

---

# **ANTIBIBIOTIC RESISTANCE OF *E .COLI* AND *S. AUREUS* ISOLATES FROM OUTPATIENTS IN IRKUTSK**

**Irina S. Gymnina**  
*Laboratory Diagnostic Center  
Irkutsk State Medical University  
Irkutsk, Russia*

---

---

**Antimicrobial resistance  
is a global pandemic.**

---

# Purpose of study:

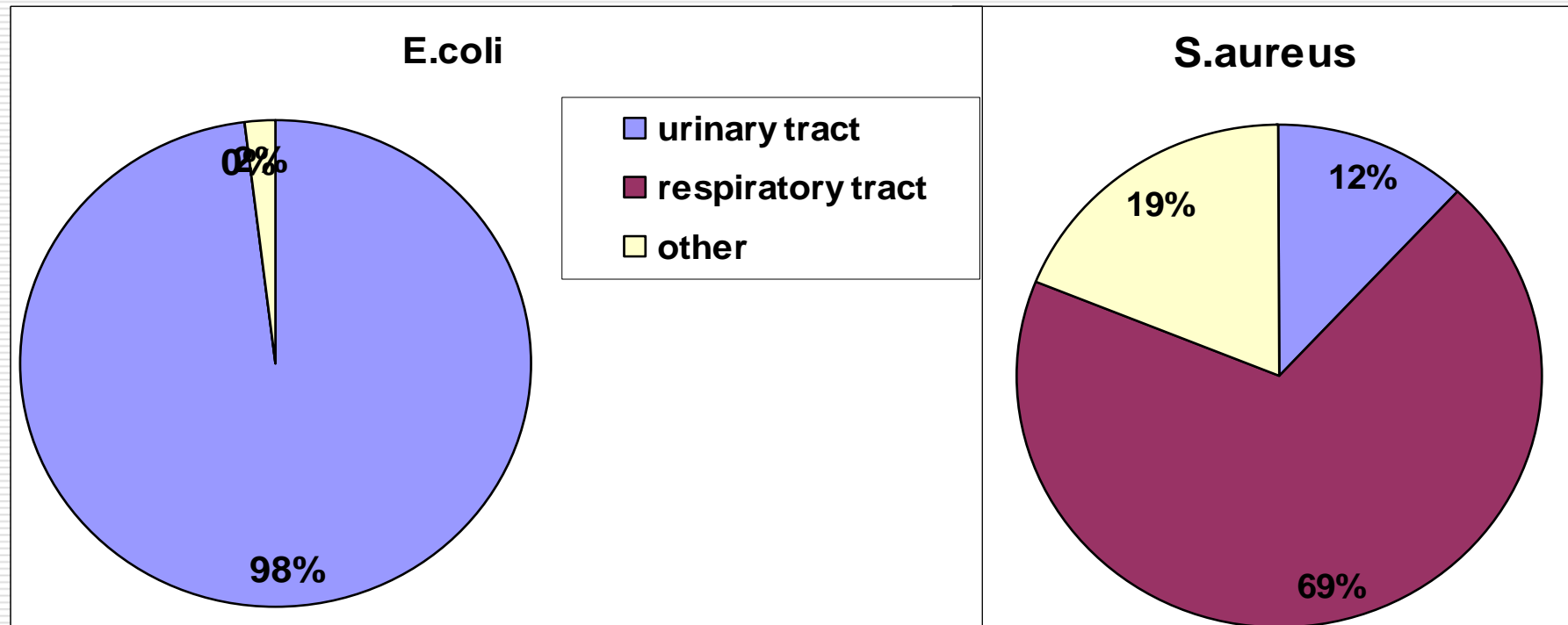
---

**to evaluate the prevalence  
of antimicrobial resistance  
of *E. coli* and *S. aureus*  
isolated from outpatients.**

---

# Materials

- ❑ In 2008-2009 1029 samples from 882 patients with various pathologies were received.
- ❑ 58 *E. coli* isolates (98% from urinary tract) and 104 *S. aureus* isolates (69% from respiratory tract) were tasted.



# Methods

---

- Endo, 6% salt egg yolk and blood agar were used for microorganisms' isolation.
  - The semiautomatic analyzer «AutoScan4 System», Siemens (USA) was used for bacteria identification and susceptibility testing.
  - The 95% CIs for the percentage of resistant isolates were calculated.
-

