BAKTERİYEL DİRENÇTE GÜNCEL DURUM

Doç. Dr. Seniha ŞENBAYRAK

Sağlık Bilimleri Üniversitesi
Haydarpaşa Numune Eğitim ve Araştırma Hastanesi
Enfeksiyon Hastalıkları ve Klinik Mikrobiyoloji Kliniği

ANTİMİKROBİYAL DİRENÇ

- Dünyada ve ülkemizde boyutları giderek artan ciddi bir halk sağlığı sorunu

- ABD’ de 2012-2017

  Antimikrobiyal dirençli bakteriler

  2,8 milyondan fazla enfeksiyona

  35.000'den fazla ölüme neden oldu

Centers for Disease Control and Prevention. Antibiotic Resistance Threats in the United States, 2019.

Bad Bugs, No Drugs: No ESKAPE! An Update from the Infectious Diseases Society of America

Helen W. Boucher,[1] George H. Talbot,[2] John S. Bradley,[3,4] John E. Edwards, Jr,[5,6,7] David Gilbert,[8] Louis B. Rice,[9,10] Michael Scheld,[11] Brad Spellberg,[5,6,7] and John Bartlett[12]

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BAD BUGS, NO DRUGS

As Antibiotic Discovery Stagnates ...
A Public Health Crisis Brews

IDSA
Infectious Diseases Society of America

July 2008

E	*E. faecium (VRE)*
S	*S. aureus (MRSA)*
K	*Klebsiella species*
A	*A. baumannii*
P	*P. aeruginosa*
E	*Enterobacter Species*

Yeni antibiyotikler gerekli!!!

Boucher et al.CID 2009;48:1

World Health Organization

WHO PRIORITY PATHOGENS LIST FOR R&D OF NEW ANTIBIOTICS

Priority 1: CRITICAL#

Acinetobacter baumannii, carbapenem-resistant

Pseudomonas aeruginosa, carbapenem-resistant

Enterobacteriaceae*, carbapenem-resistant, 3rd generation cephalosporin-resistant

Priority 2: HIGH

Enterococcus faecium, vancomycin-resistant

Staphylococcus aureus, methicillin-resistant, vancomycin intermediate and resistant

Helicobacter pylori, clarithromycin-resistant

Campylobacter, fluoroquinolone-resistant

Salmonella *spp.*, fluoroquinolone-resistant

Neisseria gonorrhoeae, 3rd generation cephalosporin-resistant, fluoroquinolone-resistant

Priority 3: MEDIUM

Streptococcus pneumoniae, penicillin-non-susceptible

Haemophilus influenzae, ampicillin-resistant

Shigella *spp.*, fluoroquinolone-resistant

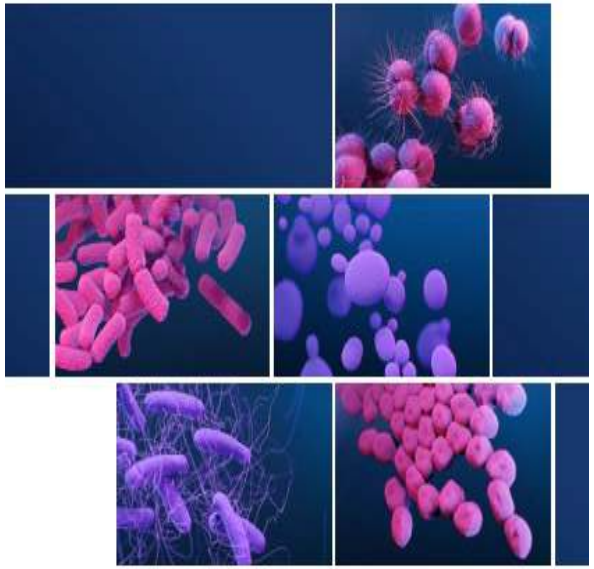
Mycobacteria (including *Mycobacterium tuberculosis*, the cause of human tuberculosis), was not subjected to review for inclusion in this prioritization exercise as it is already a globally established priority for which innovative new treatments are urgently needed.

* Enterobacteriaceae include: *Klebsiella pneumonia*, *Escherichia coli*, *Enterobacter* spp., *Serratia* spp., *Proteus* spp., and *Providencia* spp, *Morganella* spp.

http://www.who.int/medicines/publications/WHO-PPL-Short_Summary_25Feb-ET_NM_WHO.pdf?ua=1

ANTIBIOTIC RESISTANCE THREATS
IN THE UNITED STATES

2019



Urgent Threats

- Carbapenem-resistant *Acinetobacter*
- *Candida auris* (*C. auris*)
- *Clostridioides difficile* (*C. difficile*)
- Carbapenem-resistant Enterobacteriaceae (CRE)
- Drug-resistant *Neisseria gonorrhoeae* (*N. gonorrhoeae*)

