

POINT PREVALENCE SURVEY

A tool for antibiotic stewardship in hospitals



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Background – Strategic plan

- By means of a point prevalence survey and internal audits measuring 4 antibiotic quality indicators in hospitals:
 - Choice of therapeutic antibiotic in accordance with local guideline in 90% of prescriptions
 - Reason in notes in 90% of prescriptions
 - Choice of antibiotic for surgical prophylaxis in accordance with local guidelines in 90% of prescriptions
 - Duration surgical antibiotic prophylaxis in accordance with local guidelines in 90% of prescription

Method

- Standardized and validated protocol.
- A **one-day cross sectional** PPS during which all wards admitting **inpatients** were audited once **between February-May 2015**.
- Detailed data were collected for each patient receiving at least one antimicrobial (details on antimicrobial agent, age and gender, indication for treatment, info on quality indicators).
- Denominators = total N patients present on the ward at 8 am and total N beds by ward.
- Drugs were classified according to the standardized WHO Anatomical Therapeutic Chemical (ATC) classification system.



Method : Type of hospital follows ECDC definitions

- **Primary level**: District hospital or first-level referral. Hospital with few specialities.
- **Secondary level**: Often referred to as provincial hospital with five to ten clinical specialities. Often corresponds to general hospital with teaching function.
- **Tertiary level**: Hospital with highly specialized staff and technical equipment; regularly takes referrals from other hospitals. Often University hospital.
 - ***For Belgium : definition of tertiary care hospital was adapted to definition used by the Institute of Public Health, Belgium.***
- **Specialized hospital**: Single clinical specialty, possibly with sub-specialties; highly specialized staff and technical equipment. E.g. paediatric hospital, infectious diseases hospital

Method

- All data were mandatory.
 - Support: Helpdesk and FAQ-list
 - Global-PPS web-based application for data-entry, validation and reporting (see: <http://www.global-pps.com/>).
 - All data were completely anonymous entered onto the database and safeguarded at the University of Antwerp.
 - Participation on a voluntary basis
 - Ethical approval
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- Analyses: Belgian data (N=100 hospital sites) are compared to European overall data (excluding BE) (N=114 hospital sites)

The Belgian 2015 Global-PPS database

Degree of participation of Belgian hospitals to the Global-PPS

	BE hospital entities			BE hospital sites		
	Total hospital entities	N entities participated	Degree of participation (%)	Total hospital sites	N sites participated	Degree of participation (%)
Brussels	12	6	50.0%	25	9	36.0%
Flanders	54	42	77.8%	111	57	51.4%
Wallonia	36	21	58.3%	75	34	45.3%
Total	102	69	67.6%	211	100	47.4%

Degree of participation of Belgian and other European hospitals to the Global-PPS



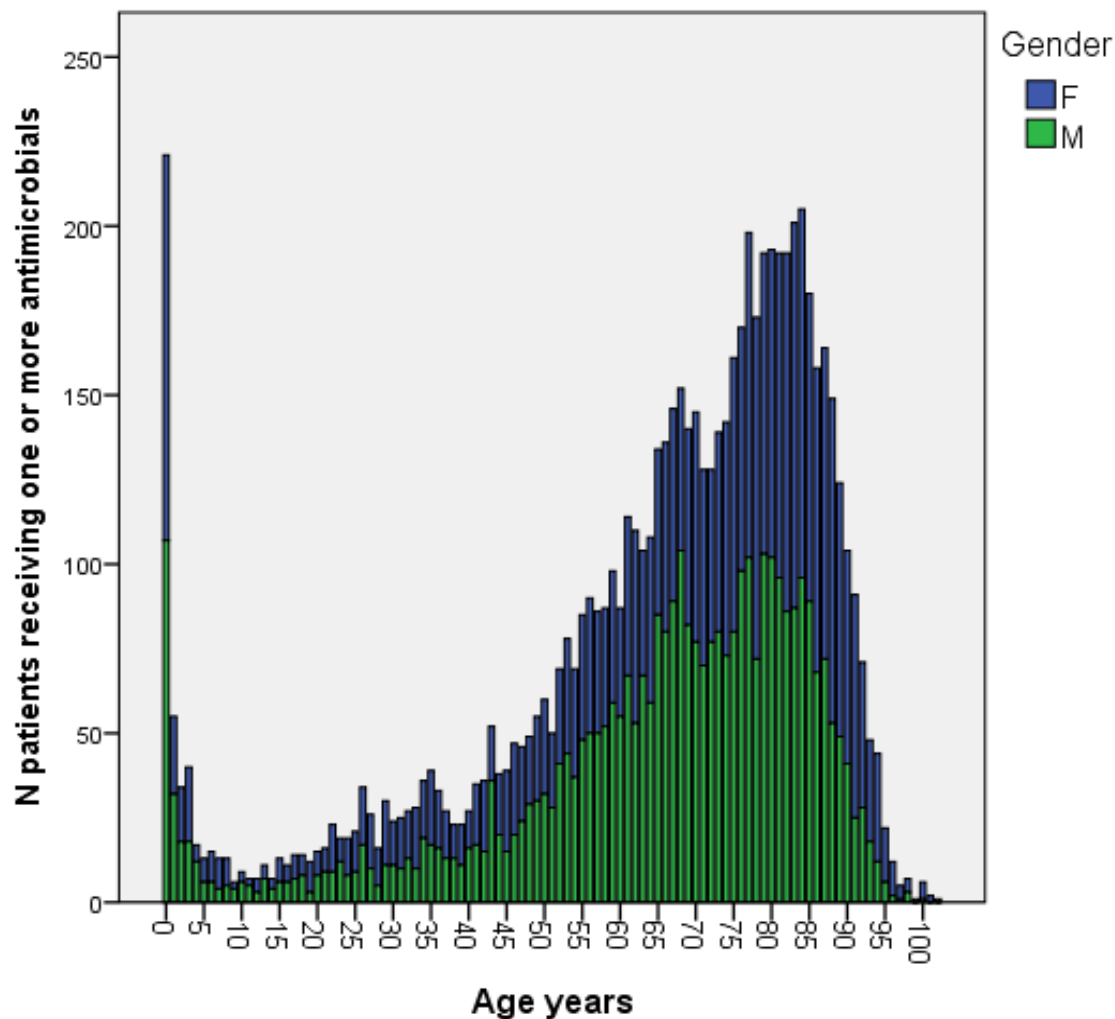
	Belgium	Europe
Primary	24%	13.2%
Secondary	68%	35.1%
Tertiary	6%	34.2%

