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Prevalence of multi-resistant micro-organisms in the ambulatory setting in a Swiss region

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Background

- Antibiotic resistance is increasing worldwide
- Prevalence of multiresistance is increasing in the ambulatory setting
- Surveillance of antibiotic resistance is a corner stone in resistance control
- Resistance data retrieved from routine microbiology may not reflect true resistance rates in outpatient care due to limited diagnostics

Aims

a) To describe the prevalence of resistance and multiresistance in urinary tract and skin isolates in outpatients
b) To compare results with data from the passive resistance surveillance system ANRESIS (www.anresis.ch)

Methods

- All general practitioners and dermatologists in the canton of Berne, Switzerland, were asked to send
  a) wound swabs of patients with a purulent wound infection
  b) urine samples of patients >15 years with urinary tract infection (UTI)
- Samples were designated "routine" for "would have been sent anyway" and "solicited" samples for "taken for study purpose only"
- Samples were analyzed at the ifik according to CLSI standards
- All wound swabs were screened for Methicillin- resistant *S. aureus* (MRSA)
- Extended spectrum beta-lactamase (ESBL) production was confirmed by the double-disk test
- Patients were included only once for skin infection. They could be included more than once for UTI, if the intervall between two episodes was >30 days

Conclusion

- Susceptibility rates in *E. coli* were highest for fosfomycin and nitrofurantoin
- For UTI isolates solicited samples had higher susceptibility rates. than routine samples. Therefore passive surveillance systems may not reflect resistance rates for all patient groups.
- Prior antibiotic therapy was a predictor for antibiotic resistance UTI.
- The prevalence of MRSA (2.1%) and ESBL (1.0%) is still rare in outpatients, and carriage is associated with classical risk factors for multiresistance.

Abbreviation of antibiotics

amc	amoxicillin-clavulanic acid	nfu	nitrofurantoin
amp	ampicillin	nor	norfloxacin
cip	ciprofloxacin	rif	rifampicin
cxa	cefuroxime axetile	sxt	trimethoprim-silfamethoxazole
ery	erythromycin	tet	tetracycline
fos	fosfomycin		

Acknowledgment

We would like to thank all physicians for their participation in this study

Results

Wound swabs

- 213 skin samples were analyzed, 138 (65%) were culture positive
- Routine samples included a higher percentage of swabs from ulcers and from older patients and patients with prior antibiotic therapy
- Microorganisms did not differ significantly between groups

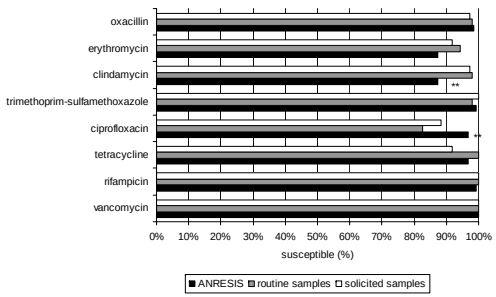
	solicited[1]	routine[1]	p-values[2]	ANRESIS
n [3] (samples)	84	113		169
age mean (SD) years	38(21)	50 (23)	<0.001	49 (50)
females n (%)	40 (48)	60 (53)	ns	84 (50)
rural n (%)	20 (24)	28 (25)	ns	61 (36)
clinical information n (%)				
abscess or folliculitis	47 (56)	51 (45)	ns	-
ulceration	3 (3.6)	17 (15)	0.016	-
wound infection	22 (26)	27 (24)	ns	-
impetigo	7 (8.3)	10 (8.8)	ns	-
antibiotics in last 3 months	6 (7.1)	29 (26)	0.002	-
known MRSA	1 (1.2)	3 (2.7)	ns	-
long term facility	3 (3.6)	6 (5.3)	ns	-
culture positive n (%)	54 (65)	73 (64)	ns	169 (100)
microbiology n (% of positive samples)[4]				
monobacterial infections	42 (78)	59 (81)	ns	148 (88)
Staphylococcus aureus	35 (55)	52 (61)	ns	127 (67)
Streptococcus pyogenes	5 (7.8)	3 (3.5)	ns	0 (0)
coagulase-negative Staphylococci	1 (1.6)	2 (2.4)	ns	14 (7.4)
other gram-positive cocci	7 (11)	11 (13)	ns	7 (3.7)
enterobacteriaceae	8 (13)	9 (11)	ns	29 (15)
other gram-negative rods	7 (11)	7 (8.2)	ns	12 (6.3)
anaerobes	1 (1.6)	1 (1.2)	ns	0 (0)