Serious Threats

- Drug-resistant *Campylobacter*
- Drug-resistant *Candida*
- Extended-spectrum beta-lactamase (ESBL)-producing Enterobacteriaceae
- Vancomycin-resistant *Enterococci* (VRE)
- Multidrug-resistant *Pseudomonas aeruginosa* (*P. aeruginosa*)
- Drug-resistant nontyphoidal *Salmonella*
- Drug-resistant *Salmonella* serotype Typhi
- Drug-resistant *Shigella*
- Methicillin-resistant *Staphylococcus aureus* (MRSA)
- Drug-resistant *Streptococcus pneumoniae* (*S. pneumoniae*)
- Drug-resistant Tuberculosis (TB)

Concerning Threats

- Erythromycin-resistant group A *Streptococcus*
- Clindamycin-resistant group B *Streptococcus*

Watch List

- Azole-resistant *Aspergillus fumigatus* (*A. fumigatus*)
- Drug-resistant *Mycoplasma genitalium* (*M. genitalium*)
- Drug-resistant *Bordetella pertussis* (*B. pertussis*)

2050 için Öngörü ???

The impact of antimicrobial resistance in 2050

10 milyon ölüm / yıl
Dünya ekonomisine
100 trilyon dolar yük

Bassetti M, et al. *Intensive Care Med* 2017; 43 (10):1464-75

Global Antimicrobial Resistance and Use Surveillance System (GLASS) Report

Early implementation

2020

World Health Organization

3. GLASS Verileri

- 2019 yılına ait
- 66 ülke katılımlı (TR hariç)

- Kan

-Acinetobacter spp
-E. coli
-K. pneumoniae
-Salmonella spp.
-S. aureus
-S. pneumoniae

İdrar

-E. coli
-K. pneumoniae

Gaita

-Salmonella spp.
-Shigella spp.

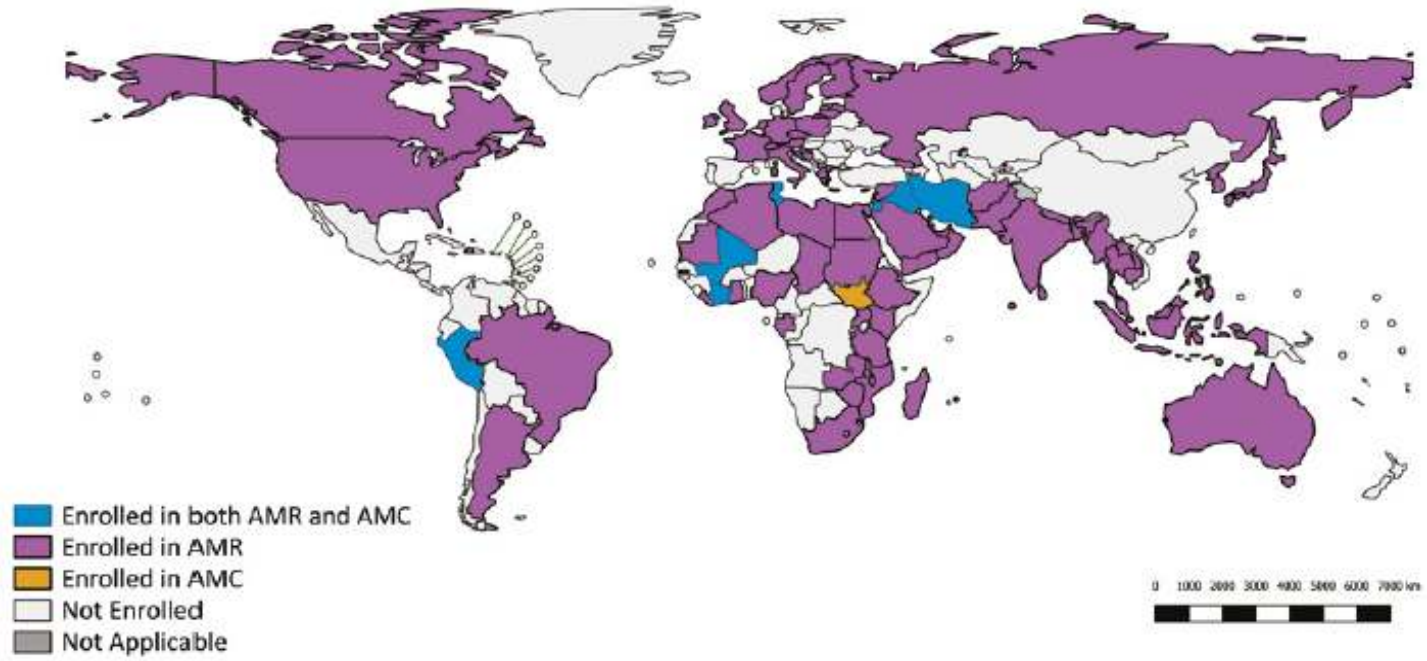
Servikal-Üretral

-N. gonorrhoeae

Örneklerinden antimikrobiyal duyarlılık testinin yapıldığı 2.164.568 hasta dahil

GLASS

Fig 1.2 Map of enrolment in GLASS-AMR (by the end of April 2020)



The boundaries and names shown and the designations used on this map do not imply the expression of any opinion whatsoever on the part of the World Health Organization concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. Dotted and dashed lines on maps represent approximate border lines for which there may not yet be full agreement.