Participating European hospitals

East Europe	15
North Europe	36
South Europe	45
West Europe	118
Grand Total	214

Global-PPS in Belgium

Distribution of age and gender of hospitalized patients receiving at least 1 antimicrobial



Male	Female
N=3669 (50.9%)	N=3542 (49.1%)

2015 Global-PPS in Belgium

Recorded antimicrobial prescriptions

8802 antimicrobial prescriptions

7942 (90.2%) antibacterials for systemic use (ATC J01)

437 (4.9%) antimycotics for systemic use (ATC J02)

181 (2.1%) drugs to treat tuberculose (ATC J04)

114 (1.3%) nitroimidazole derivatives (ATC code P01AB)

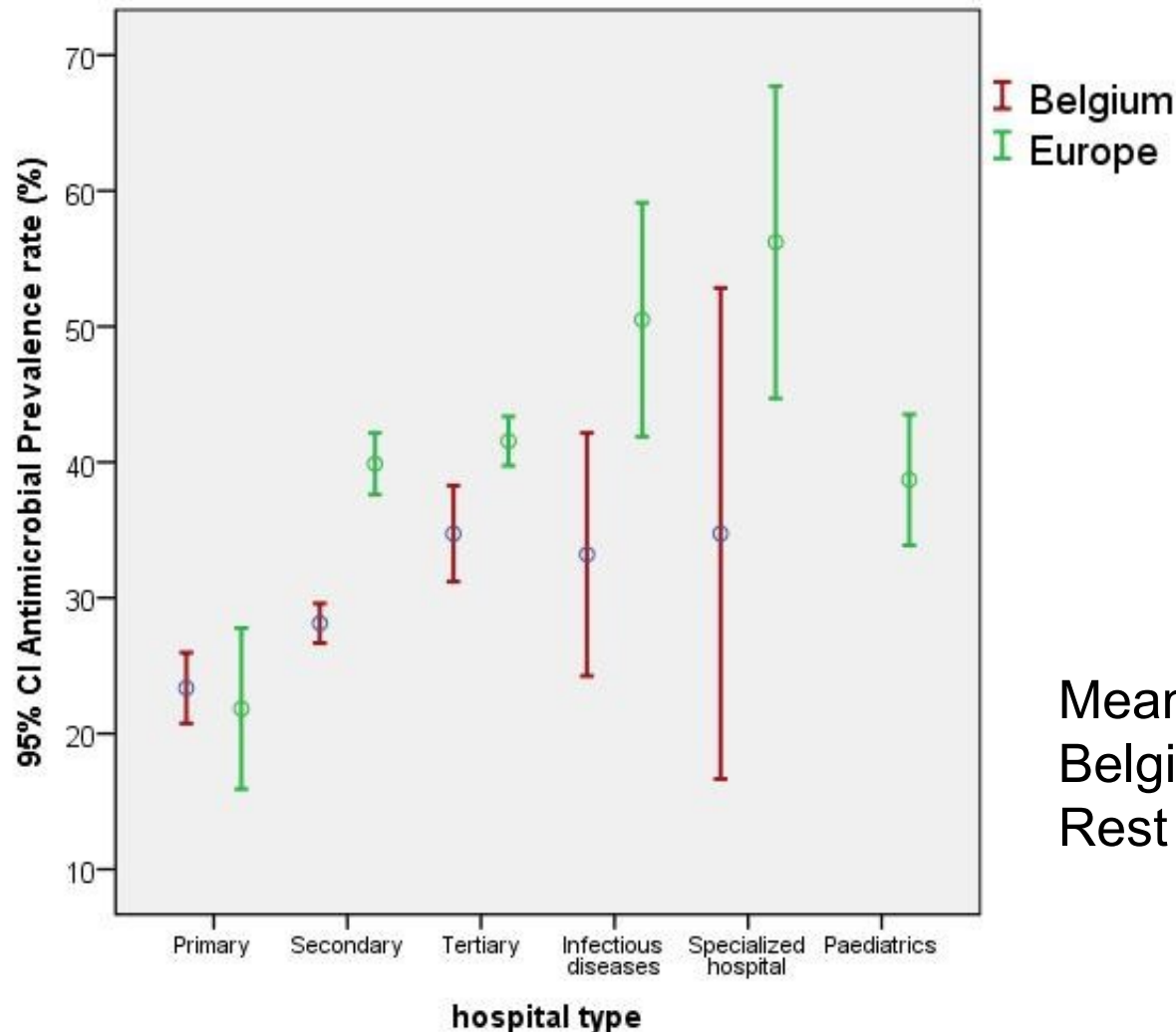
110 (1.2%) intestinal anti-infectives (ATC code A07)

18 (0.2%) neuraminidase inhibitors (ATC code J05AH)

