

# Antimicrobial susceptibility testing data of Swiss microbiological laboratories show good data reliability and comparability

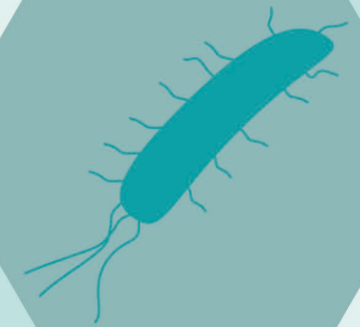
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# Background and methods

**CAESAR** = Central Asian and European Surveillance of Antimicrobial Resistance network

**Purpose:** Increase knowledge of antimicrobial susceptibility in Central Asian and non-EU member states

**How:**

- Establishing antimicrobial susceptibility testing (AST) standards
- Maintain an AST database of specific bacterial species of concern isolated from blood and cerebrospinal fluid (13 states included to date).
- Annual external quality assessments (EQA) to estimate data reliability and comparability.

**Switzerland provides data by the Swiss Centre for Antibiotic Resistance (ANRESIS) from the beginning and joined CAESAR's EQA last year for the first time.**

**→ How reliable and representative are Swiss AST data?**

**Methods:**

- Evaluation of CAESAR database and external quality control feedback reports for antibiotics tested, concordance between laboratories and adherence to EUCAST expert rules



# CAESAR external QC: gram-negatives

Organism	<i>Escherichia coli</i>																<i>Salmonella</i> Enteritidis																<i>Acinetobacter baumannii</i> complex											
	Amikacin	Amoxicillin	Amoxicillin-clavulanic acid	Ampicillin	Cefotaxime	Ceftazidime	Ceftriaxone	Ciprofloxacin	Colistin	Ertapenem	Gentamicin	Imipenem	Levofloxacin	Meropenem	Ofloxacin	Piperacillin-tazobactam	Tobramycin	Amikacin	Amoxicillin	Amoxicillin-clavulanic acid	Ampicillin	Cefotaxime	Ceftazidime	Ceftriaxone	Ciprofloxacin	Colistin	Ertapenem	Gentamicin	Imipenem	Levofloxacin	Meropenem	Ofloxacin	Piperacillin-tazobactam	Tobramycin	Amikacin	Ciprofloxacin	Colistin	Gentamicin	Imipenem	Levofloxacin	Meropenem	Tobramycin		
Swiss laboratories	Intended result	S	R	R	R	S	S	S	S	S	S	S	S	S	S	S	S	R	R	S	R	S	S	S	R	R	S	R	S	S	S	R	S	R	R	R	R	R	R	R	R	R	R	
	S	17	0	1	0	8	23	23	23	6	22	19	22	12	21	3	17	12	7	0	15	0	7	20	23	3	2	20	8	20	6	20	0	19	7	1	0	2	0	1	0	1	0	1
	I	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	R	0	7	22	23	0	0	0	0	0	0	0	0	0	0	2	0	5	6	4	23	0	0	0	18	5	0	5	0	2	0	3	0	2	20	23	9	21	22	18	22	15		
	Not examined	6	16	0	0	15	0	0	0	17	1	4	1	11	2	20	0	11	10	17	4	0	16	3	0	2	16	3	10	3	14	3	20	4	14	2	0	12	2	0	5	0	7	
Concordant (%)	100	100	95.7	100	100	100	100	100	100	100	100	100	100	100	73.9	100	38.5	100	78.9	100	100	100	100	85.7	71.4	100	38.5	100	66.7	100	100	100	22.2	95.2	100	81.8	100	95.7	100	95.7	93.8			
All laboratories	Intended result	S	R	R	R	S	S	S	S	S	S	S	S	S	S	S	R	R	S	R	S	S	S	I/R	R	S	R	S	S	R	S	R	R	R	R	R	R	R	R	R	R			
	S	251	5	18	0	210	259	240	269	135	242	259	248	220	265	117	196	179	185	2	129	2	204	239	227	91	66	219	189	237	115	247	31	215	138	4	3	55	1	3	1	2	2	
	I	1	0	11	0	0	2	0	1	0	0	2	1	0	0	1	23	0	1	0	4	0	1	5	1	7	0	2	1	1	39	3	7	3	0	0	0	1	0	2	0	1	0	
	R	15	122	231	272	3	7	2	1	3	1	8	2	2	1	3	26	13	51	113	97	264	2	6	2	148	50	1	49	3	52	1	71	5	35	254	266	103	263	261	240	260	211	
	Not examined	5	145	12	0	59	4	30	1	134	29	3	21	50	6	151	27	80	35	157	42	6	65	22	42	26	156	50	33	31	66	21	163	49	99	14	3	113	8	6	31	9	59	
Concordant (%)	94.0	96.1	88.8	100	98.6	96.6	99.2	99.3	97.8	99.6	96.3	98.8	99.1	99.6	96.7	80.0	93.2	21.5	98.3	56.1	99.2	98.6	95.6	98.7	63.0	43.1	98.6	20.5	98.3	55.8	98.4	65.1	96.4	20.2	98.4	98.9	64.8	99.6	98.1	99.6	98.9	99.1		