# Interpretive criteria for *E.coli* isolates: Minimum Inhibitory Concentrations (MICs)

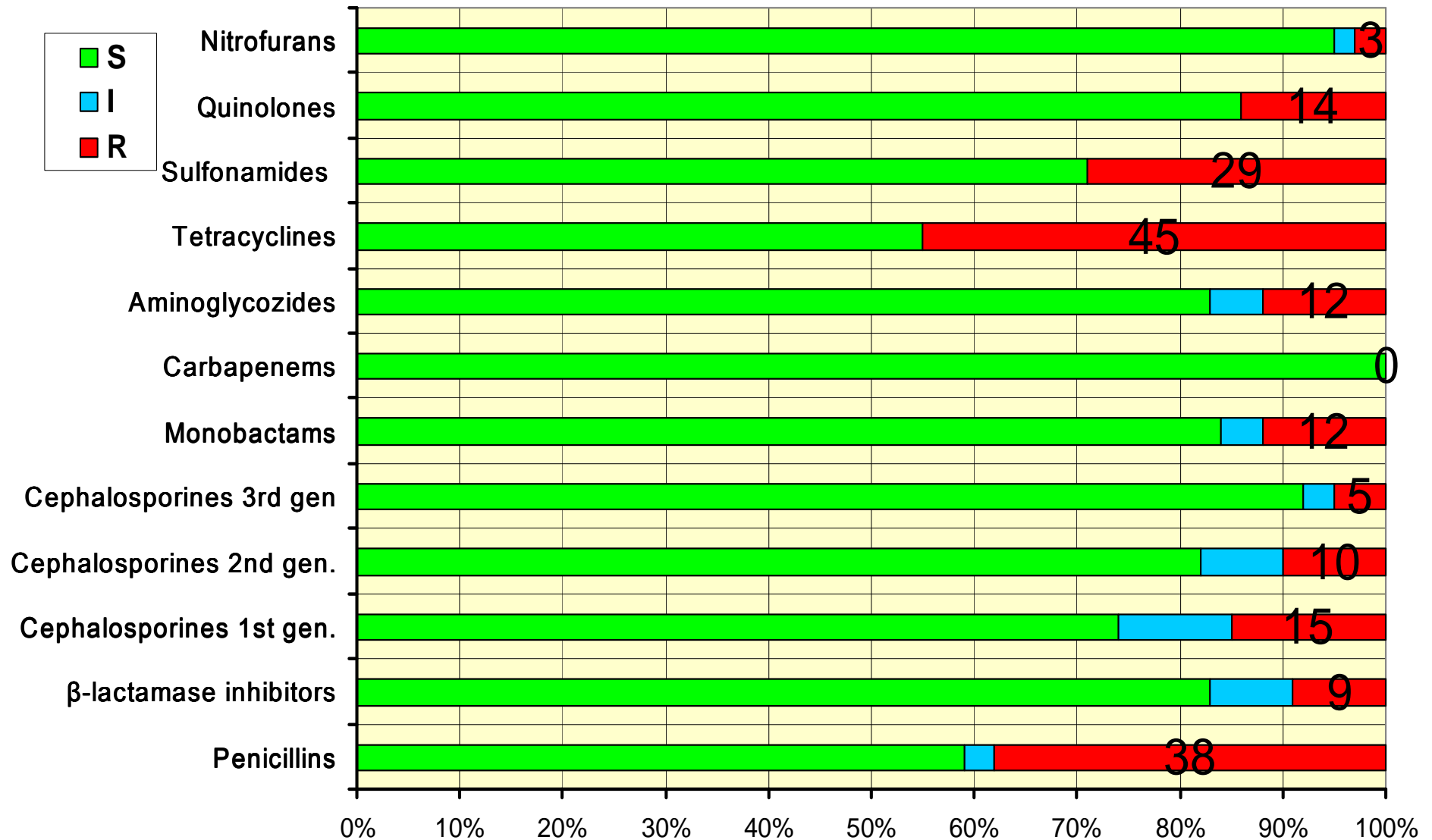
Subclass	Antibiotic	Susceptible	Intermediate	Resistant
Penicillins	Ampicillin	≤8	16	≥32
β-lactamase inhibitor combinations	Amox/K Clav	≤8	16	≥32
Cephalosporines 1 <sup>st</sup> Gen.	Cefazolin	≤8	16	≥32
	Cephalothin	≤8	16	≥32
Cephalosporines 2 <sup>nd</sup> Gen.	Cefoxitin	≤8	16	≥32
	Cefuroxime	≤8	16	≥32
Cephalosporines 3 <sup>rd</sup> Gen.	Cefotaxime	≤8	16-32	≥64
	Cefepime	≤8	16	≥32
	Cefotetan	≤16	32	≥64
	Ceftriaxone	≤8	16-32	≥64
Monobactams	Aztreonam	≤8	16	≥32
Carbapenems	Imipenem	≤4	8	≥16
Aminoglycozides	Amikacin	≤16	32	≥64
	Gentamicin	≤4	8	≥16
	Tobramycin	≤4	8	≥16
Tetracyclines	Tetracycline	≤4	8	≥16
Quinolones	Ciprofloxacin	≤1	2	≥4
	Levofloxacin	≤2	4	≥8
	Norfloxacin	≤4	8	≥128
Nitrofurans	Nitrofurantoin	≤32	64	≥4
	Trimeth/Sulfa	≤2	-	≥4