Antimicrobial prevalence rates (%) in Belgium, by type of hospital

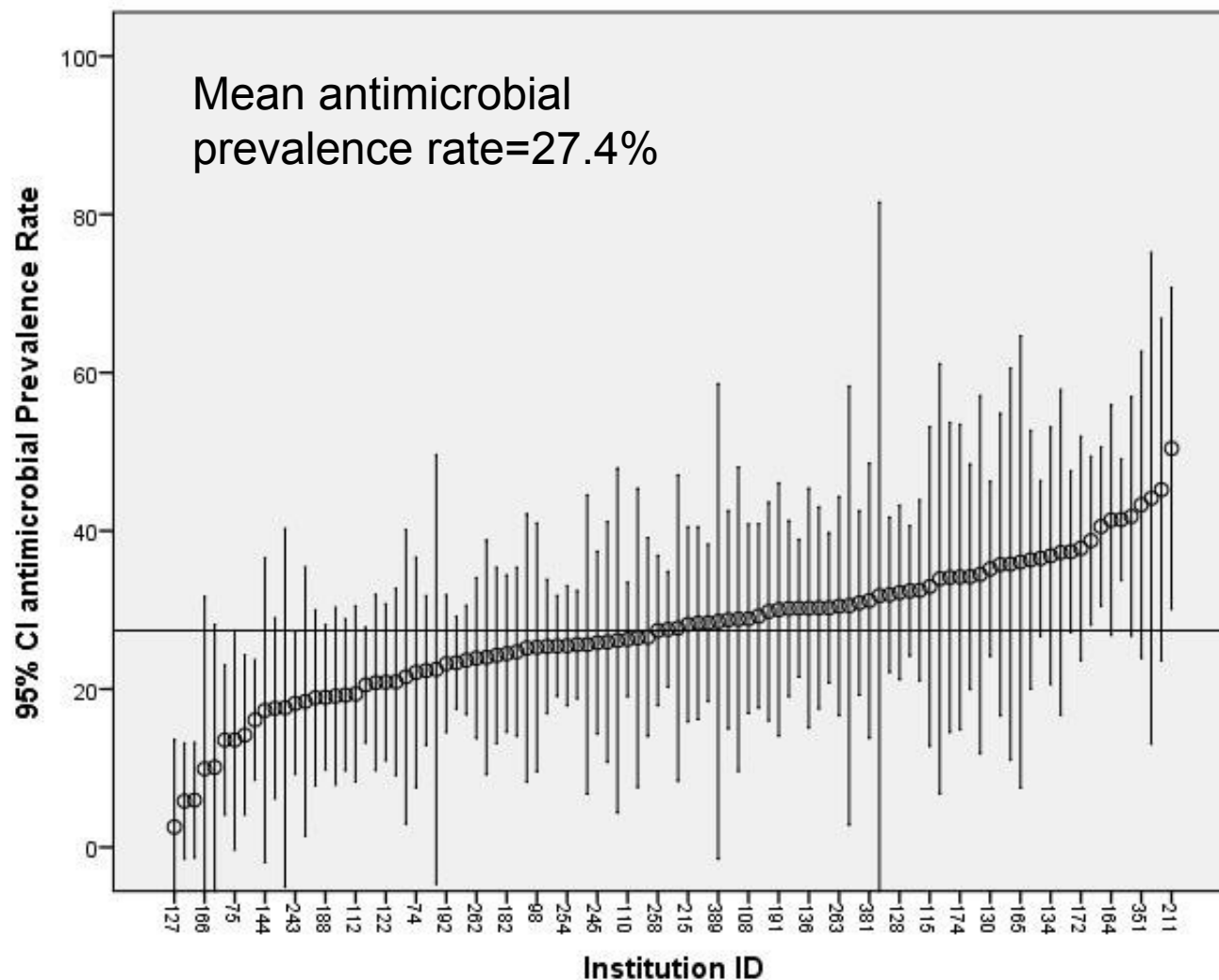
Hospital type	N Beds	N Patients	N treated patients	%	Range (%)
Primary (n=24)	5944	4539	1073	23.6%	3.3-51.8
Secondary (n=65)	23443	18172	4968	27.3%	10.2-45.6
Tertiary (n=6)	4243	3409	1126	33.0%	26.2-38.2
Specialized hospital (n=2)	248	206	44	21.4%	6.0-32.0
Total	33878	26326	7211	27.4%	3.3-51.8
Rest of Europe	47389	36527	12792	35.0%	23.7-66.0

Antimicrobial prevalence rates (%) by type of hospital in Belgium and Europe



Mean antimicrobial prevalence
Belgium: 27.4%
Rest Europe: 35.0%

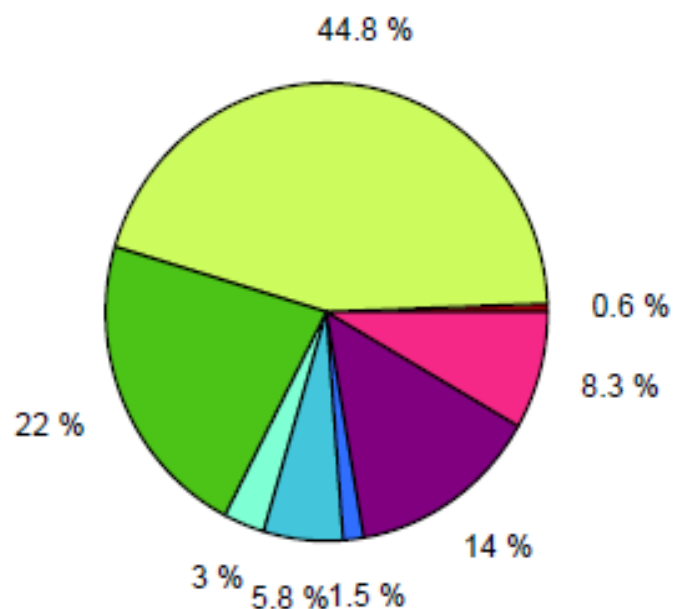
Antimicrobial prevalence rates (%) in Belgian hospitals



Type of antibiotics prescribed in Belgian hospitals

Top 10 prescribed antibiotics in Belgian and European hospitals

Country (n= 100 hospitals)



