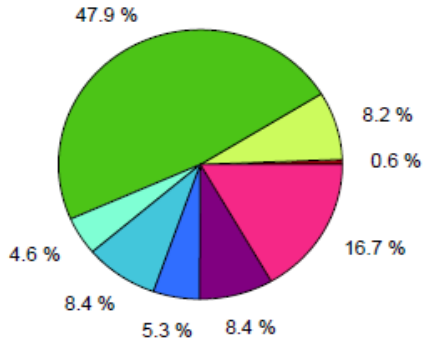
Hosp 1 (N= 256 treated patients)



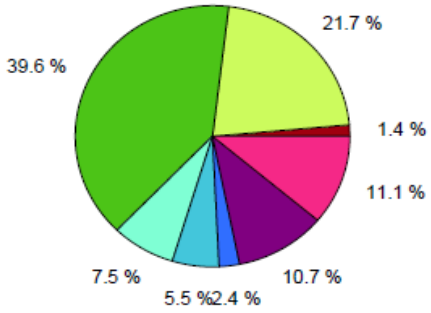
Hosp 2 (N= 198 treated patients)



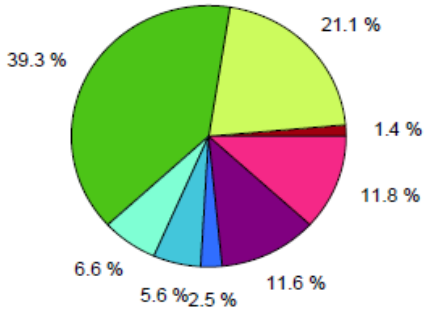
Iran (n= 4 hospitals)



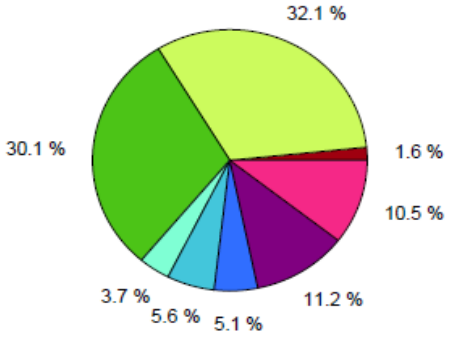
East & South Asia (n= 29 hospitals)



East & South Asia - tertiary (n= 17 hospitals)



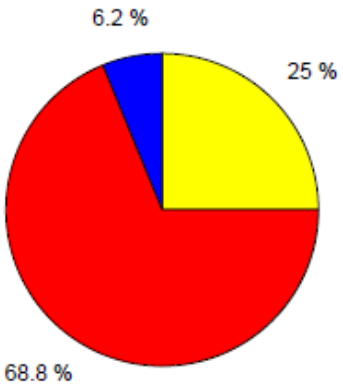
Europe (N= 213 hospitals)



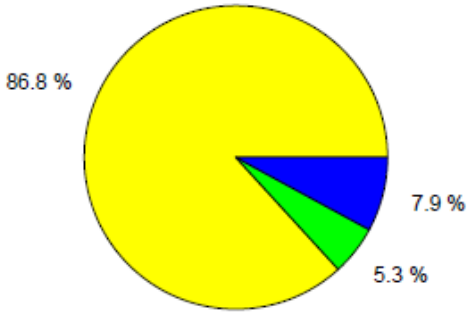
- Tetracyclines
- Penicillins
- Other beta−lactams
- Sulfonamides and Trimethoprim
- Macrolides, Lincosamides and Streptogramins
- Aminoglycosides
- Quinolones
- Other antibacterials

Proportional use of beta-lactam antibacterials

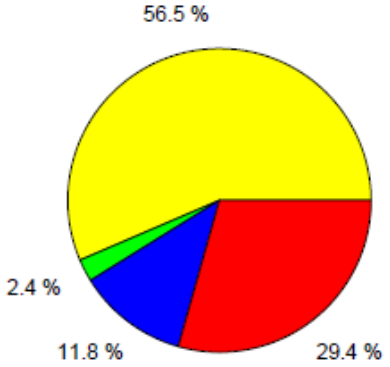
Hosp 1 (N= 30 treated patients)



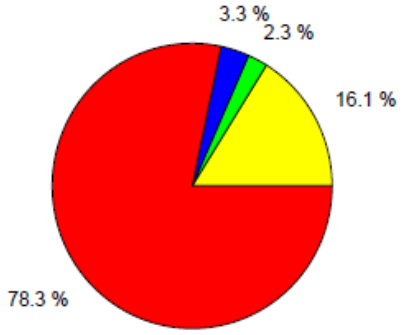
Hosp 2 (N= 38 treated patients)



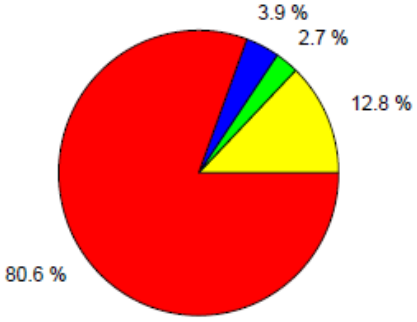
Iran (n= 4 hospitals)