# Susceptability (S), intermediate susceptibility (I), resistance (R) summary for *E.coli* isolates (n=58)

Subclass of antibiotics	S	I	R	95%CI for R%
Penicillins	59	3	38	31.6-44.4
$\beta$ -lactamase inhibitor combinations	83	8	9	5.2-12.8
Cephalosporines 1 <sup>st</sup> Gen.	74	11	15	10.3-19.7
Cephalosporines 2 <sup>nd</sup> Gen.	82	8	10	6.1-13.9
Cephalosporines 3rd Gen.	92	3	5	2.3-7.7
Monobactams	84	4	12	7.7-16.3
Carbapenems	100	0	0	0
Aminoglycozides	83	5	12	7.7-16.3
Tetracyclines	55	0	45	38.5-51.5
Trimethoprim-sulfamethoxazol	71	0	29	23-35
Quinolones	86	0	14	9.4-18.6
Nitrofurans	95	2	3	0.8-5.2

# Antibiotic resistance pattern for *E.coli*

(Susceptible (S), Intermediate (I), and Resistant (R) proportion) n=58



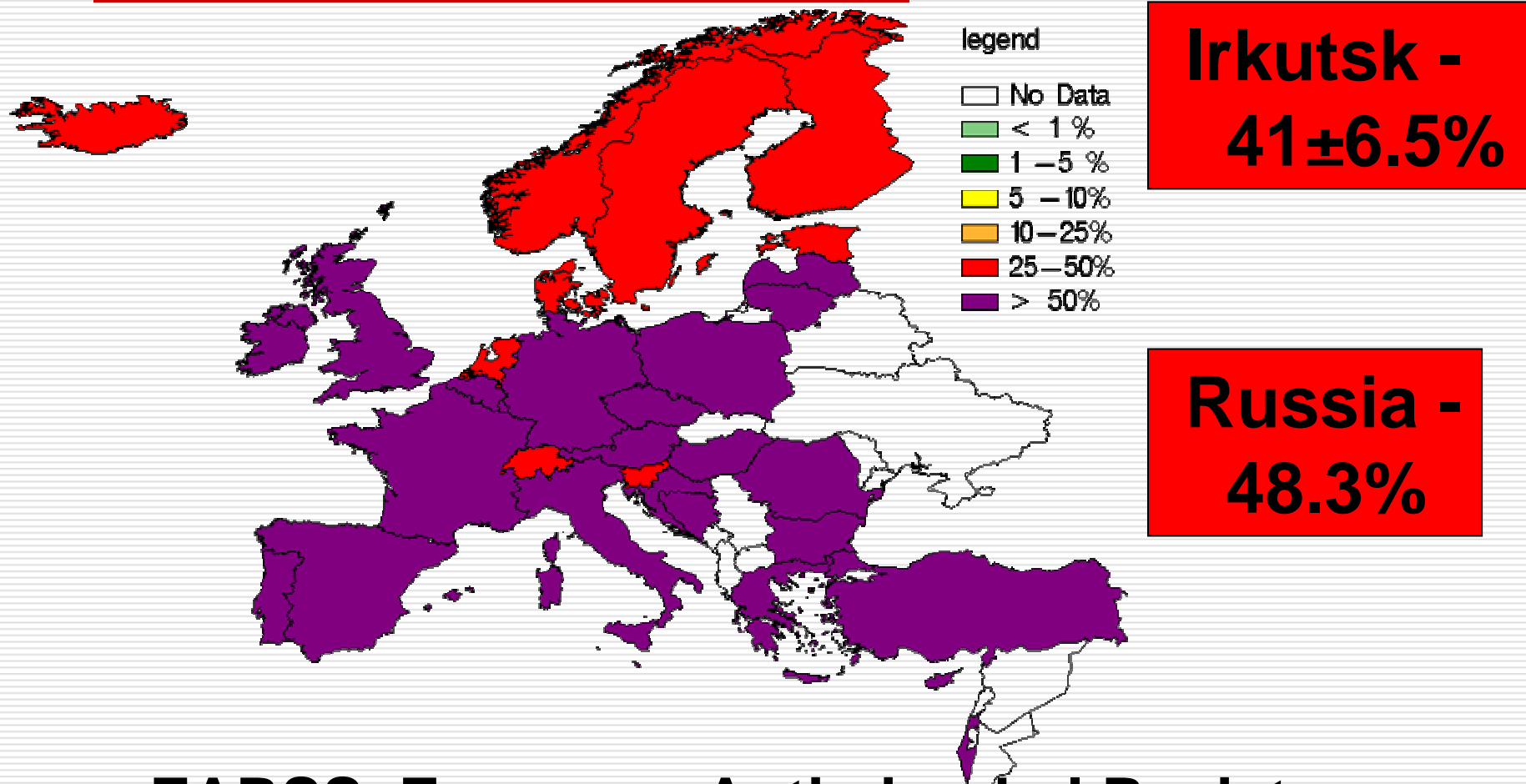


# ***E.coli* multidrug resistance to first-line antimicrobials (n=58)**

	%±m
No resistance detected	53±6,6%
Resistance to 1 antibiotic	17±4,9%
Resistance to 2 antibiotics	19±5,1%
Resistance to 3 antibiotics	10±3,9%