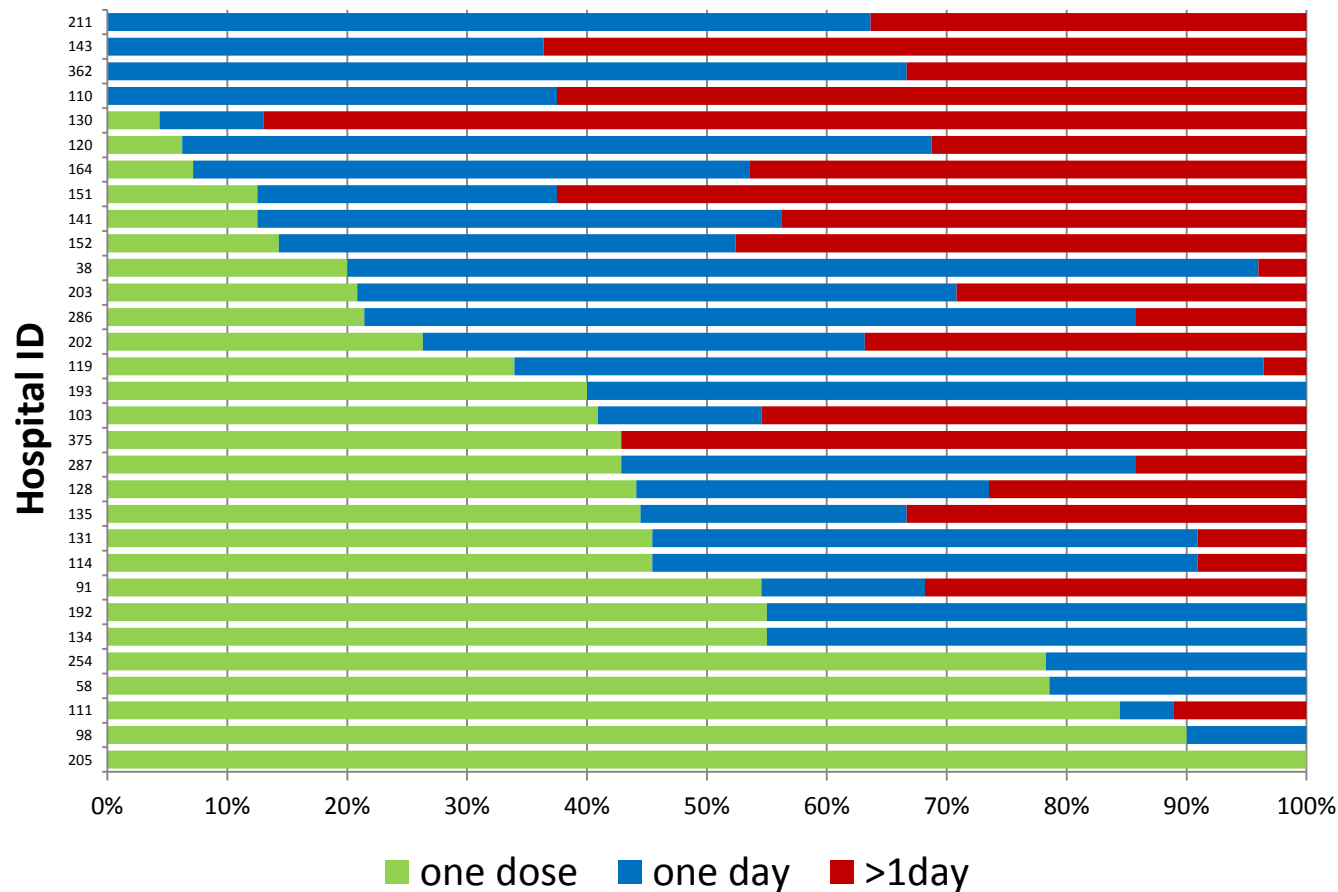
- Tetracyclines
- Penicillins
- Other beta-lactams
- Sulfonamides and Trimethoprim

- Macrolides, Lincosamides and Streptogramins
- Aminoglycosides
- Quinolones
- Other antibacterials

	Belgium		Europe	
	N	%	N	%
Co-amoxiclav	2185	27.5%	1402	8.7%
Piperacillin/Tazo	643	8.1%	996	6.2%
Cefazolin	547	6.9%	891	5.5%
Ciprofloxacin	525	6.6%	1151	7.2%
Ceftriaxone	323	4.1%	2259	14.0%
Cefuroxime	294	3.7%	636	4.0%
Moxifloxacin	294	3.7%	53	0.3%
Meropenem	292	3.7%	507	3.2%
Levofloxacin	279	3.5%	307	1.9%
Amoxicillin	237	3.0%	684	4.3%