Data source: World Health Organization
Map production: Information Evidence and Research (IER)
World Health Organization

World Health Organization

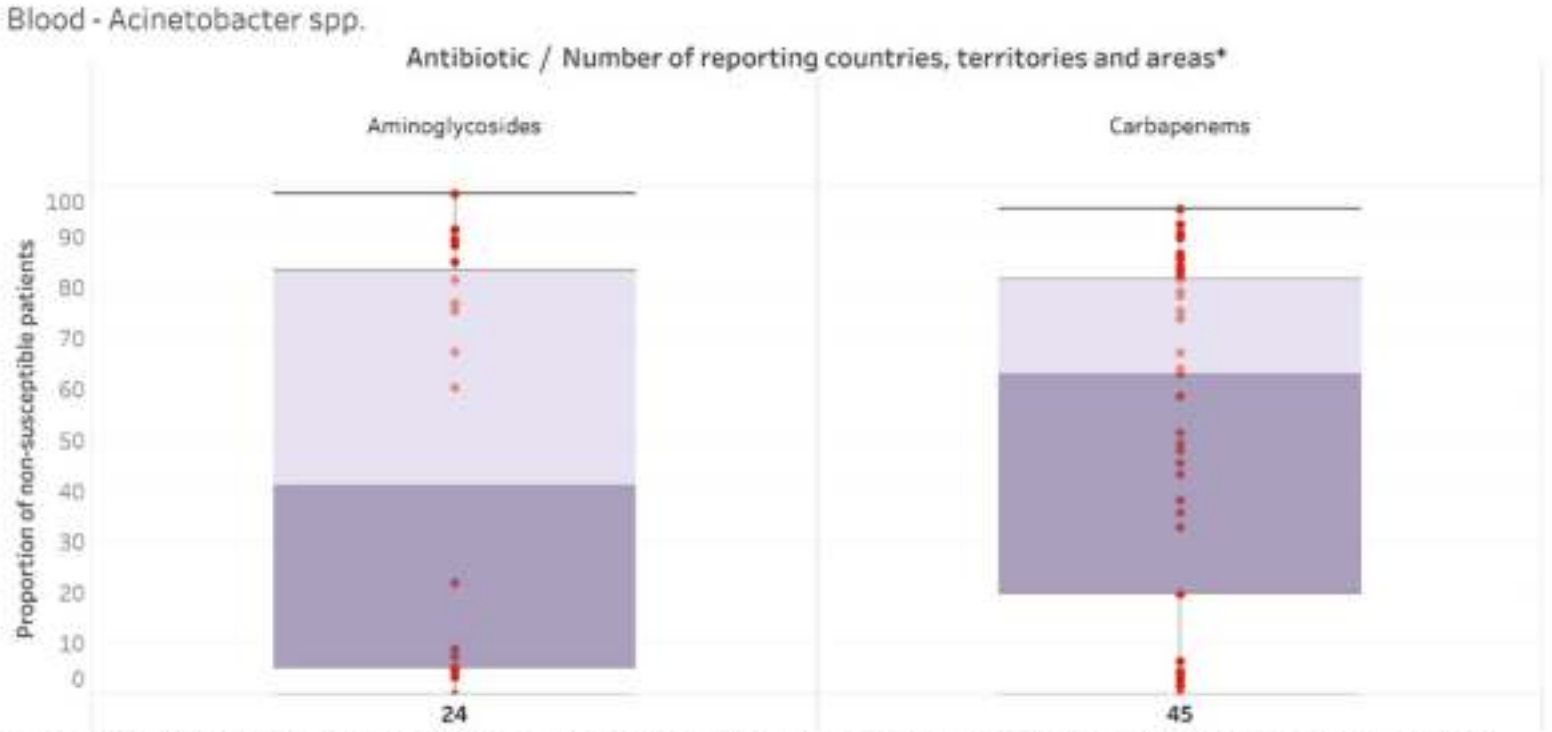
Table 2.2. Numbers of infected patients and patients with AST results reported to GLASS