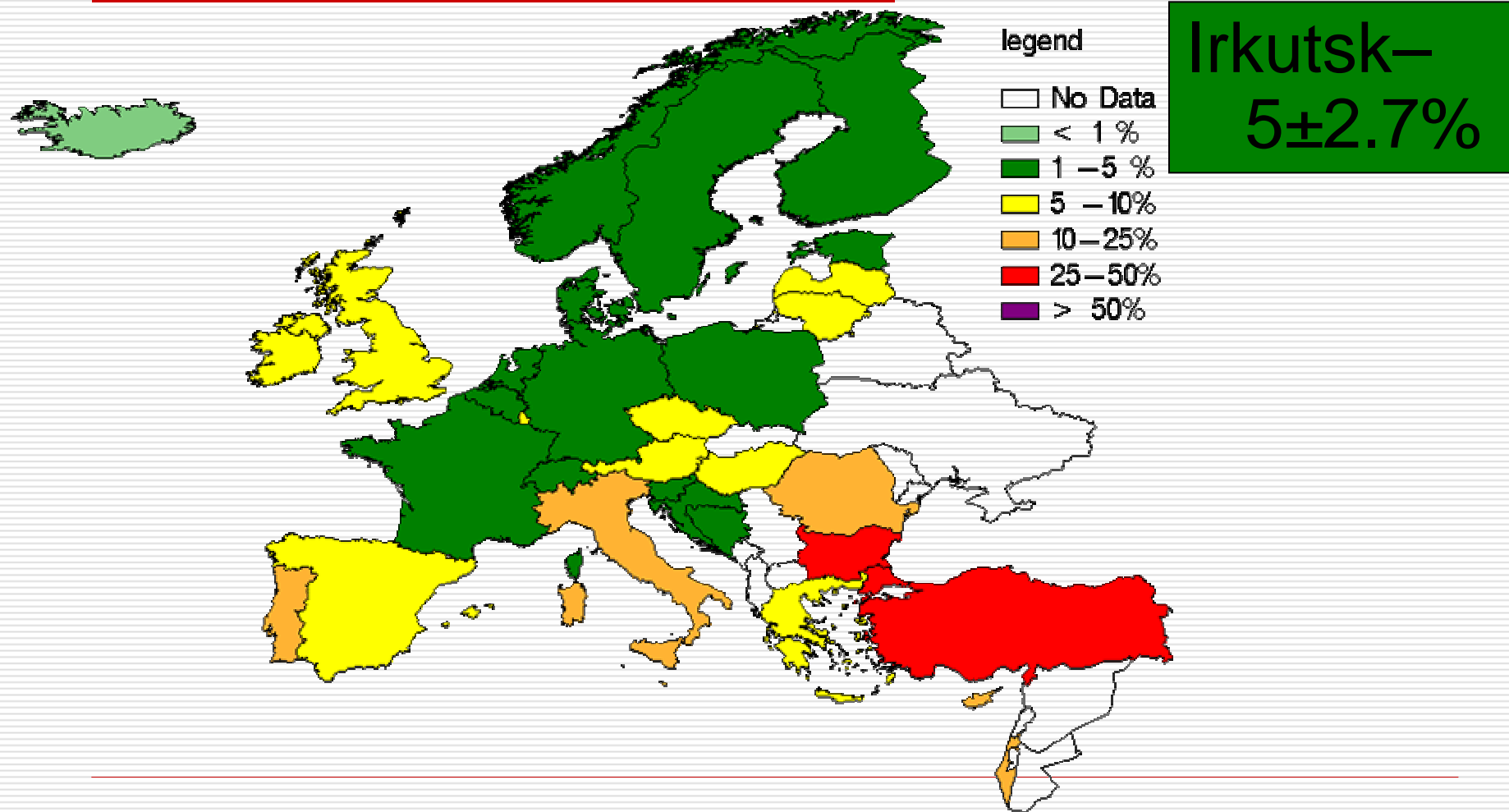
- ☐ Resistance to ampicillin;
- ☐ Resistance to ampicillin and co-trimoxazol;
- ☐ Resistance to ampicillin, co-trimoxazol and ciprofloxacin.

