

An Analysis of Recent Antibiotic Use in Acute Care Hospitals in Germany – Persistently Intense Use of Cephalosporins

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Introduction

Continuous hospital-wide antibiotic use surveillance has only recently been established in Germany (2007). Participating hospitals contribute on a voluntary basis ("ADKA-if-RKI" project; see also: www.antiinfektiva-surveillance.de).

We here describe the most recent analysis for acute care hospitals that delivered complete data for at least four quarters in 2012/13. The aim was to provide benchmarks for hospitals of similar size (<400 beds, 400-800 beds, >800 beds). Results were compared with those of earlier (2004) analyses*, in particular regarding the dominant use of cephalosporins (1/2°ceph and 3/4°ceph).

Methods

Electronically delivered quarterly consumption data are transformed into defined daily doses (ATC/DDD-Index, WHO) and into "recommended" (hospital-adapted) daily doses (RDD). Use density was calculated per 100 patient days per hospital, per department/specialty service and per normal versus intensive care wards (ICUs). Analyses excluded pediatrics and psychiatry departments

Results I

Complete data were available for 109 hospitals (Table 1), corresponding to 14.447.298 patient days (6.4% of patient days country-wide).

The overall antibiotic use density (median and IQR) was 64.4 (53-72) DDD/100 or 43.5 (36-48) RDD/100, respectively. (Table 1). Weighted means were similar: 64.8 DDD/100 and 44.2 RDD/100, respectively.

There were no significant differences in overall use between hospitals of different sizes, only university hospitals showed higher levels (Table 1). Major differences were seen for normal ward versus ICU areas both in surgical and non-surgical services (not shown).

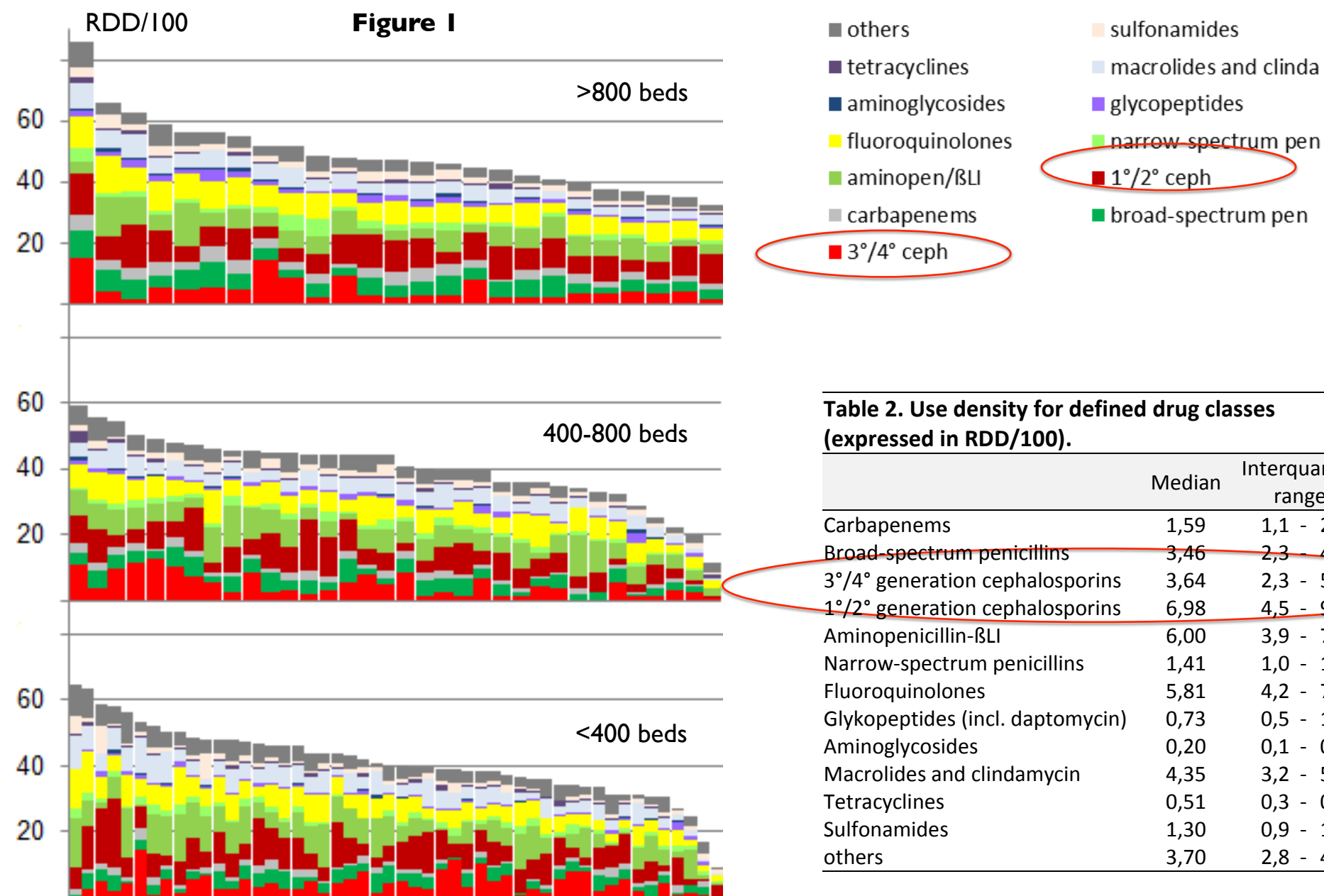


Table 2. Use density for defined drug classes (expressed in RDD/100).