INFECTION SITE	TOTAL NUMBER OF INFECTED PATIENTS	PATHOGEN	NUMBER OF INFECTED PATIENTS (BY PATHOGEN)				NUMBER OF PATIENTS WITH AST RESULTS	PATHOGEN	NUMBER OF PATIENTS WITH AST RESULTS (BY PATHOGEN)[a]			
			COMMUNITY	HOSPITAL	UNKNOWN	TOTAL			COMMUNITY	HOSPITAL	UNKNOWN	TOTAL
Bloodstream	441 794	*Acinetobacter* spp.	1 780	2 736	12 922	17 438	426 010	*Acinetobacter* spp.	1 495	2 464	11 526	15 485
		E. coli	48 939	35 974	144 701	229 614		*E. coli*	46 788	35 544	142 140	224 472
		K. pneumoniae	15 306	15 455	44 279	75 040		*K. pneumoniae*	14 465	14 951	42 088	71 504
		Salmonella spp.	2 947	334	7 907	11 188		*Salmonella* spp.	1 528	270	7 113	8 911
		S. aureus	12 030	17 408	60 054	89 492		*S. aureus*	10 325	17 007	59 728	87 060
		S. pneumoniae	3 627	1 274	14 121	19 022		*S. pneumoniae*	3 261	1 236	14 081	18 578
Urinary tract	1 888 545	*E. coli*	405 942	164 385	1 121 325	1 691 652	1 705 167	*E. coli*	293 063	157 075	1 079 508	1 529 646
		K. pneumoniae	64 571	42 206	90 116	196 893		*K. pneumoniae*	51 154	40 541	83 826	175 521
Gastroenteric	17 061	*Salmonella* spp.	2 630	257	9 269	12 156	15 029	*Salmonella* spp.	1 966	152	8 207	10 325
		Shigella spp.	375	42	4 488	4 905		*Shigella* spp.	358	29	4 317	4 704
Genital	18 572	*N. gonorrhoeae*	16 336	1	2 235	18 572	18 362	*N. gonorrhoeae*	16 195	0	2 167	18 362
Total	2 365 972		574 483	280 072	1 511 417	2 365 972	2 164 568		440 598	269 269	1 454 701	2 164 568

a For one of more antibiotics required by GLASS reporting

Acinetobacter spp.

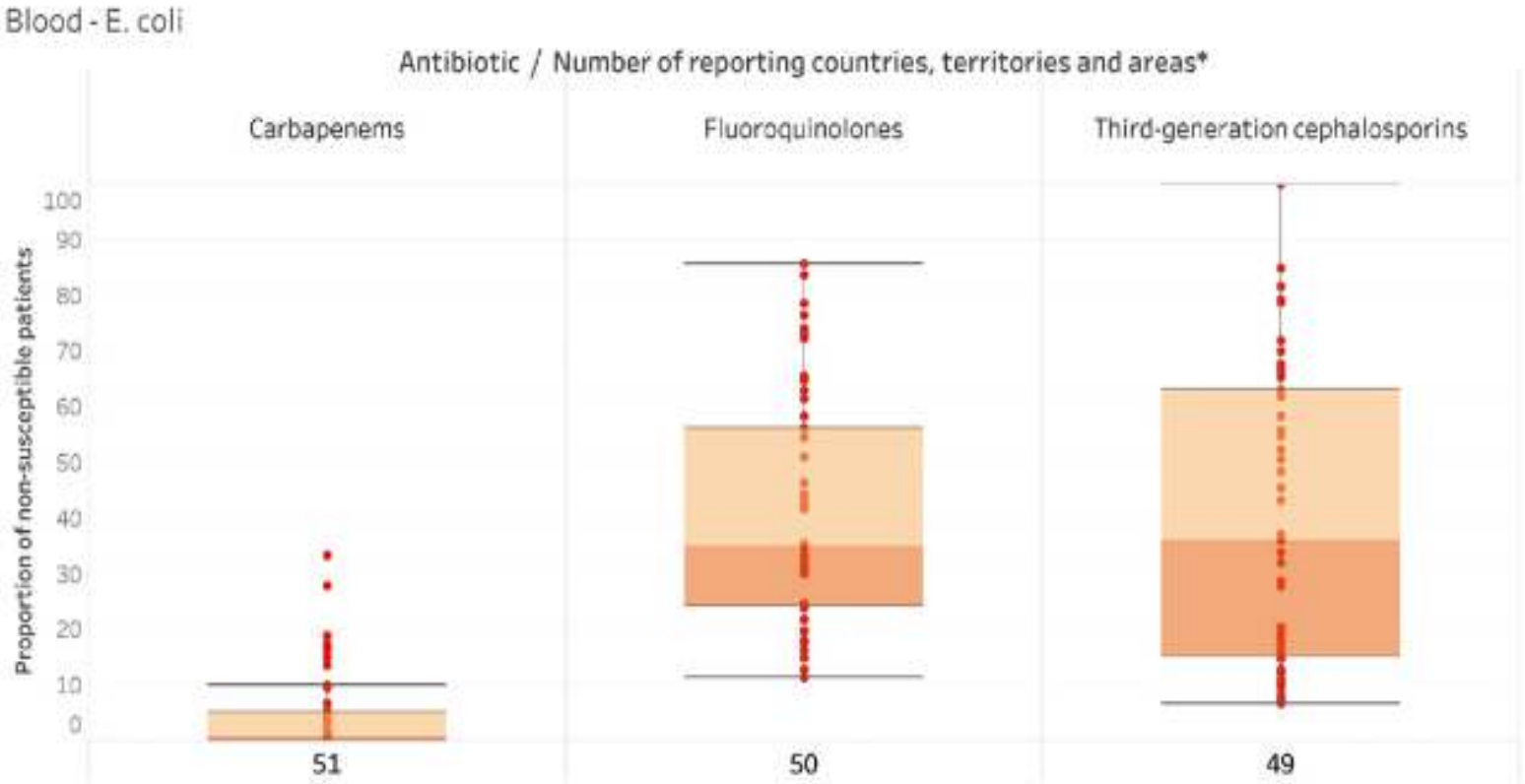
2.1.4.1 Bloodstream infections



*Rates are shown only if results were reported for > 10 patients and for pathogen–antibiotic combinations with > 10 AST results and < 30% unknown results. Single antibiotic results are shown only if data were submitted by at least 50% of the countries reporting on the specimen-pathogen combination.