# Proportion of Aminopenicillins resistant E.coli isolates in Irkutsk in comparison with situation in Europe (ERASS, 2008)

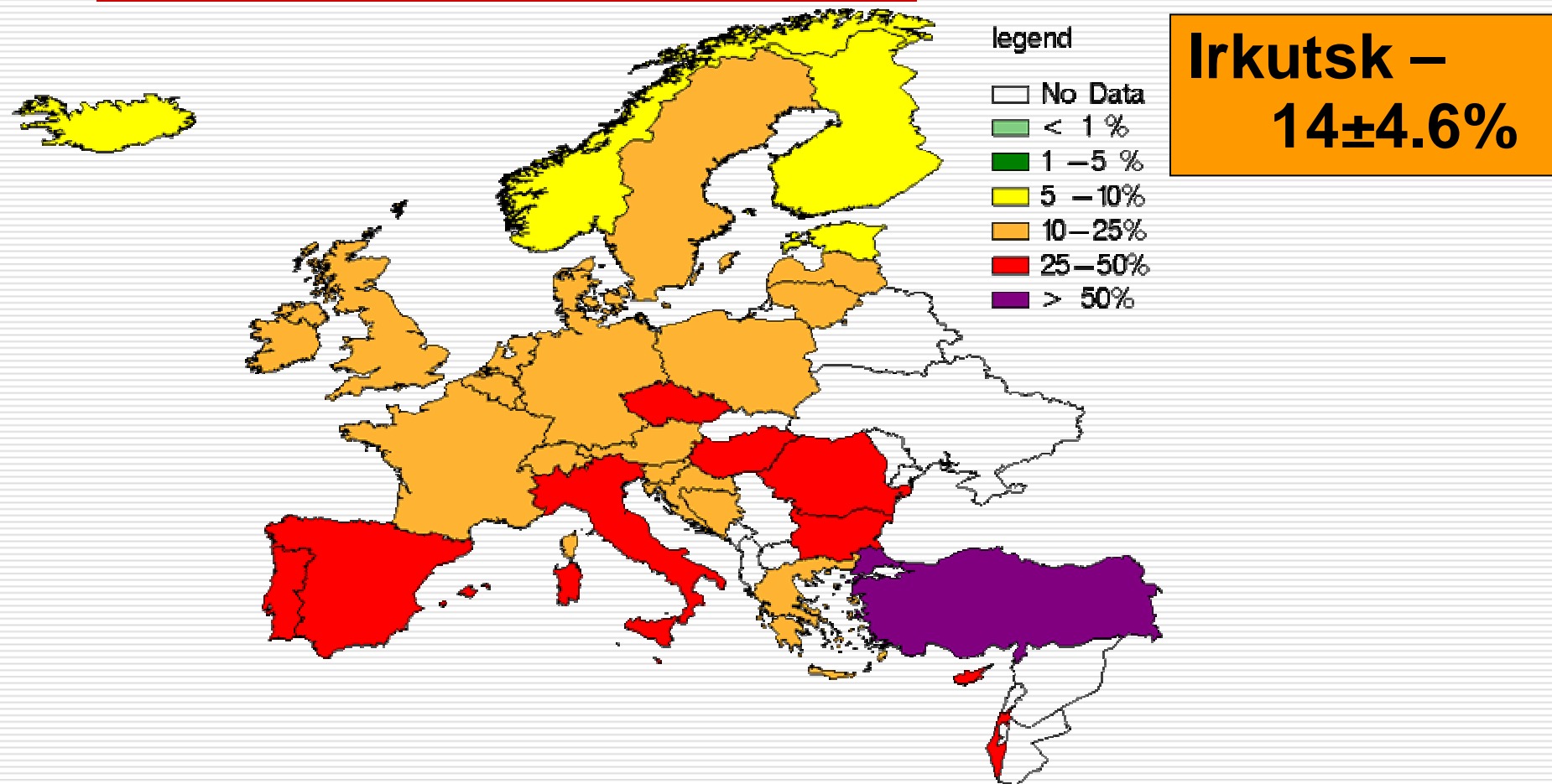


**EARSS—European Antimicrobial Resistance Surveillance System**

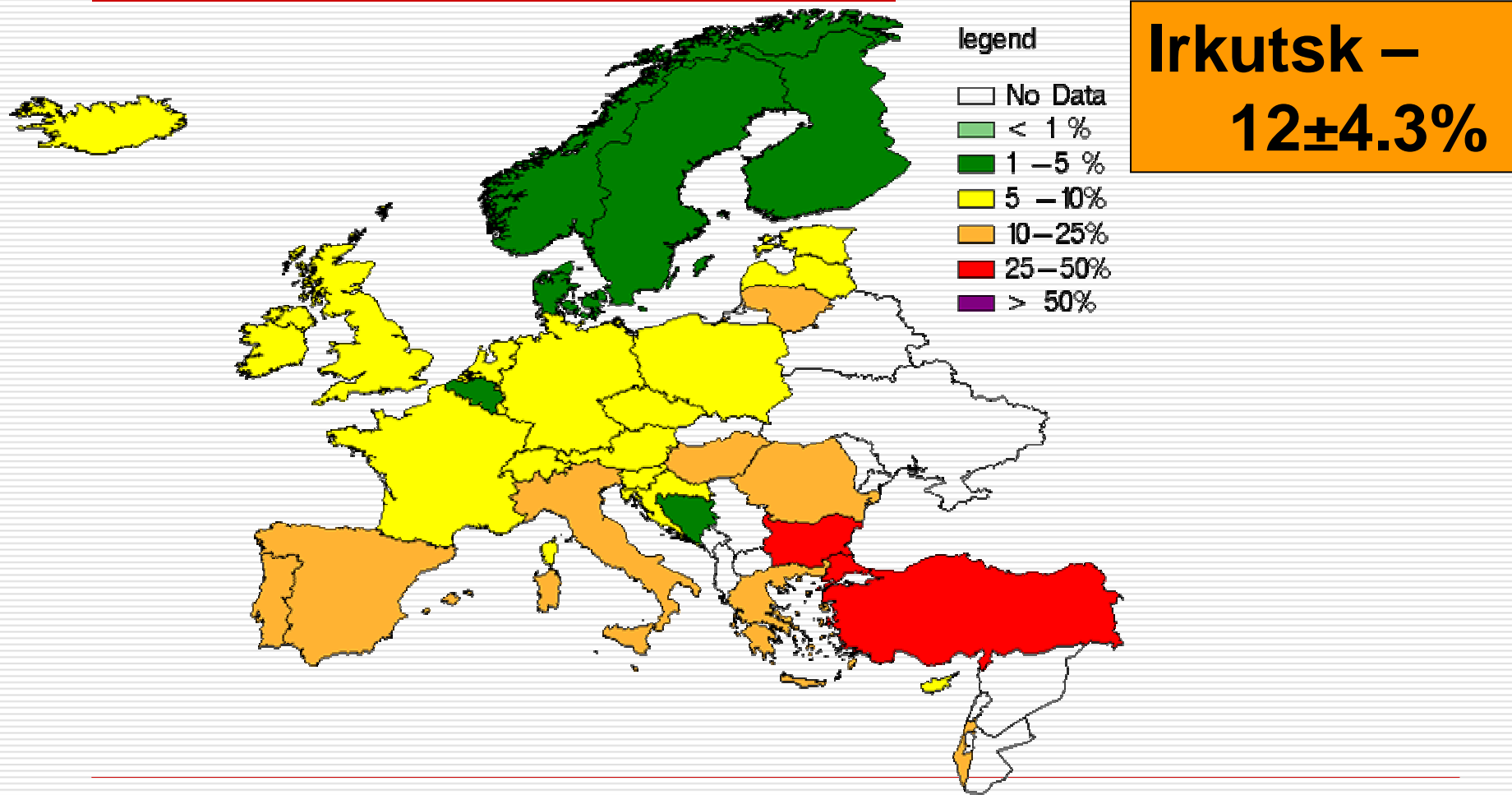
# Proportion of 3<sup>rd</sup> gen. cephalosporines resistant E.coli isolates in Irkutsk in comparison with situation in Europe (EARSS, 2008)



# Proportion of Fluorquinolones resistant E.coli isolates in Irkutsk in comparison with situation in Europe (EARSS, 2008)