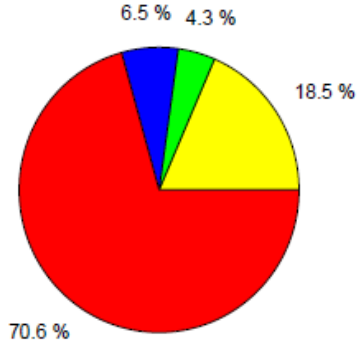
East & South Asia (n= 29 hospitals)



East & South Asia - tertiary (n= 17 hospitals)



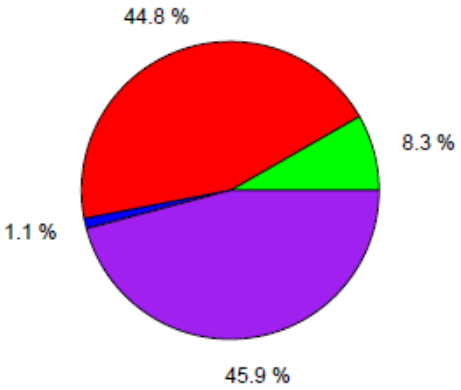
Europe (N= 200 hospitals)



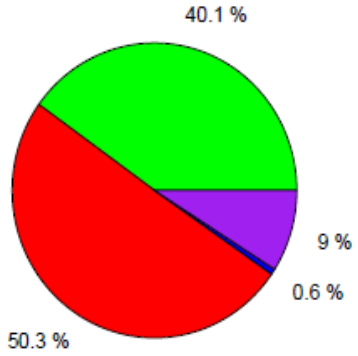
Penicillins with extended spectrum
Beta-lactamase sensitive penicillins
Beta-lactamase resistant penicillins
Combinations of penicillins, incl. beta-lactamase inhibitors

Proportional use of other beta-lactam antibacterials

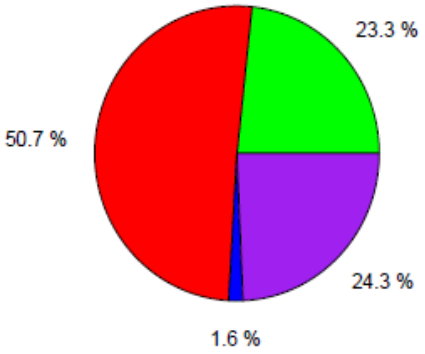
Hosp 1 (N= 174 treated patients)



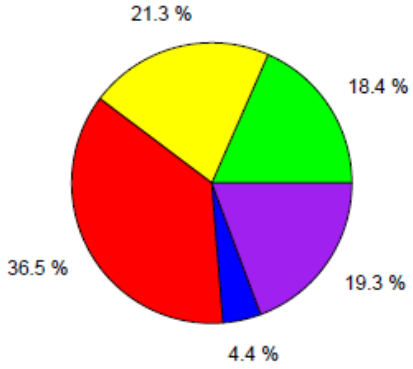
Hosp 2 (N= 170 treated patients)



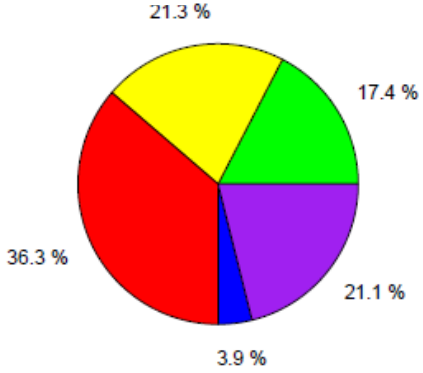
Iran (n= 4 hospitals)



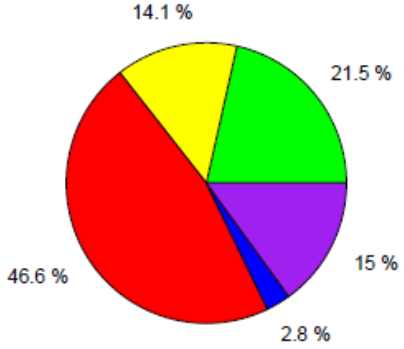
East & South Asia (n= 29 hospitals)



East & South Asia - tertiary (n= 17 hospitals)



Europe (N= 199 hospitals)



First−generation cephalosporins
Second−generation cephalosporins
Third−generation cephalosporins
Fourth−generation cephalosporins
Carbapenems

10 most common diagnoses treated with therapeutic antimicrobials

	Hosp 1		Iran	
Diagnosis	N	%	N	%
SEPSIS	36	19.5	43	12.1
Pneu	32	17.3	88	24.7
IA	22	11.9	22	6.2
Pye	18	9.7	28	7.9
PUO−HO	15	8.1	15	4.2
CNS	9	4.9	15	4.2
GI	7	3.8	24	6.7
BAC	6	3.2	7	2.0
SST	6	3.2	24	6.7
BJ	5	2.7	16	4.5