1) *16 samples excluded, because assignment to solicited or routine samples was not possible*
2) *ns=not significant*
3) *demographic data was missing in 16 (age), 6 (sex) and 8 (geography) samples. Missing samples were distributed equally between solicited and routine samples. For clinical data missing values were interpreted as "no". Excluding missing clinical data from analysis had no influence on p-values.*
4) *all microorganisms detected including dual and triple infections*

Staphylococcus aureus susceptibility

- 2/94 (2.1%) *S. aureus* isolates were MRSA. Both were susceptible to ery, cip, sxt, tet and rif; both patients showed risk factors for MRSA colonisation (long hospitalisation, MRSA known in family members)
- Susceptibility rates for *S. aureus* did not differ significantly between routine and solicited samples

Susceptibility of *S. aureus* (%) in solicited, routine and ANRESIS samples



*** significant difference (p<0.05) between routine samples and ANRESIS data*

Urinary samples

- 1018 urinary samples were collected, 68% were culture positive
- Solicited samples included a high proportion of young females without prior antibiotic exposure, living in urban regions
- The proportion of *E. coli* was highest among solicited samples

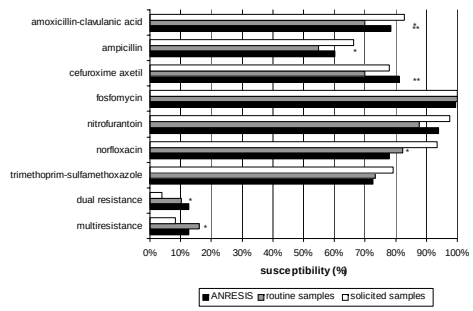
	solicited[1]	routine[1]	p-values[2]	ANRESIS
n [3] (samples)	428	525		1046
age mean (SD) years	48.3 (22)	55.7 (23)	<0.001	56.6 (25)
females n (%)	358 (84)	409 (78)	0.006	742 (71)
rural n (%)	128 (29)	212 (40)	0.001	329 (31)
clinical information n (%)				
antibiotic exposure during last 3 months	48 (11)	228 (43)	<0.001	-
bladder catheter	21 (4.9)	36 (6.9)	ns	-
known ESBL carrier	2 (0.5)	8 (1.5)	ns	-
long term facility	11 (2.6)	38 (7.2)	0.002	-
culture positive	305 (71)	348 (66)	ns	1046 (100)
microbiology n (% of positive samples)[4]				
Escherichia coli	231 (76)	232 (67)	0.01	685 (66)
Klebsiella spp.	13 (4.3)	22 (6.3)	ns	93 (8.9)
Proteus mirabilis	10 (3.3)	14 (4.0)	ns	41 (3.9)
other *Enterobacteriaceae*	16 (5.2)	17 (4.9)	ns	83 (7.9)
Enterococcus spp.	61 (20)	52 (15)	ns	33 (3.2)
Staphylococcus saprophyticus	10 (3.3)	17 (4.9)	ns	14 (1.3)
other	16 (5.2)	34 (9.8)	ns	163 (16)

1) *65 samples excluded, because assignment to solicited or routine samples was not possible*
2) *ns=not significant*
3) *demographic data was missing in 77 (age), 64 (sex) and 10 (geography) samples. Missing samples were distributed equally between solicited and routine samples. For clinical data missing values were interpreted as "no". Excluding missing clinical data from analysis had no influence on p-values.*
4) *all microorganisms detected including dual and triple infections*

Escherichia coli susceptibility

- Susceptibility rates were higher in solicited than in routine samples for all antibiotics tested except for fosfomycin
- Multiresistance (resistance to at least 3 out of amc, cxa, nor or sxt) was significantly lower in solicited samples
- Resistance data from passive surveillance were comparable to routine samples for most antibiotics
- 5 ESBL producing E. coli (1.0% of E.coli isolates) were identified. 4/5 had known risk factors for ESBL carriage
- Antibiotic exposure was the only predictor for antibiotic resistance

Susceptibility of *E. coli* (%) in solicited, routine and ANRESIS samples



** significant difference (p<0.05) between routine samples and solicited samples,*
*** significant difference (p<0.05) between routine samples and ANRESIS data*