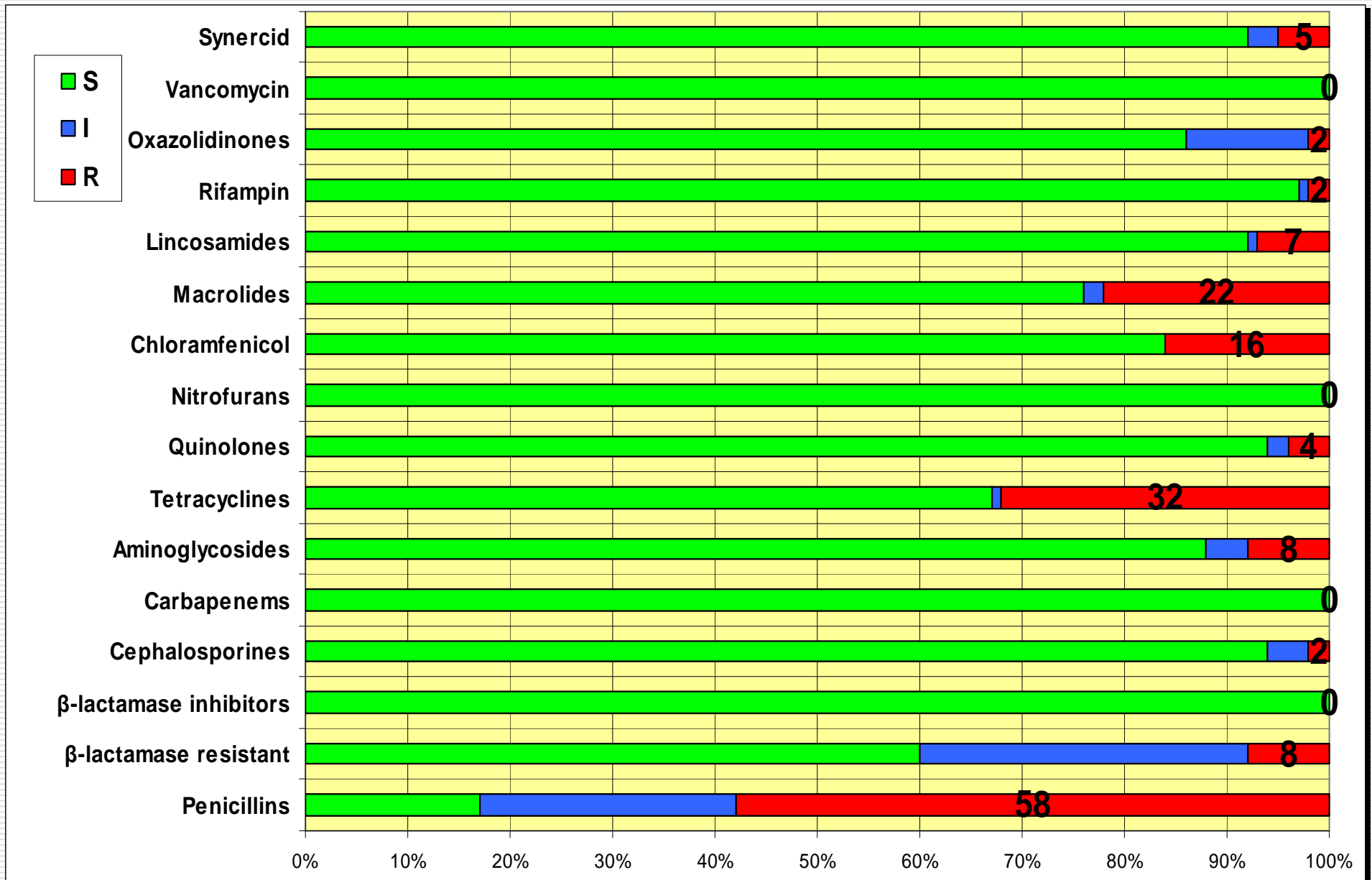
# Proportion of Aminoglycosides resistant E.coli isolates in Irkutsk in comparison with situation in Europe (EARSS, 2008)



# Susceptability, intermediate susceptibility, resistance summary for *S.aureus* isolates (n=104)

Antibiotic subclass	S	I	R	95% CI for R%
Penicillins	17	25	58	53.2-62.8
$\beta$ -lactamase resistant	60	32	8	5.3-10.7
$\beta$ -lactamase inhibitors	100	0	0	0
Cephalosporines	94	4	2	0.7-3.3
Carbapenems	100	0	0	0
Aminoglycosides	88	4	8	10.7-5.3
Tetracyclines	67	1	32	36.6-47.4
Quinolones	94	2	4	1.9-6.1
Nitrofurans	100	0	0	0
Chloramfenicol	84	0	16	12.4-19.6
Macrolides	76	2	22	17.6-26.4
Lincosamides	92	1	7	4.5-9.5
Rifampin	97	1	2	0.7-3.3
Oxazolidinones	86	12	2	0.7-3.3
Vancomycin	100	0	0	0
Synercid	92	3	5	2.9-7.1