	Hosp 2		Iran	
Diagnosis	N	%	N	%
Pneu	26	49.1	88	24.7
SST	5	9.4	24	6.7
OBGY	4	7.5	4	1.1
GI	3	5.7	24	6.7
Pye	3	5.7	28	7.9
SEPSIS	3	5.7	43	12.1
BJ	2	3.8	16	4.5
CNS	2	3.8	15	4.2
URTI	2	3.8	4	1.1
ENT	1	1.9	7	2.0

CNS=infection of central nervous system; Eye=eye infections; ENT=ear, nose and throat infections; URTI=upper respiratory tract infection; Bron=bronchitis; Pneu=Pneumonia or lower respiratory tract infection; TB=tuberculosis; CVS=cardiovascular system infections; GI=gastro−intestinal infections; IA=intra−abdominal sepsis; SST=skin and soft tissue; BJ=bone/joint infections; Cys=lower urinary tract infection; Pye=Upper urinary tract infection; OBGY=obstetric/gynaecological infections; GUM=genito−urinary males; BAC=bacteraemia; PUO=pyrexia of unknown origin; PUO−HO=fever syndrome in non−neutropaenic haematology−oncology patient; FN=fever neutropaenic patient; LYMPH=infection lymphatics

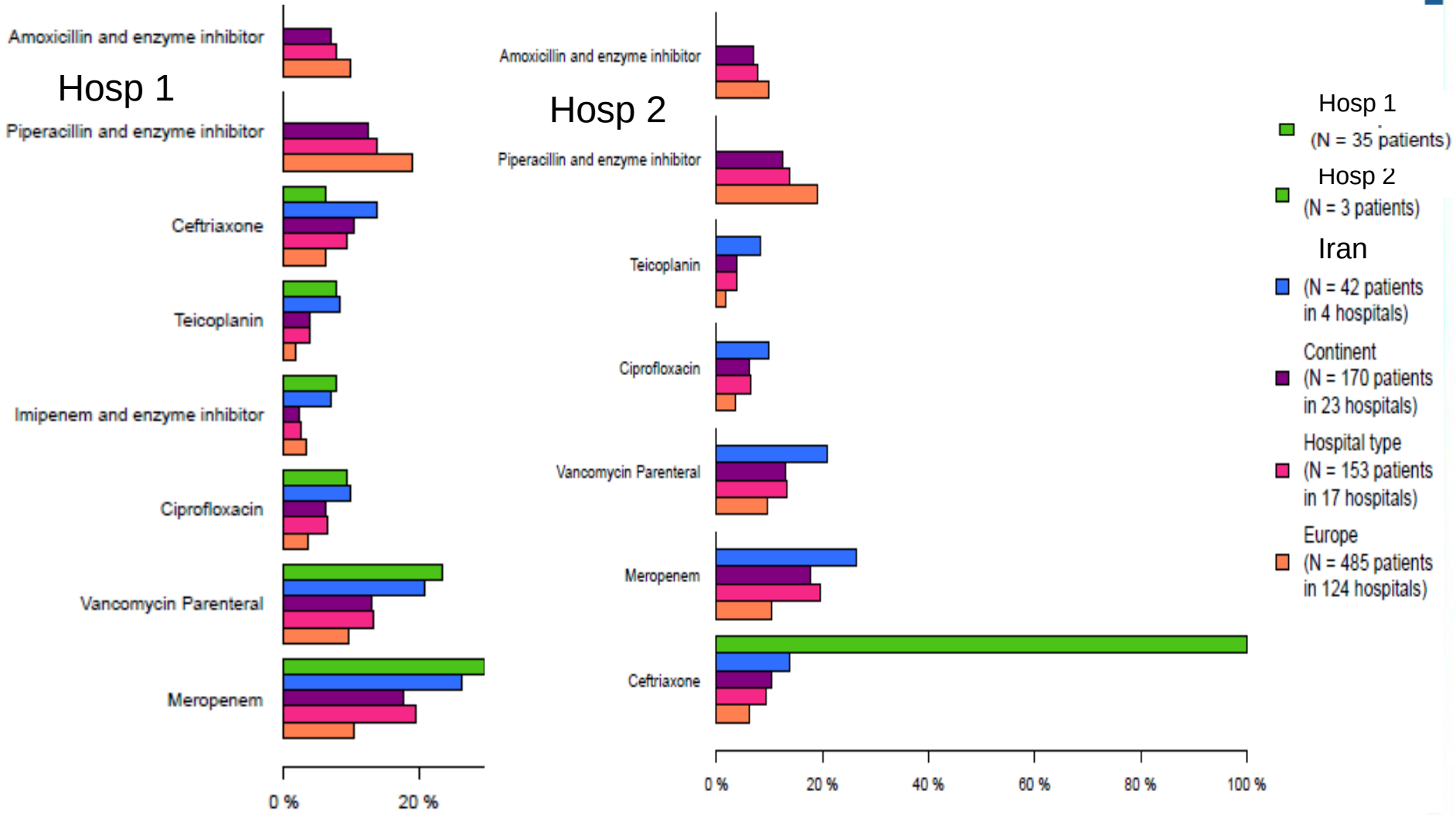
Summary of quality indicators for antibiotic use

