Meticillin resistance in *Staphylococcus aureus* in Germany 2012 - first regional results

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Objectives

Since 2008, the German Antimicrobial Resistance Surveillance (ARS) System collects data for all bacterial pathogens and publishes reference data on the national level. As participation in ARS is voluntary, the coverage of the surveillance varies considerably between geographical regions and by hospital type within these regions. The objective is to describe challenges in regional analysis and present first results of meticillin resistance in ***Staphylococcus*** *(S.) aureus* as an example.

Materials & Methods

For regional analysis, five regions with approximate equal population size were defined. Coverage of surveillance data is assessed as percentage of hospitals represented in ARS of all hospitals in the region and number of practices represented in ARS per 100,000 inhabitants respectively. For the present analysis only regions with more than five percent coverage / five practices per 100,000 inhabitants were included.

The analysis is based on 26,659 non-duplicate isolates of *S. aureus* from 4,352 practices and 31,807 isolates from 269 hospitals collected by 14 laboratories in 2012. Copy strain elimination is based on first isolate/patient/year after eliminating isolates from screening sites. Proportions of resistance to meticillin were computed for: a) outpatient care b) hospital care overall and c) hospitals with low and medium level of specialisation (L1) and hospitals with high level of specialisation (L2) by region.

Results

Coverage of ARS surveillance differs between regions as shown in table 1 and there are considerable differences with regard to hospital type: the percentage of hospitals with high level of specialisation is 26 in the west, 15 in the south-west and 12 in the north-west.

In outpatient care, proportions of MRSA in the west are significantly higher than in the south-west and north-west (12.9% vs. 8.1% and 7.0% resp.) whereas in hospital care MRSA-rates differ significantly between all three regions: W: 23.4%; SW: 13.7%; NW: 18.1% (table 2a).

Overall, MRSA-proportions in hospitals with low and medium level of specialisation and those with high level of specialisation do not differ significantly (19.7% vs. 19.0%) but stratification by level across regions reveals different effects: for hospitals with low and medium level of specialisation, MRSA-proportions in the west and north-west are significantly higher than in the south-west; for hospitals with high level of specialisation MRSA-proportions are highest in the west compared to south-west and north-west (table 2b).

Table 1:

German Antimicrobial Resistance Surveillance System (ARS): Participation and coverage by region 2012

	region				
	NE	**NW**	**SE**	**SW**	**W**
no. of hospitals represented in ARS (A)	3	33	15	96	140
of these (percentage):					
L1 - low or medium level of specialisation		*48*		*56*	*58*
L2 - high level of specialisation		*12*		*15*	*26*
LX - single specialty		*39*		*29*	*16*
total no. of hospitals (official statistics) (B)	220	352	495	577	401
coverage: A as percentage of B	1,4	9,4	3,0	16,6	34,9
no. of practices represented in ARS (P)	769	643	70	1329	2380
inhabitants (millions)	9,7	13,0	18,7	21,6	17,6
practices (P) /100,000 inhabitants	8	5	< 1	6	14

NE - north east: Berlin, Brandenburg, Mecklenburg-Vorpommern, Saxony-Anhalt | NW - north west: Bremen, Hamburg, Lower Saxony, Schleswig-Holstein | SE - south east: Bavaria, Saxony, Thuringia | SW - south west: Baden-Württemberg, Hesse, Rhineland-Palatinate, Saarland | W - west: North Rhine-Westphalia

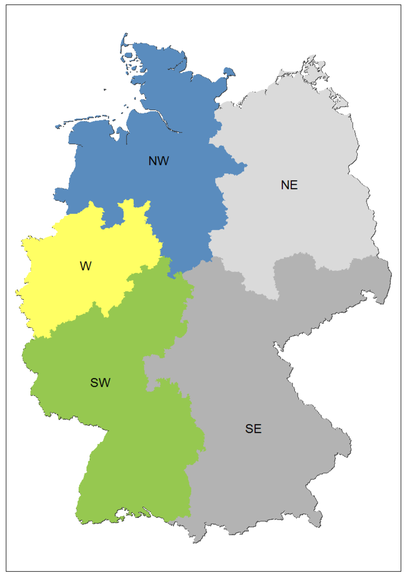

Table 2a: Proportion of MRSA by region and sector of care

region	sector of care					
	outpatient care			hospital care		
	n	R%	CI	n	R%	CI
NW	*4.377*	**7,0**	6.2 - 7.7	*2.662*	**18,1**	16.6 - 19.5
SW	*9.694*	**8,4**	7.8 - 9.0	*11.725*	**13,7**	13.1 - 14.3
W	*12.588*	**12,9**	12.3 - 13.5	*17.420*	**23,4**	22.7 - 24,0

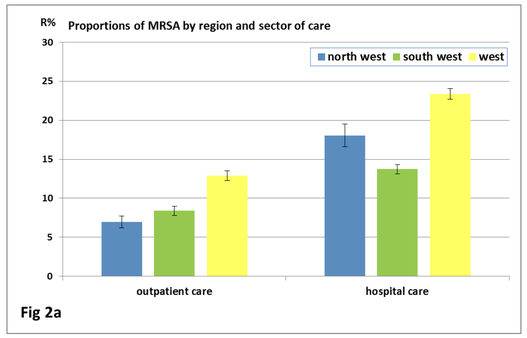

Fig 2a

Table 2b: Proportion of MRSA by region and level of specialisation

region	hospital level of specialisation					
	low or medium			high		
	n	R%	CI	n	R%	CI
NW	*1.103*	**23,6**	21.0 - 26.1	*1.222*	**15,7**	13.7 - 17.8
SW	*6.700*	**12,8**	11.9 - 13.6	*4.488*	**14,8**	13.8 - 15.9
W	*9.584*	**24,2**	23.4 - 25.1	*7.229*	**22,3**	21.3 - 23.3

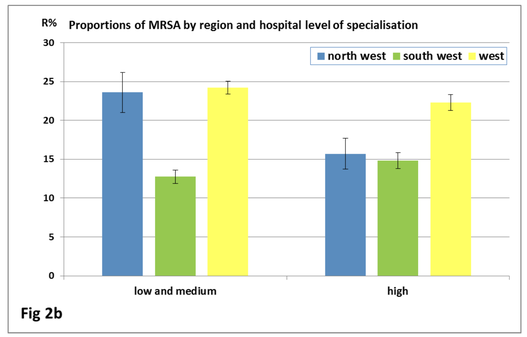

Fig 2b

Conclusion

When data on antimicrobial resistance from a surveillance system based on voluntary participation are used for comparison of regional resistance attention should be paid to potential selection bias. In the present example, hospital level of specialisation was not associated with MRSA-rate but there were differential effects on the regional level.

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