# Antibiotics resistance pattern for *S.aureus* (Susceptible (S), Intermediate (I), and Resistant (R)) n=104

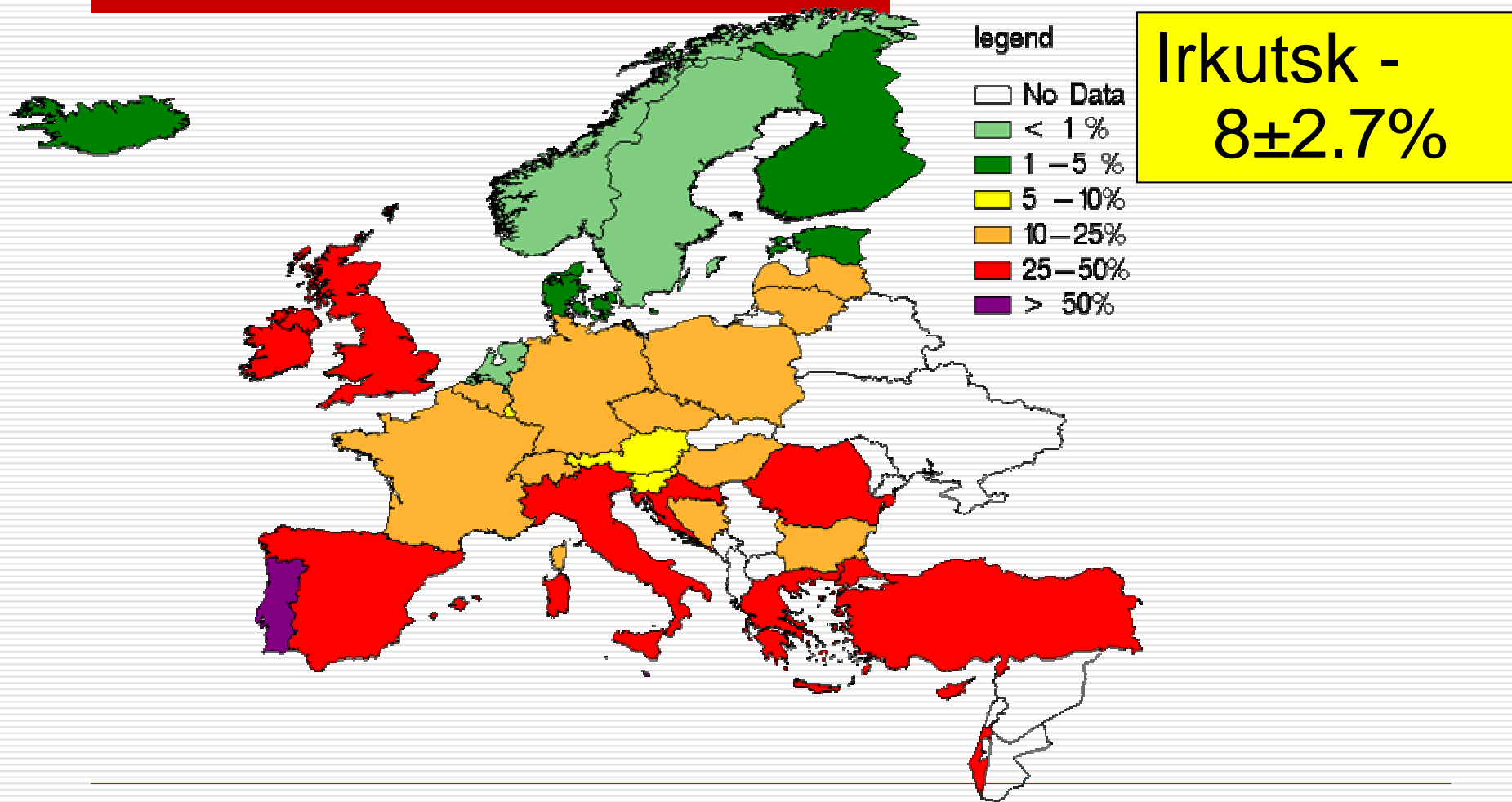


## ***S.aureus* multidrug resistance to first-line antimicrobials (n=104).**

	<b>% ± m</b>
<b>No resistance detected</b>	<b>12,5 ± 3,2</b>
<b>Resistance to 1 antibiotic</b>	<b>61,5 ± 4,8</b>
<b>Resistance to 2 antibiotics</b>	<b>15 ± 3,5</b>
<b>Resistance to 3 antibiotics</b>	<b>7 ± 2,5</b>
<b>Resistance to 4 antibiotics</b>	<b>2 ± 1,4</b>
<b>Resistance to 5 antibiotics</b>	<b>2 ± 1,4</b>
<b>Resistance to all antibiotics</b>	<b>0</b>



# Proportion of MRSA isolates in Irkutsk in comparison with situation in Europe (EARSS, 2008)



# Results:

- ❑ Of *E.coli* isolates, 38% (31.6-44.4) were resistant to penicillins; 14% (18.6-9.4) to quinolones; 12% (16.3-7.77) to aminoglycosides and monobactams; and 5% (7.7-2.3) to 3rd generation cephalosporines.
- ❑ 29% (24,6-33,4) of *E.coli* isolates were resistant to two or more first-line antimicrobials: 19% (13,9-24,1) were resistant to ampicillin and trimethoprim–sulfamethoxazole and 10% (6,1-13,9) to ampicillin, trimethoprim–sulfamethoxazole and ciprofloxacin.
- ❑ Of *S.aureus* isolates, 58% (53.2-62.8) were resistant to penicillines; 32% (36.6-47.4) to tetracyclines, 22% (17.6-26.4) to macrolides, 16% (12.4-19.6) to chloramphenicol, 8% (5.3-10.7) were methicillin-resistant (MRSA). All isolates were susceptible to  $\beta$ -lactamase inhibitor combinations, glycopeptides, nitrofurans and carbapenems.
- ❑ 26% (21,7-30,3) of isolates were multidrug-resistant, 61.5% (65.3-57.7)  $\beta$ -lactamase positive, 15% (11,5-18,5) resistant to two first-line antimicrobials in ampicillin and erythromycin or ampicillin and ciprofloxacin combinations.
- ❑ The antimicrobials resistant isolates prevalence in Irkusk is lower (except aminoglycosides), than in majority European countries.



**Thank you for your  
attention!**