	Median	Interquartile range
Carbapenems	1,59	1,1 - 2,5
Broad-spectrum penicillins	3,46	2,3 - 4,4
3°/4° generation cephalosporins	3,64	2,3 - 5,6
1°/2° generation cephalosporins	6,98	4,5 - 9,4
Aminopenicillin-βLI	6,00	3,9 - 7,9
Narrow-spectrum penicillins	1,41	1,0 - 1,8
Fluoroquinolones	5,81	4,2 - 7,4
Glykopeptides (incl. daptomycin)	0,73	0,5 - 1,2
Aminoglycosides	0,20	0,1 - 0,4
Macrolides and clindamycin	4,35	3,2 - 5,5
Tetracyclines	0,51	0,3 - 0,7
Sulfonamides	1,30	0,9 - 1,8
others	3,70	2,8 - 4,8

Table 1. Overall antibiotic use density (systemic antibiotics) in German acute care hospitals 2012/13 (w/o pediatrics & psychiatry) expressed in DDD per 100 patient days (and RDD/100).

Hospital type/size	n	RDD*/100		DDD*/100	
		Median	Interquartile range	Median	Interquartile range
Non-university hospitals	98				
<400 beds	50	40,1	34,7- 47,6	61,0	51,3- 71,8
400-800 beds	34	42,3	35,1- 45,4	61,7	50,9- 67,7
>800 beds	14	41,5	37,2- 47,1	59,9	53,4- 67,9
University hospitals	11	55,0	47,3- 57,8	78,5	71,4- 82,8
Total	109	43,5	36,0- 47,9	64,4	53,3- 71,9

*RDD, „recommended daily doses“ according to Kern et al [Infection 2005;33:333-9] and de With et al [J Hosp Infect 2006;64:231-7], DDD, according to ATC-WHO definitions [2012].

Results II

Cephalosporins (27% of all RDD) dominated over penicillins (26%) (Figure, red and green areas, and Table 2).

Proportions (among all RDD per hospital) of 1/2°ceph varied between 5-37%, for 3/4°ceph and penicillins the ranges were <1-29% and 10-49%, respectively.

Other findings were:

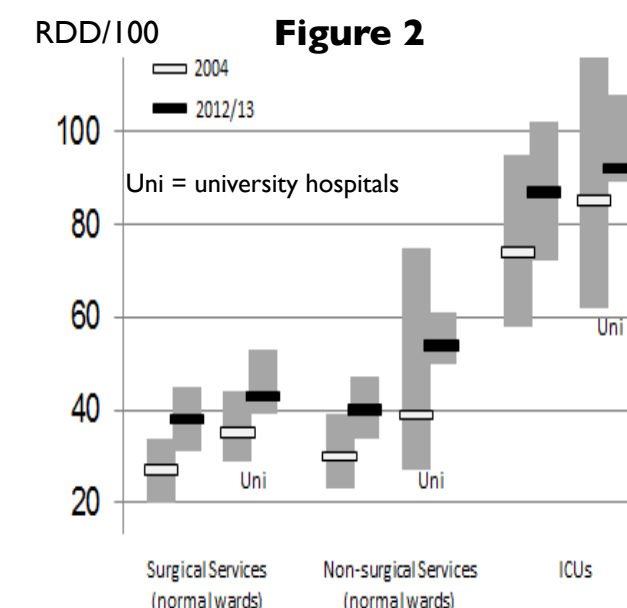
- 1/2°ceph were more often prescribed in surgical vs non-surgical areas (9-13 vs 1.5-2.3 RDD/100)
- Increased use of 3/4°ceph and minimal use of glycopeptides were seen in non-surgical ICUs of small hospitals
- Extensive use of carbapenems, fluoroquinolones and glycopeptides were seen in non-surgical university hospital normal wards – in part associated with hematology-oncology.

A comparison with 2004 data showed:

- An increased use density overall (Figure 2)
- Cefuroxime as the TOP substance (Table 3) in 2004 and 2012/13
- A higher proportion of ceftriaxone in the recent analysis (Table 3).

Table 3. TOP 5 single most prescribed substances 2004* and 2012/13 (according to RDD)

	2004		2012/13
Cefuroxime	13.8 %	Cefuroxime	14.6 %
Cotrimoxazole	7.9 %	Ampicillin-Sulbactam	8.9 %
Ampicillin-Sulbactam	6.8 %	Piperacillin-Tazobactam	8.8 %
Amoxicillin-clavulanic acid	5.9 %	Ceftriaxone	8.2 %
Ceftriaxone	5.5 %	Ciprofloxacin	8.1 %



Conclusions

Reference values are now available for acute care hospitals in Germany. Shorter treatments and using penicillins rather than cephalosporins should be encouraged.

Acknowledgments: Financial support: ADKA, DGI, RKI, BMBF, EU. We thank Nadine Weber, Antonia Hug, Sven-Ulrich Steib, Lin Wang and Marcel Feig.

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