	Hosp 1		Hosp 2		Iran		East & South Asia		East & South Asia - tertiary		Europe	
	N	%	N	%	N	%	N	%	N	%	N	%
Medical												
Reason in notes	298	98.3	76	65.0	430	70.6	3285	79.1	2735	80.8	10572	81.0
Guidelines missing	0	0.0	86	73.5	231	37.9	884	21.3	755	22.3	1964	15.1
Guideline compliant	201	97.1	0	0.0	206	78.6	2128	83.1	1652	83.1	6791	80.5
Stop/review date documented	278	91.7	1	0.9	280	46.0	1884	45.4	1672	49.4	4771	36.6
Surgical												
Reason in notes	19	90.5	56	50.9	77	45.0	1700	68.8	1501	70.0	5470	69.8
Guidelines missing	0	0.0	69	62.7	108	63.2	551	22.3	501	23.4	1526	19.5
Guideline compliant	14	100.0	0	0.0	15	37.5	1110	74.6	911	73.0	3473	71.7
Stop/review date documented	21	100.0	8	7.3	29	17.0	1016	41.1	899	42.0	3386	43.3
ICU												
Reason in notes	145	98.6	55	71.4	213	82.6	666	75.9	609	74.9	2506	78.8
Guidelines missing	0	0.0	72	93.5	100	38.8	202	23.0	197	24.2	618	19.4
Guideline compliant	81	100.0	0	0.0	82	92.1	366	77.7	330	76.6	1481	84.6
Stop/review date	147	100.0	1	1.3	148	57.4	493	56.2	469	57.7	1245	39.2

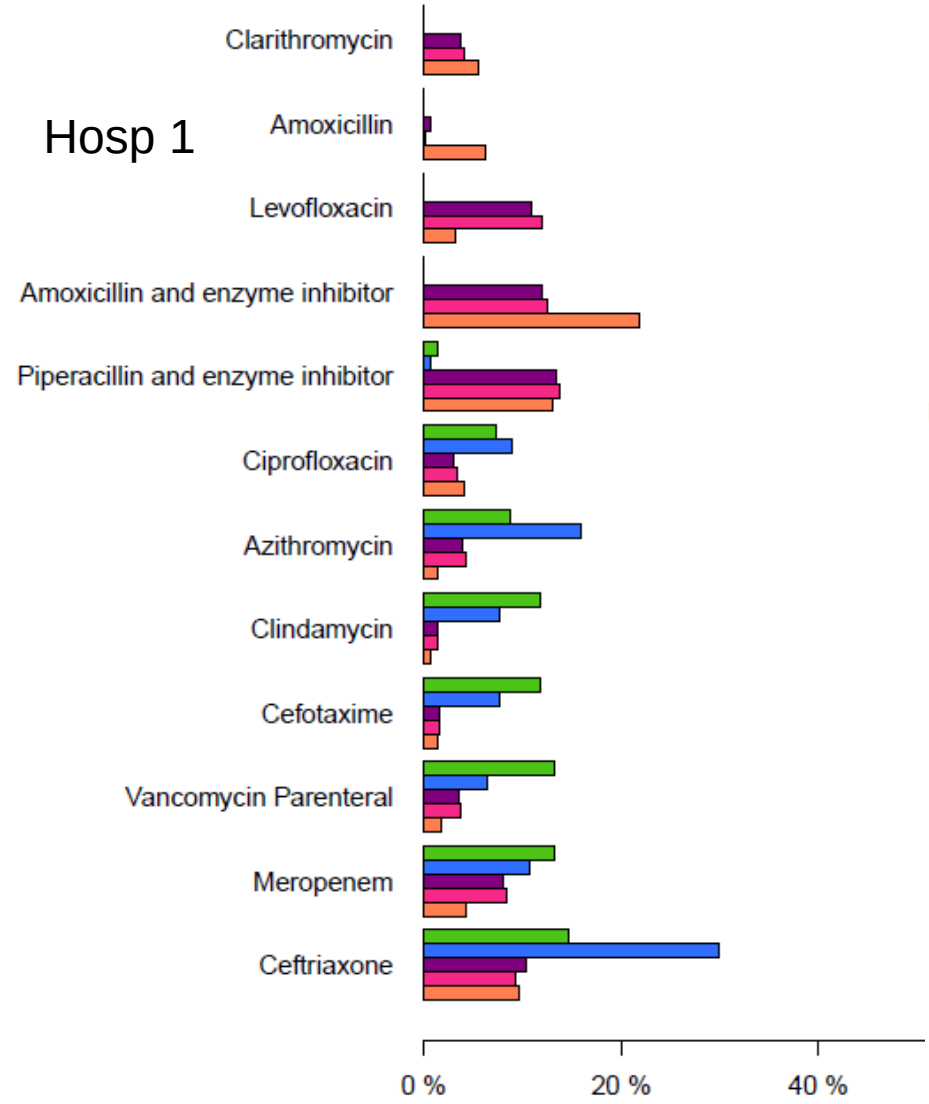
Antibiotic quality indicators by activity (medical, surgery, ICU) for all patients receiving antibacterials for systemic use (ATC J01).