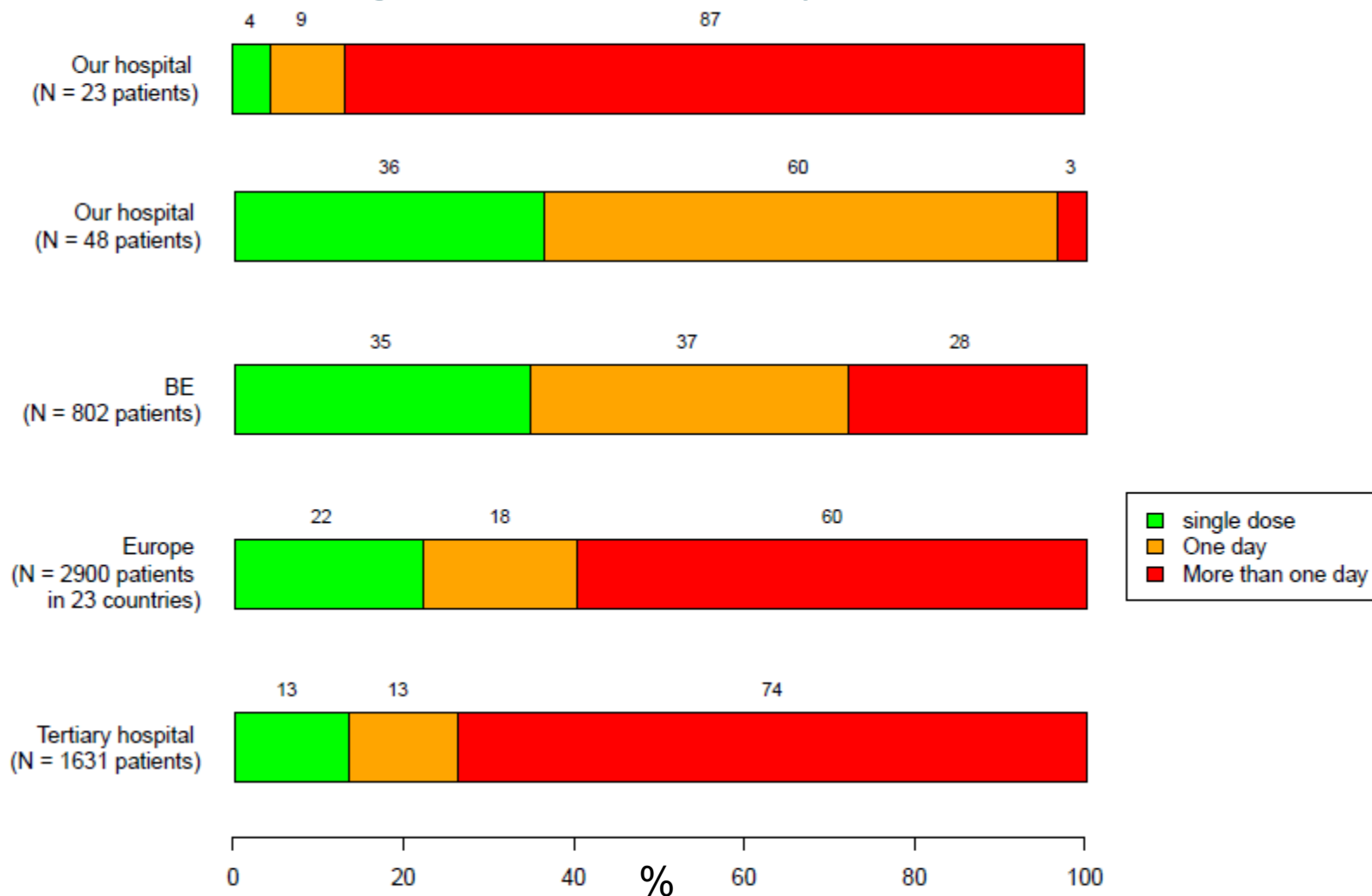
Surgical prophylaxis

Duration of surgical prophylaxis in Belgian hospitals



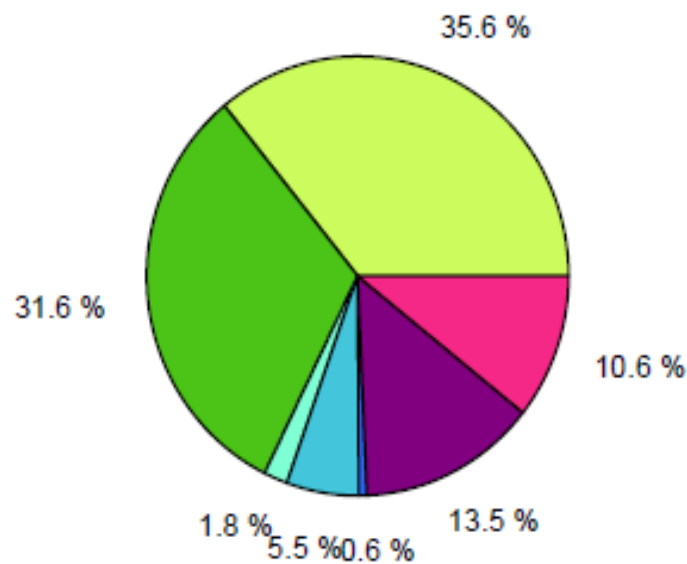
Selection hospitals with ≥ 10 patients receiving surgical prophylaxis (n=31 hospitals)

Prolonged surgical prophylaxis in Belgian tertiary care hospitals as compared to Belgium and Europe



Antibiotic choice of surgical prophylaxis in Belgian hospitals

Country (n= 89 hospitals)



■ Tetracyclines
■ Penicillins
■ Other beta-lactams
■ Sulfonamides and Trimethoprim

■ Macrolides, Lincosamides and Streptogramins
■ Aminoglycosides
■ Quinolones
■ Other antibiotics

	Belgium	Europe
Cefazolin	62.6%	18.9%
Ceftriaxone	0.1%	21.4%
Cefuroxime	5.0%	10.5%
Metronidazole	2.7%	9.4%
Co-amoxiclav	10.4%	7.0%
Gentamicin	0.1%	7.8%
Ciprofloxacin	3.4%	5.2%
Amikacin	0.4%	2.6%
Clindamycin	3.3%	1.4%
Vancomycin	0.5%	1.7%
Amoxicillin	0.6%	1.3%