E.coli

Median rate:36.0% (IQR 15.2–63.0).



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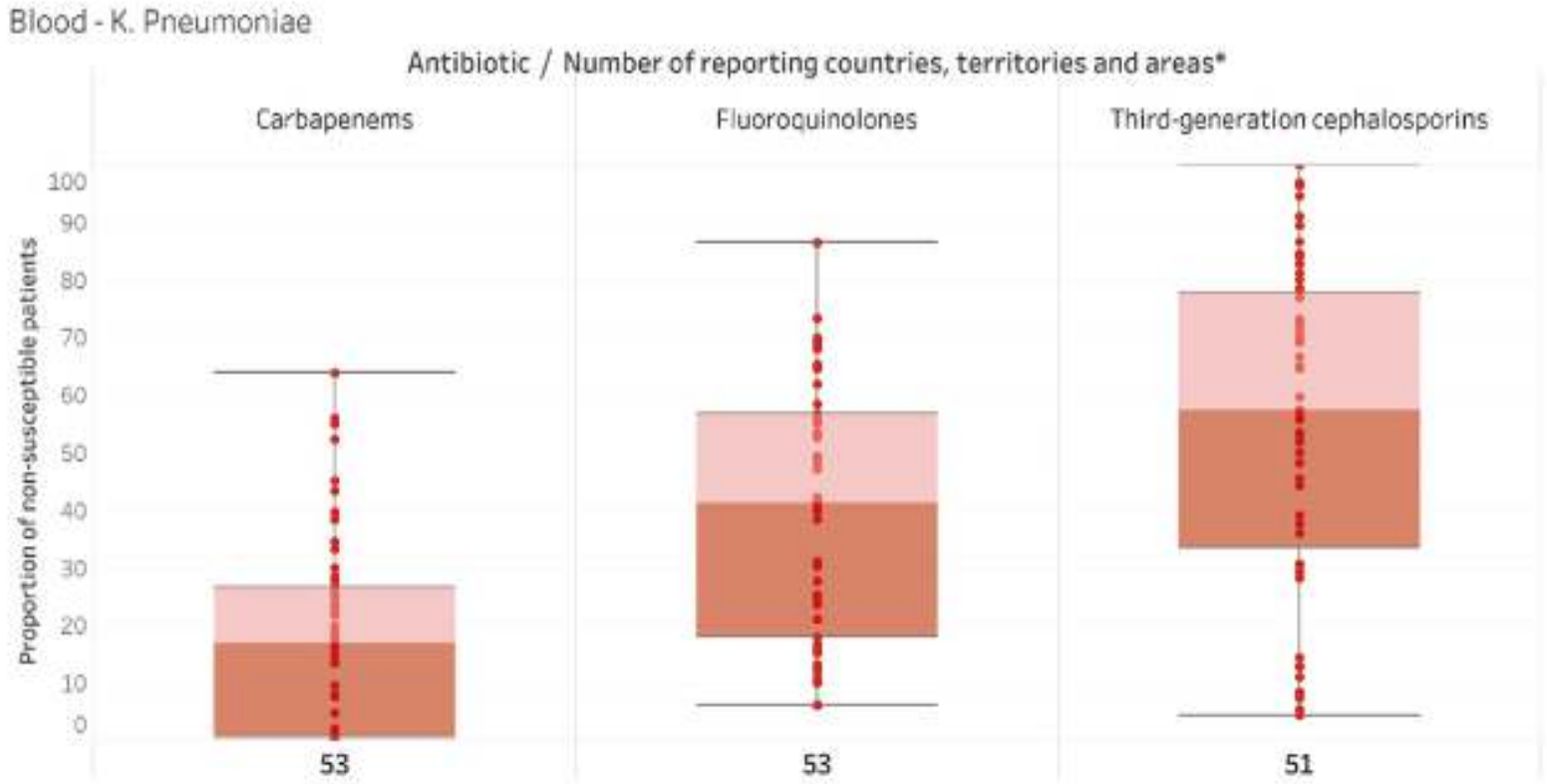
K.pneumoniae