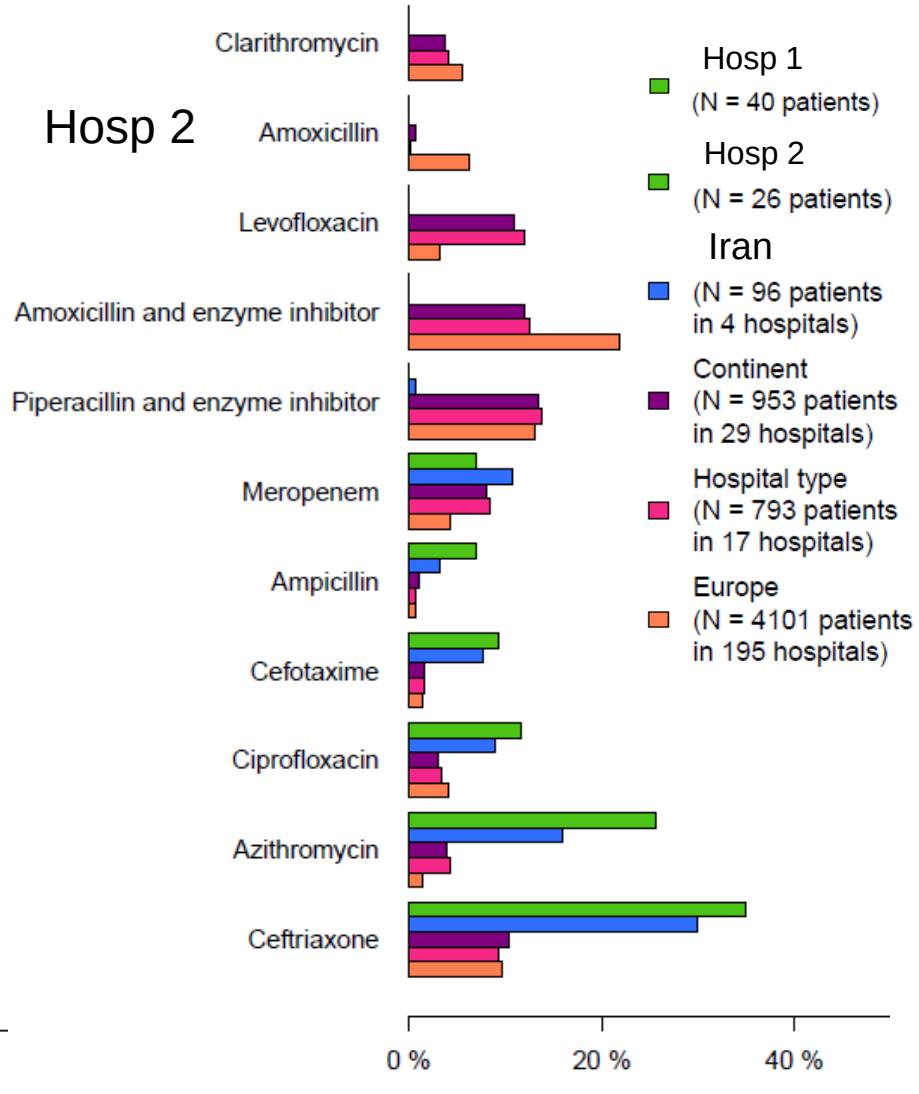
- For reason in notes and stop/review date documented: Count at antibacterial level.
- For guidelines missing: Count on NA (= no local guidelines for the specific indication) at patient level and diagnosis over total scores for this indicator.
- For guideline compliance: Count at patient level and diagnosis for compliance= yes or no only. For combination therapy with >1 antibiotic: if 1 antibiotic by diagnosis is not compliant, this combination therapy as a whole for this diagnosis will be counted as non−compliant.