Selected Antibiotic Quality Indicators

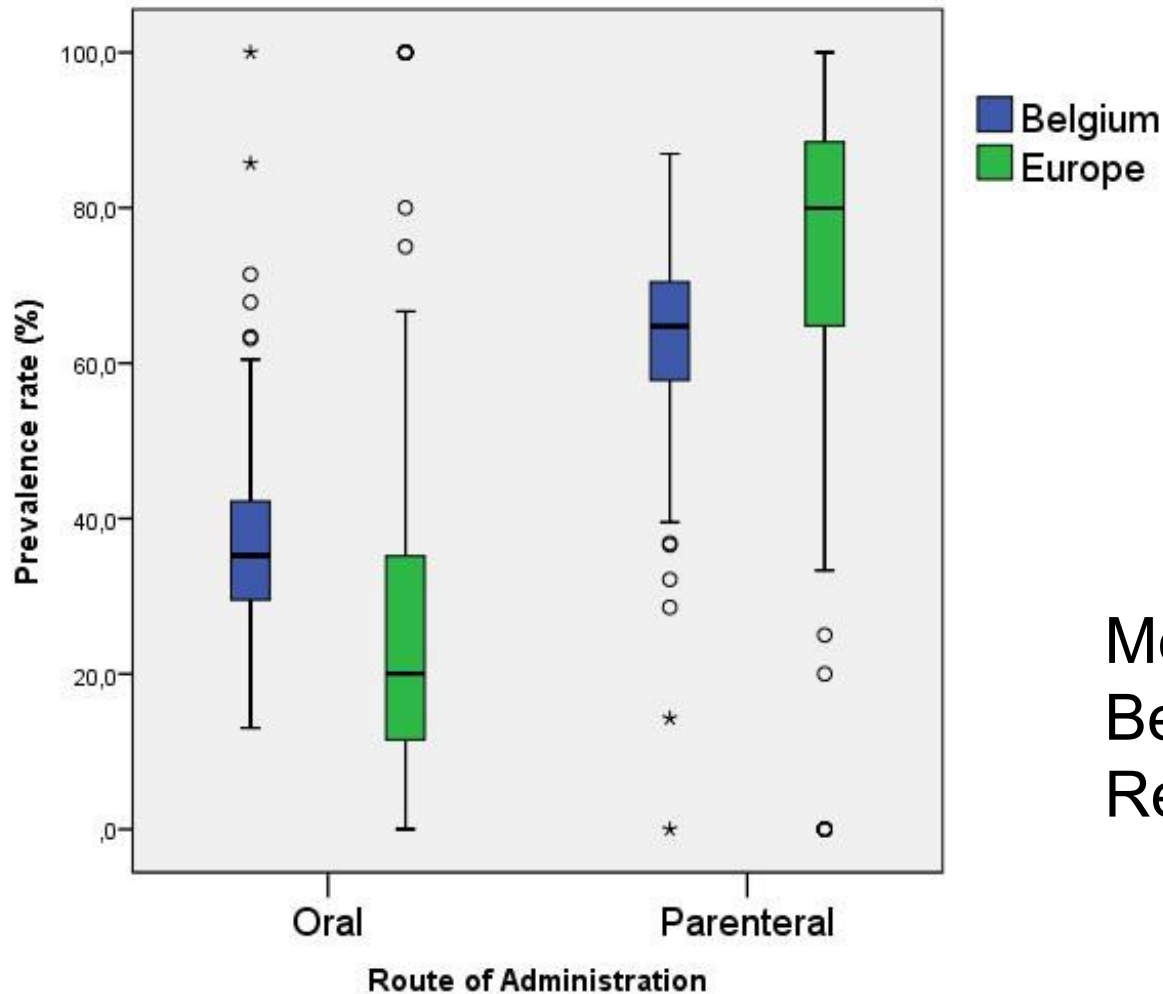
Antibiotic quality indicators

	Hosp 1		Hosp 2		Belgium		Europe	
	N	%	N	%	N	%	N	%
Medical								
Reason in notes	131	78.0	108	83.1	4041	81.5	10064	81.2
Guidelines missing	2	1.2	32	24.6	483	9.7	1487	12.0
Guideline compliant	121	91.7	60	67.4	3050	80.3	6716	80.7
Stop/review date documented	168	100.0	48	36.9	1726	34.8	4669	37.7
Surgical								
Reason in notes	41	37.3	39	81.2	1535	73.2	4950	68.8
Guidelines missing	0	0.0	10	20.8	179	8.5	1168	16.2
Guideline compliant	70	71.4	13	39.4	1200	74.2	3307	71.4
Stop/review date documented	110	100.0	10	20.8	981	46.8	3357	46.7
ICU								
Reason in notes	44	95.7	11	68.8	780	89.6	2305	77.6
Guidelines missing	4	8.7	1	6.2	64	7.3	484	16.3
Guideline compliant	31	93.9	8	80.0	525	83.3	1417	84.1
Stop/review date	6	13.0	11	68.8	301	34.6	1238	41.7

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

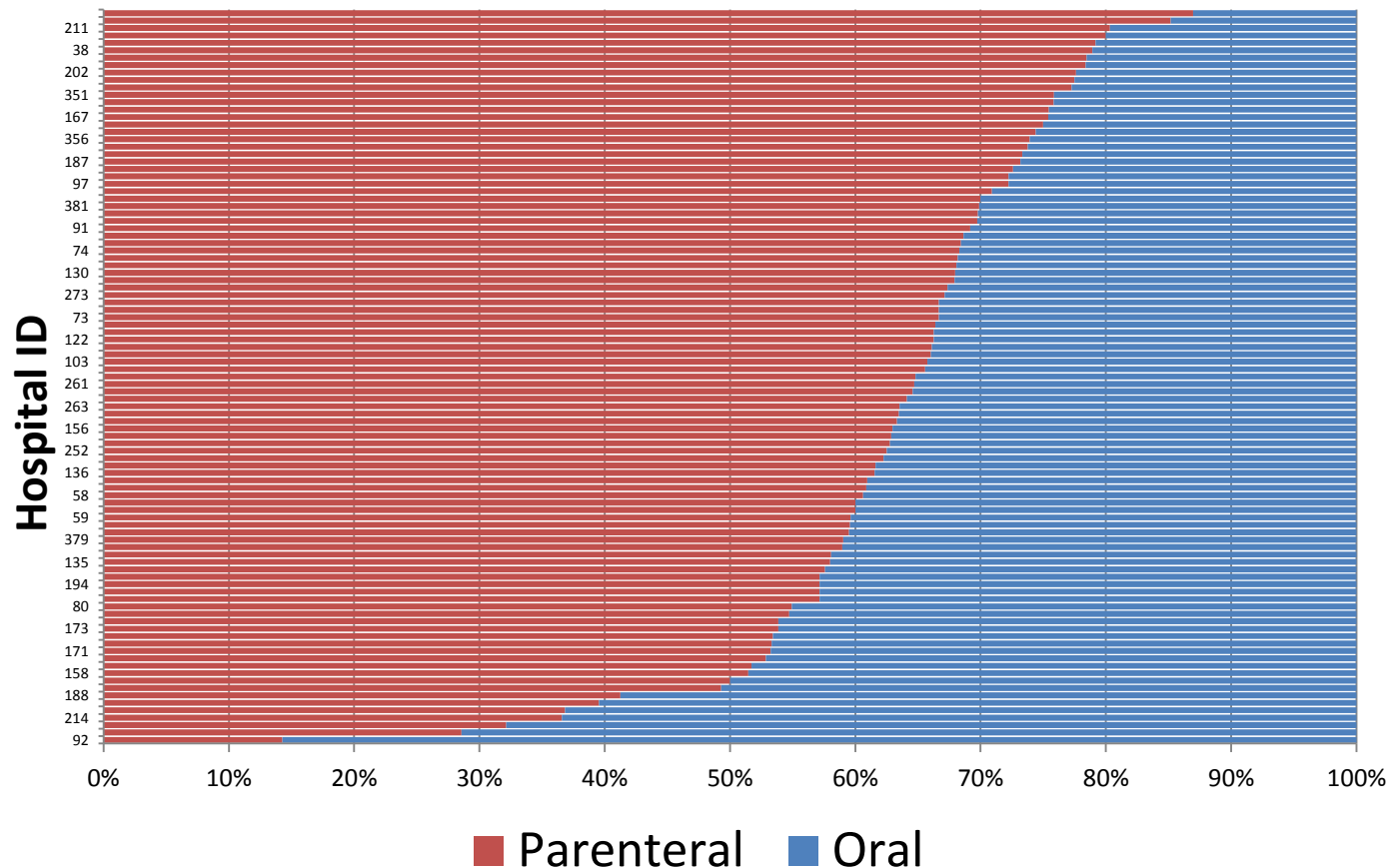
- For reason in notes and stop/review date documented: Count at antibacterial level.
- For guidelines missing: Count on NA (= no local guidelines for the specific indication) at patient level and diagnosis over total scores for this indicator.
- For guideline compliance: Count at patient level and diagnosis 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.