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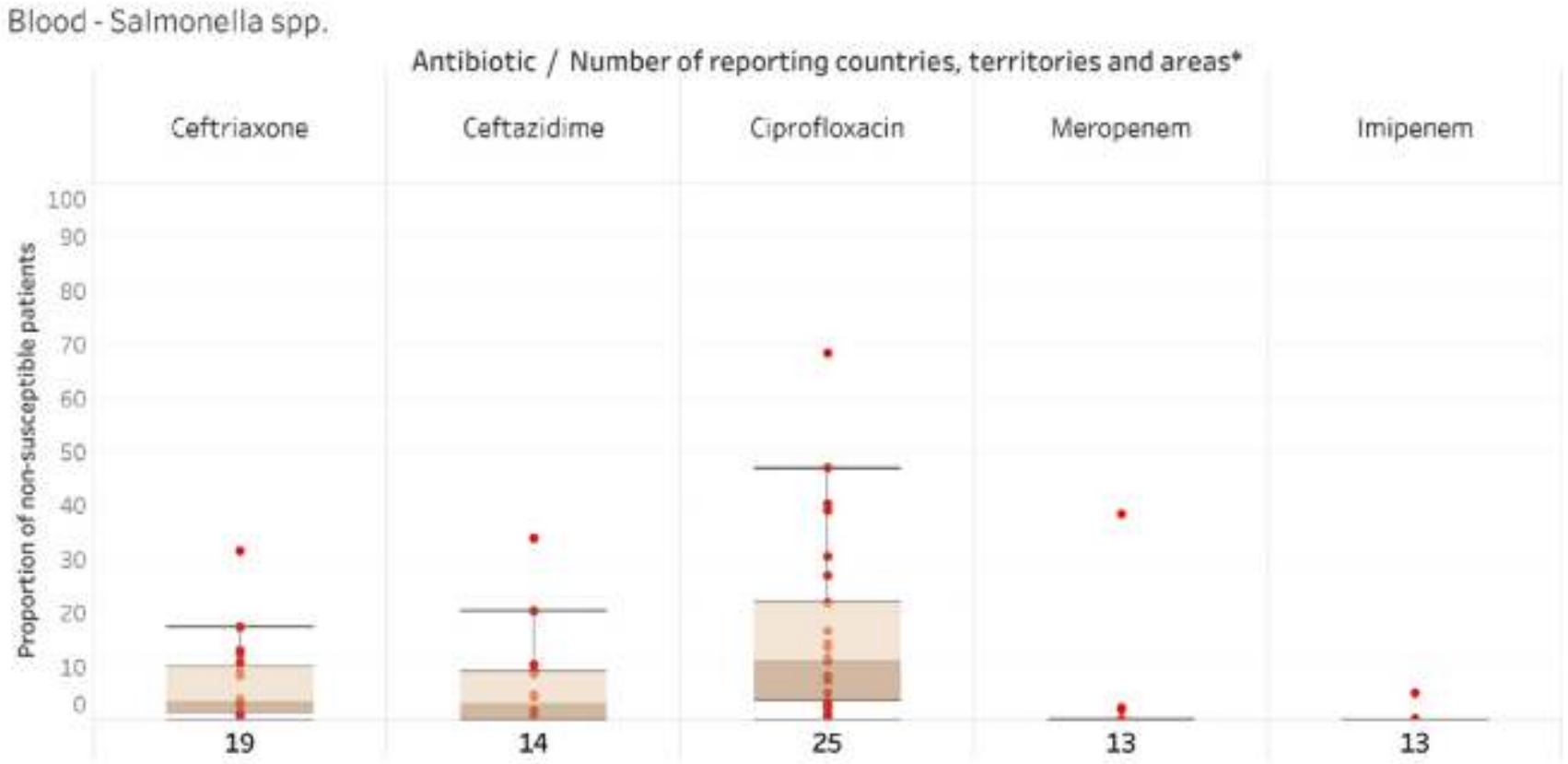
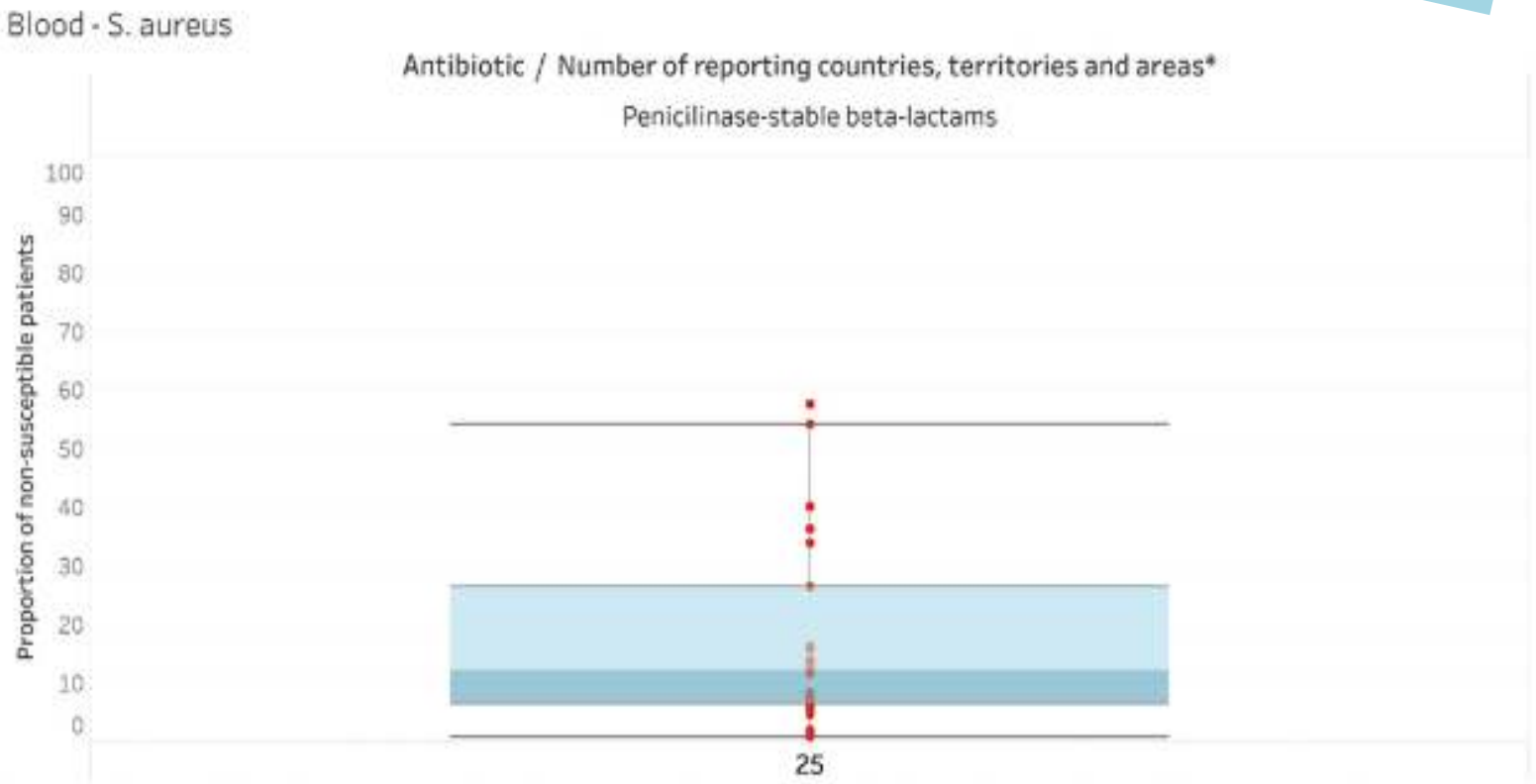
Salmonella spp.