Top 5 most frequently used antibiotics for sepsis in adults and children

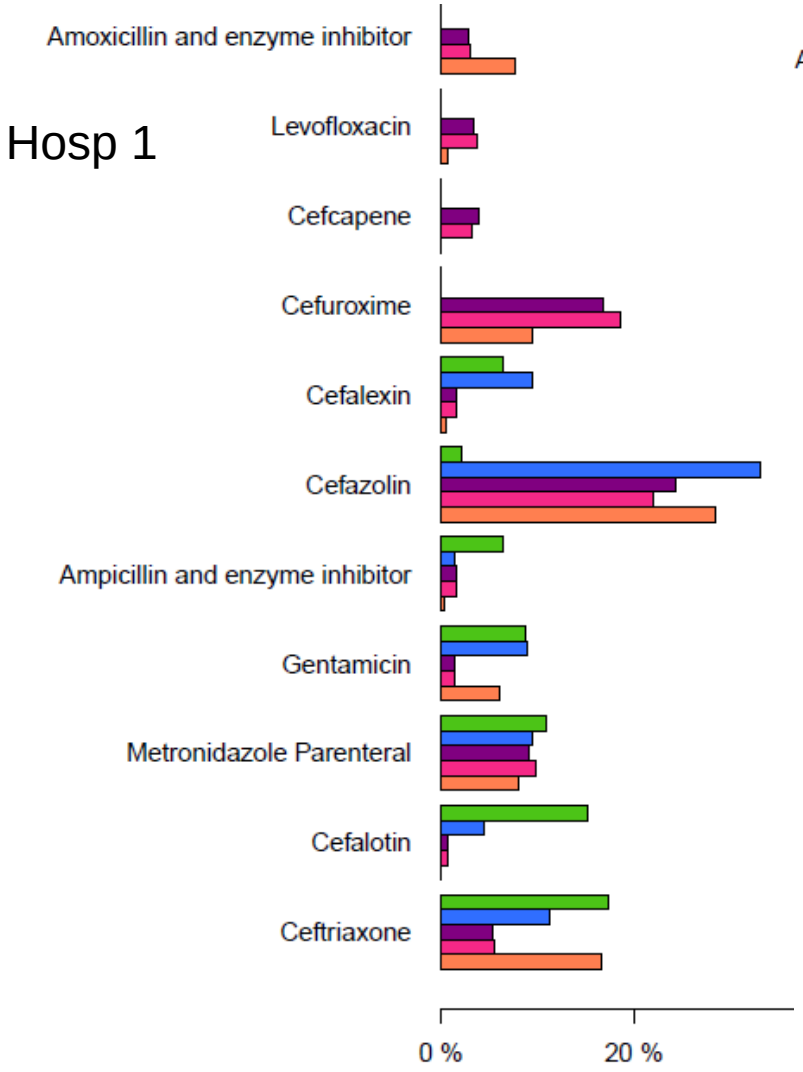


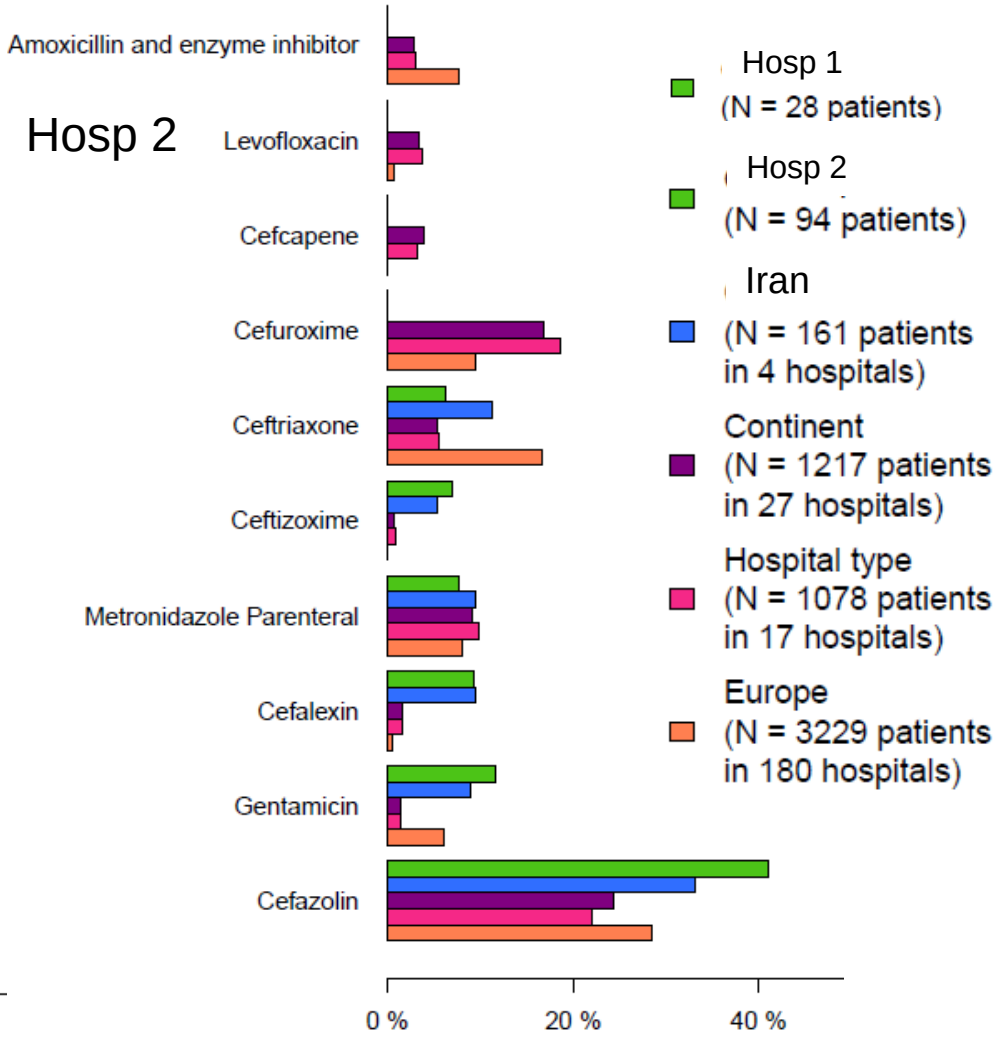
Top 5 most frequently used antibiotics for pneumonia in adults and children