Oral versus parenteral administration of antibiotics in Belgian and European hospitals



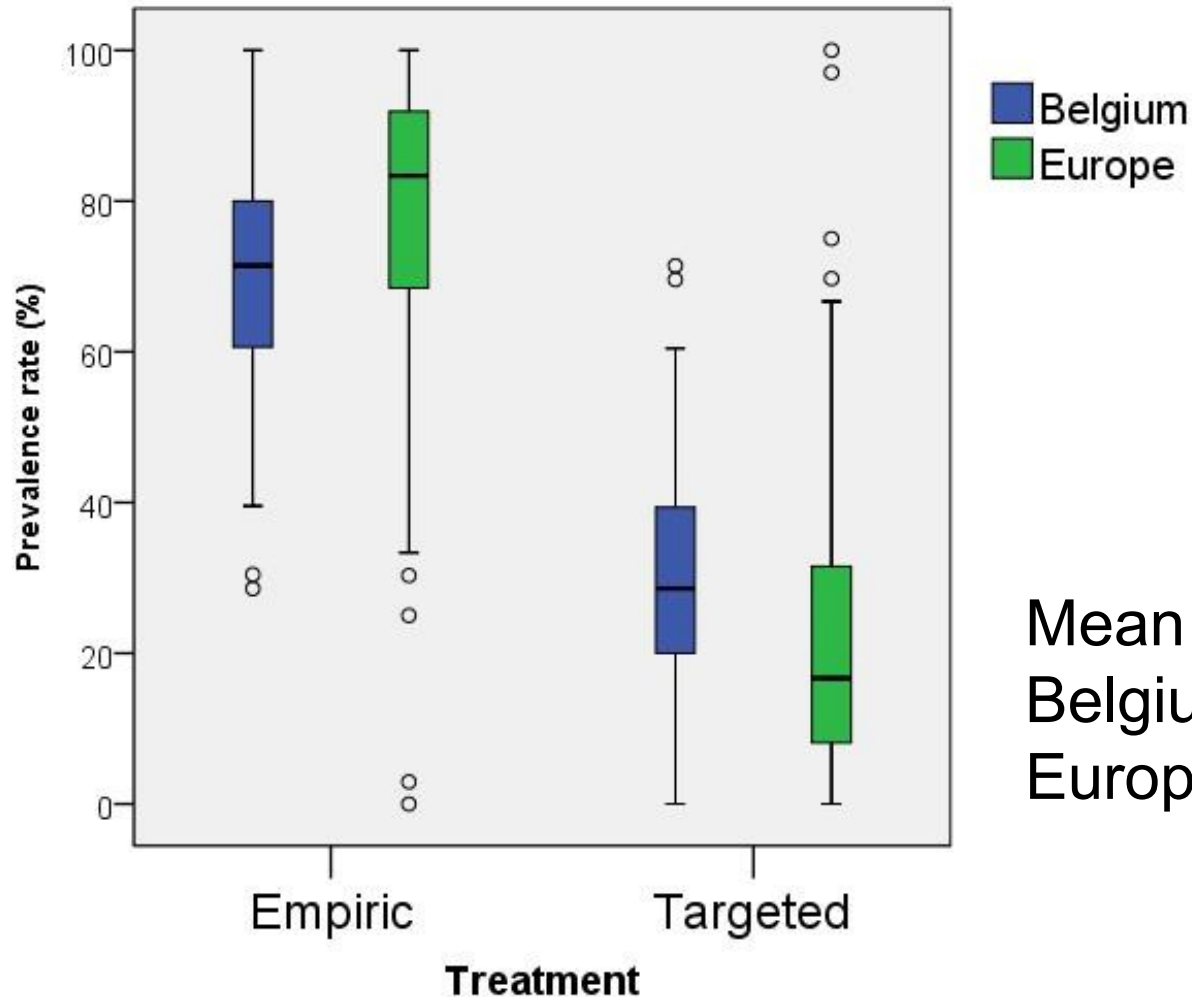
Mean parenteral use
 Belgium: 66.0%
 Rest Europe: 73.2%

Oral versus parenteral administration of antibiotics in Belgian hospitals



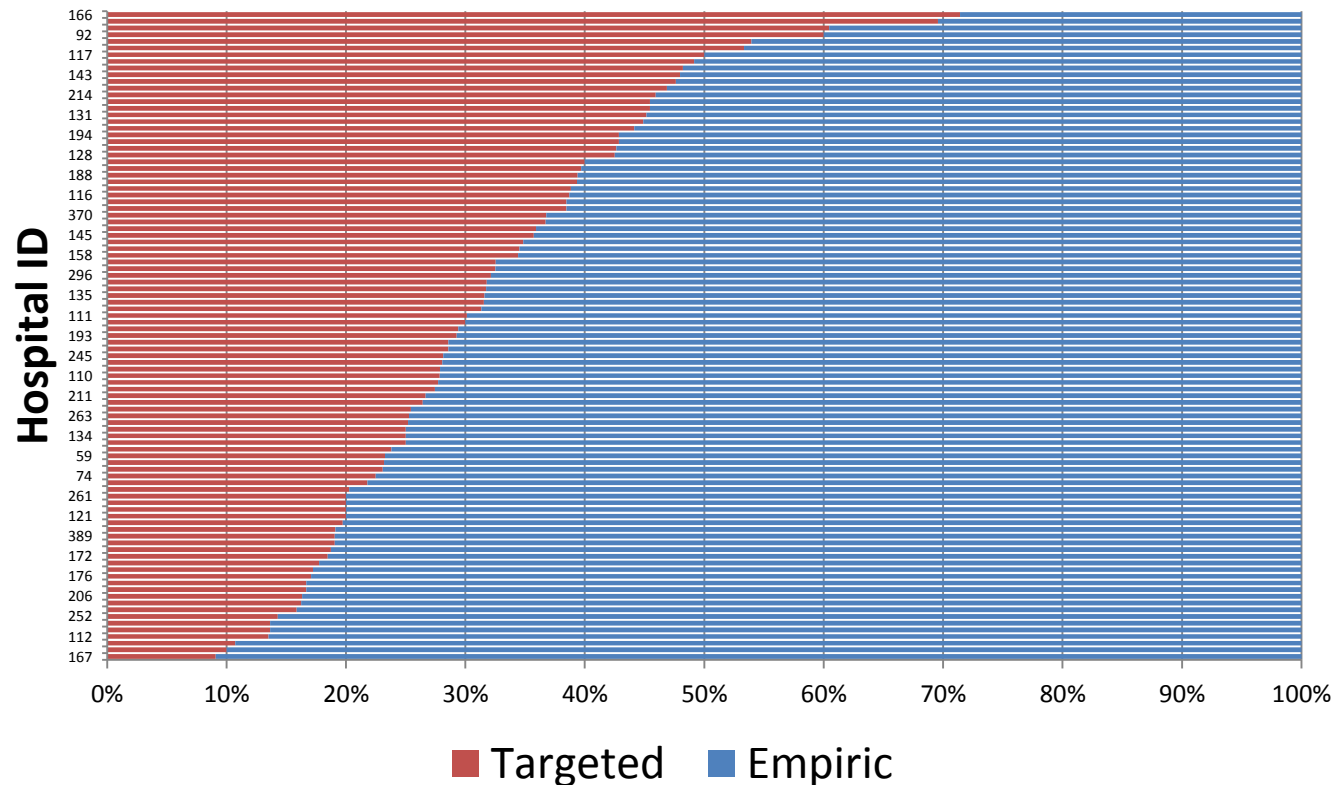
Mean parenteral use = 66.0%

Empiric versus targeted prescribing of antibiotics for therapeutic use in Belgian and European hospitals