*Rates are shown only if results were reported for > 10 patients and for pathogen–antibiotic combinations with > 10 AST results and < 30% unknown results. Single antibiotic results are shown only if data were submitted by at least 50% of the countries reporting on the specimen-pathogen combination.

S.aureus

median rate :12.11%
(IQR 6.4–26.4)



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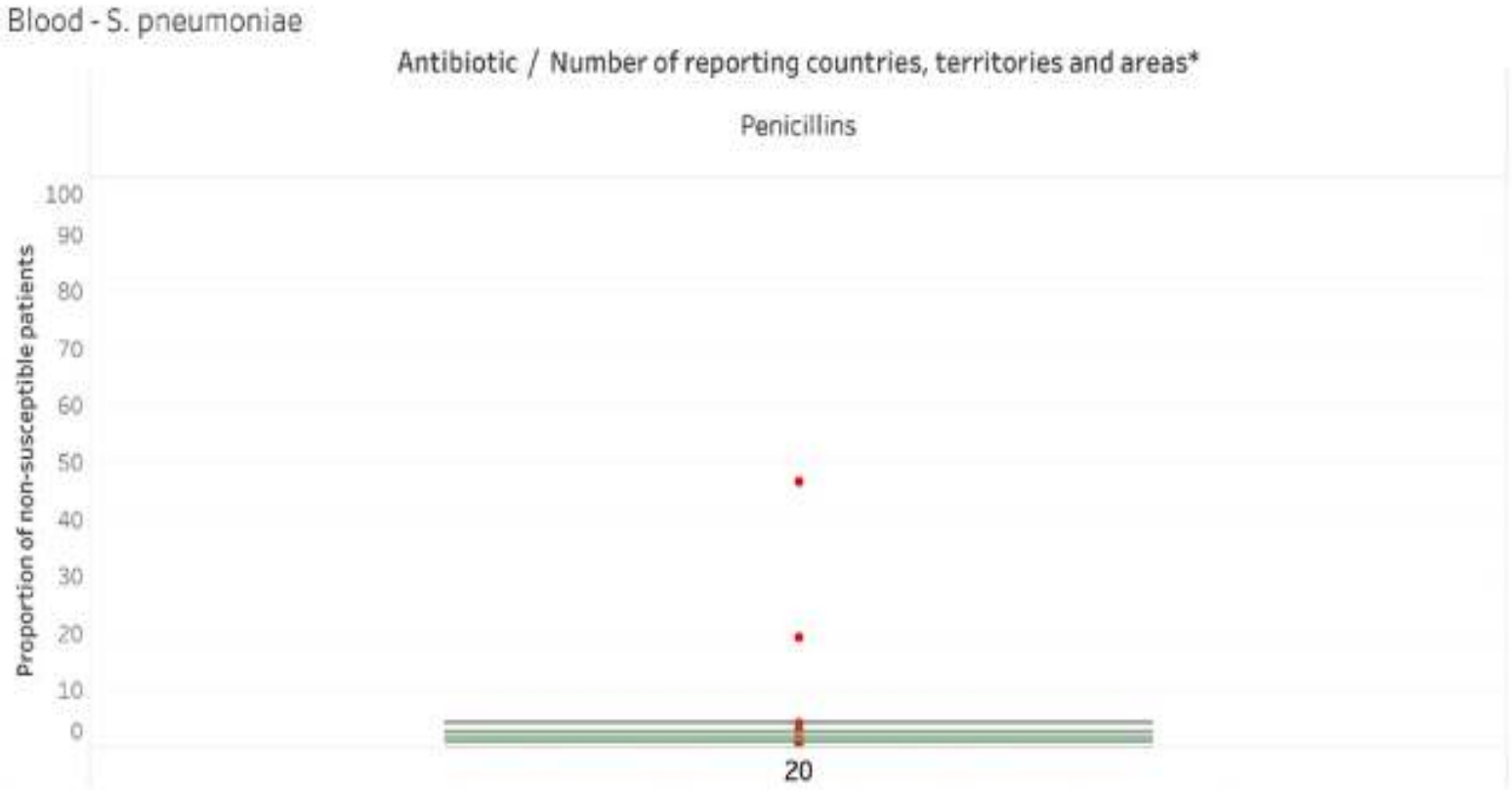
S.pneumoniae