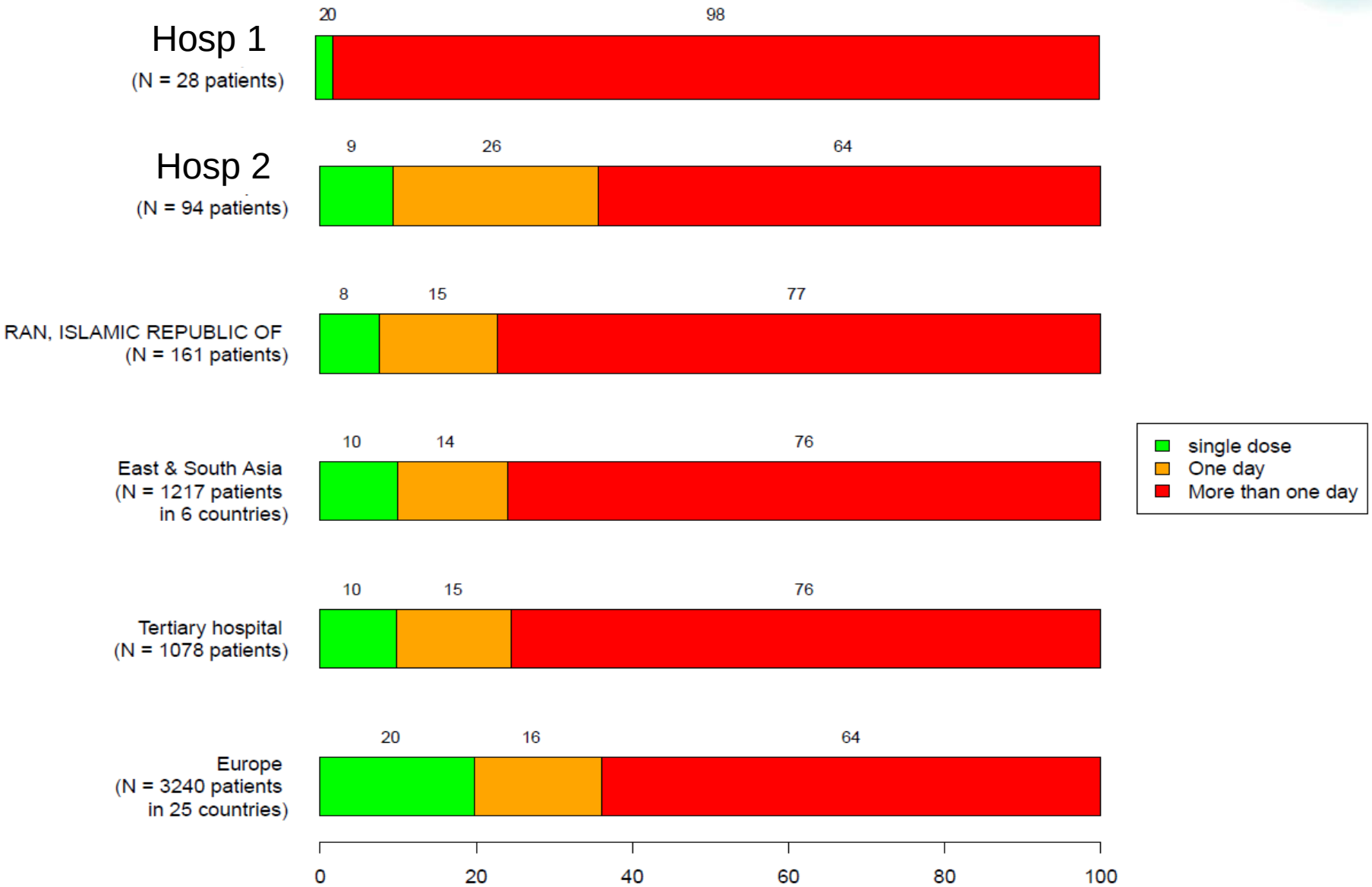


Top 5 most frequently used antibiotics for surgical prophylaxis in adults and children