## General:

- 272 laboratories participated in total, including 23 Swiss facilities
- Good concordance between Swiss laboratories
- Swiss concordance rates are reflected in overall concordance, but higher than overall concordance in many cases
- Lower concordance rates for  $\beta$ -lactam –  $\beta$ -lactamase inhibitor combinations and colistin due to technical testing challenges

## Salmonella

- Aminoglycosides: non-adherence to expert rules to report them as resistant irrespective of test results due to some evidence of treatment ineffectiveness
- Ciprofloxacin: breakpoints differ from other *Enterobacterales*

# CAESAR external QC: gram-positives

Organism	<i>Staphylococcus aureus</i>												<i>Streptococcus pneumoniae</i>												<i>Enterococcus faecalis</i>											
	Benzylpenicillin	Cefoxitin	Ciprofloxacin	Clindamycin	Erythromycin	Fusidic acid	Gentamicin	Linezolid	Rifampicin	Teicoplanin	Tetracycline	Vancomycin	Benzylpenicillin	Benzylpenicillin	Meningitis	Benzylpenicillin	Non-meningitis	Cefotaxime	Cefotaxime	Meningitis	Cefotaxime	Non-meningitis	Ceftriaxone	Ceftriaxone	Meningitis	Ceftriaxone	Non-meningitis	Clindamycin	Erythromycin	Levofloxacin	Moxifloxacin	Norfloxacin	Amoxicillin	Ampicillin	Gentamicin-HLR	Teicoplanin
Swiss laboratories	Intended result	R	R	R	R	R	S	R	S	R	R	R	R	I/R	R	S/I	I	I	I	I	I	I	I	I	I	I	R	R	I	S	R	S	S	pos	S	S
	S	0	0	0	0	1	20	0	18	0	0	0	14	0	0	1	0	0	0	7	5	5	0	0	4	14	0	6	22	0	21	23				
	I	0	0	0	0	0	0	0	0	0	0	0	0	13	1	20	2	0	0	14	10	10	0	0	12	2	0	1	1	n/a	0	0				
	R	19	23	22	23	21	1	22	0	23	16	21	8	3	22	2	3	2	2	1	1	1	19	23	5	1	5	0	0	21	0	0				
	Not examined	4	0	1	0	1	2	1	5	0	7	2	1	7	0	0	18	21	21	1	7	7	4	0	2	6	18	16	0	2	2	0				
Concordant (%)	100	100	100	100	95.5	95.2	100	100	100	100	100	36.4	100	95.7	91.3	40.0	0	0	63.6	62.5	62.5	100	100	57.1	82.4	100	85.7	95.7	100	100	100					
All laboratories	Intended result	R	R	R	R	R	S	R	S	R	R	R	R	I/R	R	S/I	I	I	I/R	I	I	I/R	I	I	I/R	I	R	R	S/I	S	R	S	S	pos	S	S
	S	0	3	3	2	3	204	2	249	2	28	3	184	7	21	40	26	27	54	36	38	46	2	75	193	26	108	242	27	192	254					
	I	0	0	1	0	0	0	1	0	0	5	1	3	3	116	48	28	43	75	45	65	3	3	113	6	0	1	3	n/a	1	2					
	R	253	256	258	242	261	6	256	4	222	127	243	46	191	48	85	79	61	56	62	38	183	250	64	15	106	11	25	212	16	14					
	Not examined	19	13	10	28	8	62	13	19	48	112	25	39	71	87	99	139	141	87	129	131	40	17	20	58	140	152	2	33	63	2					
Concordant (%)	100	98.8	98.5	99.2	98.9	97.1	98.8	98.4	99.1	79.4	98.4	19.7	95.0	74.1	27.7	80.5	32.8	40.5	74.8	46.1	78.9	98.0	74.6	90.2	80.3	90.0	89.6	88.7	91.9	94.1						

## *Staphylococcus aureus*:

- Vancomycin: test strain close to breakpoint, resistance pattern rarely encountered in Switzerland, all Swiss laboratories used MIC-methods, but one did not examine Vancomycin

## *Streptococcus pneumoniae*:

- Benzylpenicillin: incorrect application of testing algorithm or of breakpoint
- Cephalosporins: test strains just at breakpoint or 1 dilution above or below
- Levofloxacin: 4 laboratories were likely not yet applying increased exposure category I, 5 laboratories one dilution above/below breakpoint

## *Enterococcus faecalis*:

- very good overall concordance

## Conclusion:

- Good overall concordance shown in external quality control
- Swiss susceptibility data are evenly distributed geographically, across lab types and sizes.
- Switzerland provides reliable estimates of resistance rates
- **Detailed report will follow for all participating labs**