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Background

In 2008, Germany expanded the scope of its national antimicrobial resistance surveillance system to the sector of ambulatory care. This presentation gives a first insight into resistance in the most frequent Gram-negative pathogens isolated from urine samples from outpatients in 2008/2009. Data will be stratified by year, age groups and selected geographical regions.

Materials & Methods

The dataset is taken from the German Antimicrobial Resistance Surveillance (ARS) System. Four laboratories with continuous data collection in 2008 and 2009 submitted data on 96,191 urine samples collected in 2405 practises in Germany; composition of the sample by region, specialty, sex and agegroup of patients is given in table 1. From these specimens, a total of 113,697 pathogens were isolated: the most frequent Gram-negative pathogens were *E. coli*, *P. mirabilis* and *K. pneumoniae*; frequencies and percentages are shown in table 2.

Analysis of susceptibility is based on non-duplicate isolates. Species identification and antimicrobial susceptibility testing is performed by VITEK 2, results are evaluated according to CLSI guidelines. Proportions of susceptible isolates were calculated for the following antibiotics: ampicillin (AMP), ampicillin/sulbactam (AMS), piperacillin (PIP), piperacillin/tazobactam (PIT), cefotaxime (CTX), ciprofloxacin (CIP), co-trimoxazole (SXT).

Results

Results of susceptibility testing are displayed as percentages of susceptible isolates of all non-duplicate isolates tested in table 3. In *E. coli* overall proportions of susceptibility for the most frequently used antimicrobials in urinary tract infections as AMP, AMS, SXT and CIP vary from 54.5% (AMP) to 84.3% (CIP), in *P. mirabilis* the corresponding range spans from 64.2% (SXT) to 92.5% (AMS) and in *K. pneumoniae* proportions for selected antibiotics are all above 80%.

Stratification by age groups shows lower levels of susceptibility for patients older than 60 for AMP, PIP, CIP and SXT in *E. coli* as well as in *P. mirabilis*. Regional differences with similar patterns are observed for CIP, SXT and PIP across species.

Conclusion

These first large-scale data from ambulatory care indicate that non-susceptibility of *E. coli* and to a lesser degree of *P. mirabilis* from urines to first-line antibiotics is highly prevalent, that it is even higher in patients older than 60 and that there are some regional variations. Interpretation of the data should consider that in ambulatory care settings specimens are mainly taken from pre-treated patients.

References

ARS-Website: <https://ars.rki.de>

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Table 1: composition of sample (N=96.191 urine samples) by region, specialty, sex and agegroup

parameter	value	no. of isolates	in percent
region	North Rhine-Westfalia	35.835	37,3
	Berlin-Brandenburg	21.413	22,3
	South-West *	17.470	18,2
	Schleswig-Holstein	15.791	16,4
	others	5.682	5,9
specialty	internal medicine/GPs	52.168	54,2
	nephrology	14.839	15,4
	obstetrics & gynaecology	12.521	13,0
	urology	7.796	8,1
	pediatrics	7.344	7,6
	others	1.523	1,6
sex	male	18.982	19,7
	female	60.756	63,2
	unknown	16.453	17,1
agegroup	<=15	8.554	8,9
	16-59	38.004	39,5
	>=60	49.633	51,6
total		96.191	100,0

* South West = Baden-Wuerttemberg, Rhineland-Palatinate, Hesse

Table 2: pathogens isolated from urine samples 2008/09

pathogen(group)	no. of isolates	in percent
gram-negative pathogens	75.273	66,2
of these:		
<i>Escherichia coli</i>	53.863	47,4
<i>Proteus mirabilis</i>	5.517	4,9
<i>Klebsiella pneumoniae</i>	4.810	4,2
<i>Pseudomonas aeruginosa</i>	2.221	2,0
<i>Klebsiella oxytoca</i>	1.379	1,2
<i>Enterobacter cloacae</i>	1.072	0,9
<i>Morganella morganii</i>	796	0,7
<i>Citrobacter freundii</i>	567	0,5
<i>Enterobacter aerogenes</i>	411	0,4
<i>Proteus vulgaris</i>	408	0,4
<i>Serratia marcescens</i>	296	0,3
gram-positive pathogens	35.287	31,0
fungi	1.978	1,7
others	1.159	1,0
total	113.697	100,0