Duration of surgical prophylaxis in adults and children



Type of antibiotic treatment

	Hosp 1		Hosp 2		Country		Continent		Hospital type		Europe	
	N	%	N	%	N	%	N	%	N	%	N	%
All patients												
Empiric	322	68.4	293	96.4	873	84.1	5613	80.6	4658	80.3	18224	79.4
Targetted	149	31.6	11	3.6	165	15.9	1347	19.4	1144	19.7	4732	20.6
Adults (>= 18 years)												
Empiric	178	62.0	186	98.9	585	83.6	4947	80.0	4182	79.9	14769	78.3
Targetted	109	38.0	2	1.1	115	16.4	1238	20.0	1055	20.1	4105	21.7
Children (< 18 years)												
Empiric	120	75.9	81	93.1	238	84.1	583	85.7	407	83.7	3092	84.0
Targetted	38	24.1	6	6.9	45	15.9	97	14.3	79	16.3	587	16.0
Neonates (NICU)												
Empiric	24	92.3	26	89.7	50	90.9	83	87.4	69	87.3	363	90.1
Targetted	2	7.7	3	10.3	5	9.1	12	12.6	10	12.7	40	9.9

Selection on antibiotic treatments.
N = number of antibiotics (J01) included per type of treatment and subgroup (all patients, adults, children and neonates).

Country: IRAN, ISLAMIC REPUBLIC OF ; Continent: East & South Asia ; Hospital type: Tertiary hospital

Treatment based on microbiology data

	Hosp 1		Hosp 2		Country		Continent		Hospital type		Europe	
	N	%	N	%	N	%	N	%	N	%	N	%
MRSA	6	3.5	0	0.0	6	1.8	68	1.9	56	1.9	164	1.2
MRCoNS	10	5.8	0	0.0	10	2.9	38	1.1	28	0.9	79	0.6
VRE	5	2.9	0	0.0	5	1.5	10	0.3	10	0.3	44	0.3
ESBL	12	7.0	0	0.0	12	3.5	77	2.1	67	2.3	332	2.4
3−ceph	1	0.6	1	1.8	2	0.6	37	1.0	30	1.0	102	0.7
CRE	5	2.9	0	0.0	5	1.5	23	0.6	23	0.8	37	0.3
ESBL−NF	18	10.5	0	0.0	18	5.3	21	0.6	21	0.7	59	0.4
CR−NF	5	2.9	0	0.0	5	1.5	38	1.1	38	1.3	92	0.7
Other MDR	5	2.9	0	0.0	5	1.5	24	0.7	22	0.7	143	1.0
	57	33.3	1	1.8	58	17.1	302	8.4	264	8.9	943	6.8

N = the number of patients reported to have recieved a targeted treatment against one of the 9 microbiological results.
% = 100*(the number of patients reported to have recieved a targeted treatment/total number ofpatients receiving a therapeutic treatment (CAI or HAI) with at least one antibacterial for systemic use (J01)).

Country: IRAN, ISLAMIC REPUBLIC OF ; Continent: East & South Asia ; Hospital type: Tertiary hospital

DISCUSSION

Obtain meaningful comparisons – Interpret the results for your hospital

- Very different antibiotic prescribing practices are observed, worldwide as well as within a nation (eg Iran)
  - Quantity of antibiotics
  - Quality of antibiotics (broad-narrow spectrum, parenteral-oral use)
  - Quality indicators (eg guidelines, targeted prescribing, reason in notes etc)
- In depth study of results/ feedback
  - Find explanations for certain observed results (institutional and patient characteristics, health care system, local resistance patterns, etc.)
  - Choose feasible targets to improve antibiotic prescribing
  - Intervention: set up or strengthen an antimicrobial stewardship program
  - Repeat the PPS

NEXT Global-PPS is foreseen for January-June 2017

Obtain meaningful comparisons

- ✓ Uniformity of data collection: **common simple methodology** and web-based tool for data entry and validation = feasible & achievable surveillance
- ✓ Quality assurance approach
- ✓ Enables **in-depth interpretation** of antimicrobial consumption data at different levels
- ✓ Creation of **reference database** for scientific research and hypothesis formulation at national and international level (data are safeguarded at the University of Antwerp, Belgium, Europe).

Features of the Global-PPS

- Identification of targets for quality improvement
- **Tool for assessing interventions** to improve antibiotic prescribing in hospitals when PPS repeated
- Improve antibiotic use for **better patient health**
- **Combat antibiotic resistance**

"sustained awareness"

Acknowledgements

- Hundreds of healthcare professionals who were voluntarily collecting and submitting data globally
- The Global-PPS development group
- People who voluntary helped us with translation of protocol and data-collection templates
  - I'm looking for a volunteer to help with the Arabic/Persian translation
- So many other people to thank !

Future: next Global-PPS

JANUARY – JUNE 2017

ANY HOPSITAL IS WELCOME TO PARTICIPATE !

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