Mean targeted prescribing
Belgium: 31.7%
Europe: 21.9%

Empiric versus targeted prescribing of antibiotics for therapeutic use in Belgian hospitals



Mean targeted prescribing = 31.7%

Top 10 therapeutic antibiotic prescribing for treatment of **pneumonia** in Belgian and European hospitals

	Belgium			Europe		
	Total	CAI	HAI	Total	CAI	HAI
Co-amoxiclav	36.6%	46.6%	19.4%	12.3%	13.4%	10.2%
Piperacillin/Tazo	14.4%	9.1%	23.5%	10.5%	5.6%	20.6%
Ceftriaxone	6.9%	6.5%	7.5%	11.2%	14.8%	4.0%
Amoxicillin	2.7%	3.7%	1.0%	8.6%	10.8%	4.0%
Clarithromycin	3.9%	4.9%	2.1%	6.6%	9.2%	1.3%
Meropenem	4.4%	1.8%	8.7%	4.4%	2.3%	8.7%
Ciprofloxacin	2.7%	1.7%	4.4%	5.0%	5.2%	4.6%
Moxifloxacin	8.2%	9.7%	5.5%	0.7%	0.7%	0.8%
Levofloxacin	1.3%	1.2%	1.4%	4.2%	4.5%	3.7%
Doxycycline	0.2%	0.2%	0.1%	4.2%	4.9%	2.8%



Choice of antibiotic !

Top 10 therapeutic antibiotic prescribing for treatment of **UTI** (CYS+PYE) in Belgian and European hospitals

	Belgium			Europe		
	Total	CAI	HAI	Total	CAI	HAI
Ciprofloxacin	22.3%	21.2%	23.8%	14.1%	14.1%	14.1%
Co-amoxiclav	19.1%	23.4%	13.5%	13.8%	15.0%	11.8%
Ceftriaxone	3.1%	3.6%	2.4%	11.9%	13.5%	9.2%
Cefuroxime	9.4%	10.0%	8.7%	4.4%	4.9%	3.5%
Piperacillin/Tazo	2.7%	2.3%	3.1%	7.1%	6.3%	8.5%
Levofloxacin	9.7%	7.8%	12.3%	0.9%	0.9%	0.9%
Temocillin	9.9%	10.7%	8.9%	0.0%	0.0%	0.0%
Meropenem	4.3%	4.1%	4.6%	4.3%	3.1%	6.5%
Nitrofurantoin	4.7%	3.6%	6.3%	3.7%	4.1%	3.0%
Trimethoprim	0.2%	0.2%	0.2%	7.0%	6.5%	7.8%

Some more
interesting results



Type of HAI	Primary		Secondary		Tertiary		Specialized hospital		Total	
	N	%	N	%	N	%	N	%	N	%
POWI	43	16.2	257	18.2	104	21.2	14	23.0	418	18.8
CR-BSI. VAP. C-UTI	44	16.5	238	16.9	48	9.8	20	32.8	350	15.7
CDAD	1	0.4	17	1.2	-	-	-	-	18	0.9
Other HAI	115	43.2	686	48.7	274	55.9	23	37.7	1098	49.3
Infection from another hospital	3	1.1	45	3.2	38	7.8	1	1.6	87	3.9
Infection present from LTCF	60	22.6	166	11.8	26	5.3	3	4.9	255	11.5
Total	266			1409		490		61		2226

Patients receiving a targeted antibiotic therapy following the microbiological result: ESBL, MRSA and CPE

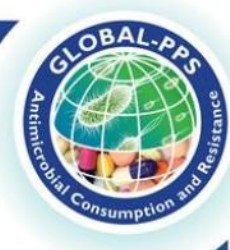
	CAI		HAI	
	N	%	N	%
ESBL	58	44.3%	73	55.7%
MRSA	31	36.9%	53	63.1%
CPE	4	22.2%	14	77.8%

Discussion

- Satisfactory degree of participation of all types of hospitals in Belgium
- Overall antimicrobial prevalence rate of 27.4% falls below European mean of 35.0%
- BE can be characterized by its very frequent prescribing of
 - Co-amoxiclav
 - Fluoroquinolones: moxifloxacin (12 times higher than EU) and levofloxacin (2 times higher than EU)

Discussion

- The number of patients with a HAI (7.9%) admitted in BE hospitals in 2015 is higher as compared to the 2011 European ECDC-PPS (5.7%)
- Surgical prophylaxis:
 - Belgium scores good with respect to choice of drug (cephazolin) and duration of surgical prophylaxis compared to Europe.
 - Certain BE hospitals score very good, while other not (outliers!)



Discussion – quality indicators

- Good score for ***reason in notes*** : 80% up to 90% in ICU (target = 90%)
- Low score for ***stop/review date in notes***: 35%
- Good score for ***guideline compliance***:
 - 80% for medical and ICU patients (target for therapeutic use=90%)
 - 74% for choice of antibiotic for surgical prophylaxis (target=90%)
 - 72% duration of prophylaxis \leq one day (Europe 40%)
- Mean targeted prescribing of 32% is much higher as compared to EU (22%)

What can be better

Future action points

- Identify and implement ***policy actions*** to:
 - Bring down the high levels of quinolone prescribing (moxifloxacin)
 - Increase prescribing of amoxicillin in replacement of amoxi-clav
 - Improve guideline compliance for surgical prophylaxis
 - Improve indication in notes of antibiotic stop/review date
- BE hospitals presenting ***outlying (disappointing) results*** on overall antimicrobial prescribing rates and selected quality indicators, should take initiatives to improve quality
- Identify reasons for ***higher rates of HAI*** in BE as compared to the EU and investigate related targeted prescribing

What next

- Get all hospitals on board for this feasible Global-PPS tool for AB stewardship in the hospital
- Repeat the PPS on a continuous defined time interval in all hospitals on a national level for benchmarking
- Implement targets tailored at hospital level by local AB support teams
- use a well-defined sample strategy (high risk wards tailored at hospital level)
- Contemplate and enforce the introduction of positive incentives to improve the “quality” of antibiotic prescribing



Thanks to
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<http://www.global-pps.com/>