Table 3: susceptibility of *E. coli*, *P. mirabilis*, *K. pneumoniae* from urine samples of outpatients in Germany 2008/09: percentages of susceptible isolates from non-duplicate isolates tested (n) against AMP – ampicillin, AMS – ampicillin/sulbactam, PIP – piperacillin, PIT – piperacillin/tazobactam, CTX – cefotaxime, CIP – ciprofloxacin and SXT – co-trimoxazole; stratification by year, age group and region

pathogen	stratification	antimicrobial						n		
		AMP	AMS	PIP	PIT	CTX	CIP		SXT	
<i>E. coli</i>	total	54,5	69,4	57,2	87,4	96,9	84,3	70,8	45.178	
	by year	2008	54,0	68,0	57,2	87,1	97,2	84,2	70,8	22.541
		2009	55,0	70,8	57,3	87,7	96,6	84,5	70,7	22.637
	by agegroup	<= 15	57,8	73,5	59,3	90,3	98,2	96,5	75,2	4.837
		16-59	58,2	71,4	60,3	88,9	97,5	89,4	74,4	17.086
		>= 60	51,1	67,3	54,6	85,8	96,2	78,1	67,1	23.255
	by region	BB	-	65,6	60,4	88,6	96,9	88,9	73,8	11.684
NW		53,6	68,7	54,3	87,4	97,9	82,4	67,9	18.839	
SH		56,5	71,6	57,6	88,1	96,7	84,8	70,2	6.533	
SW		-	70,3	59,9	86,2	95,1	82,7	73,7	6.466	
<i>P. mirabilis</i>		total	68,1	92,5	71,6	96,2	99,0	88,2	64,2	4.962
by year	2008	67,2	91,9	71,7	95,7	99,2	87,8	63,9	2.492	
	2009	69,1	93,1	71,4	96,6	98,8	88,7	64,5	2.470	
by agegroup	<= 15	79,3	94,0	79,5	96,6	99,2	96,0	75,1	808	
	16-59	72,5	93,9	73,9	96,8	99,2	91,1	65,6	1.276	
	>= 60	63,5	91,5	68,3	95,8	98,9	84,7	60,5	2.878	
by region	BB	-	90,9	77,4	97,8	99,5	94,2	70,9	1.376	
	NW	66,7	90,9	67,0	94,6	98,6	81,9	57,9	1.969	
	SH	71,1	95,3	71,7	97,1	98,9	93,4	62,8	803	
	SW	-	93,8	71,9	96,7	99,2	88,4	70,0	663	
	<i>K. pneumoniae</i>	total	R	82,5	R	88,7	95,9	92,3	86,5	4.324
by year	2008	R	82,9	R	89,4	96,9	92,3	88,1	2.175	
	2009	R	82,2	R	88,1	94,9	92,2	84,9	2.149	
by agegroup	<= 15	R	84,3	R	91,1	99,5	98,1	90,2	205	
	16-59	R	82,7	R	88,6	96,9	94,5	86,7	1.373	
	>= 60	R	82,4	R	88,6	95,2	90,7	86,2	2.746	
by region	BB	R	82,0	R	91,6	96,9	96,1	89,8	1.013	
	NW	R	83,6	R	88,1	95,9	90,3	86,5	1.795	
	SH	R	79,9	R	87,9	95,6	95,3	80,9	572	
	SW	R	84,4	R	89,3	95,3	90,9	86,4	701	

BB - Berlin/Brandenburg, NW - North Rhine-Westfalia, SW - South West, SH - Schleswig-Holstein
- not tested, R intrinsic resistance