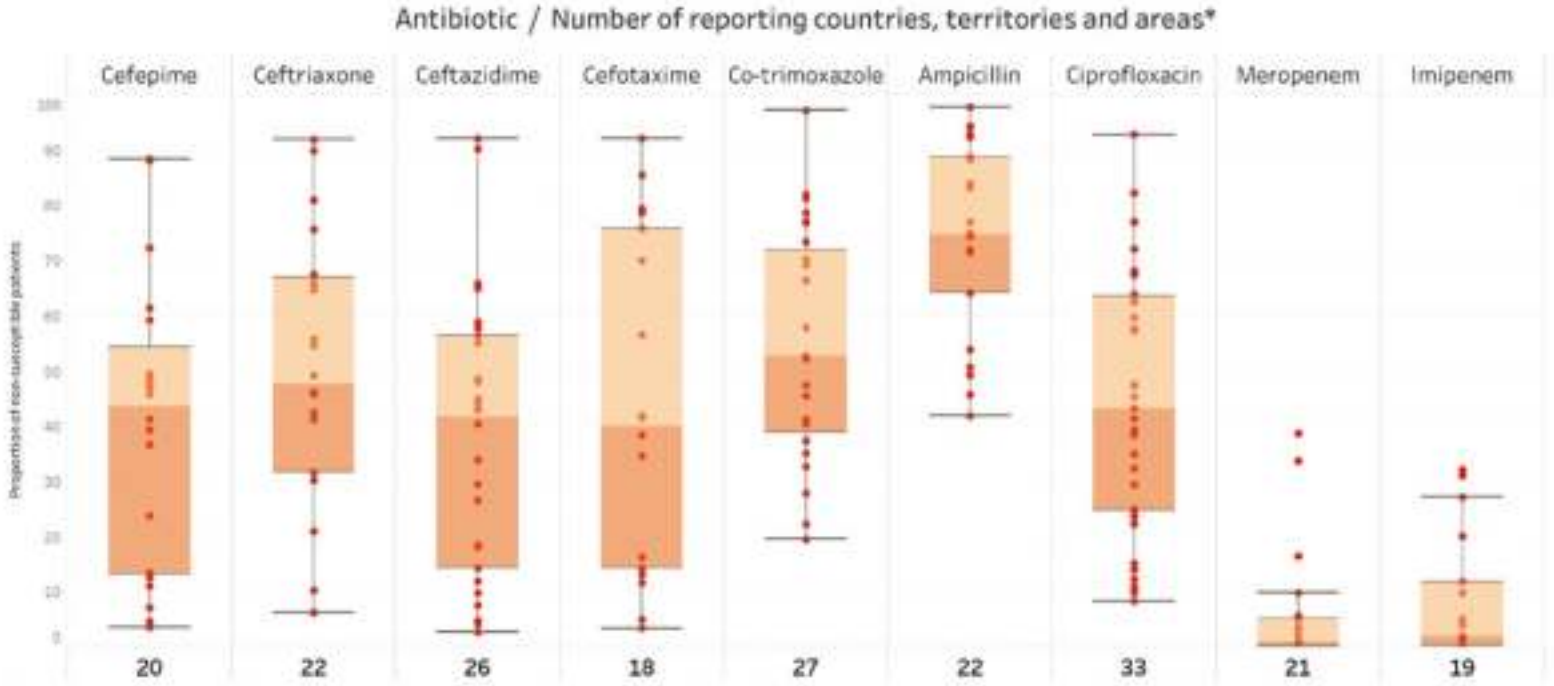


*Rates are shown only if results were reported for > 10 patients and for pathogen–antibiotic combinations with > 10 AST results and < 30% unknown results. Single antibiotic results are shown only if data were submitted by at least 50% of the countries reporting on the specimen-pathogen combination.

E.coli

2.1.4.2 Urinary tract infections

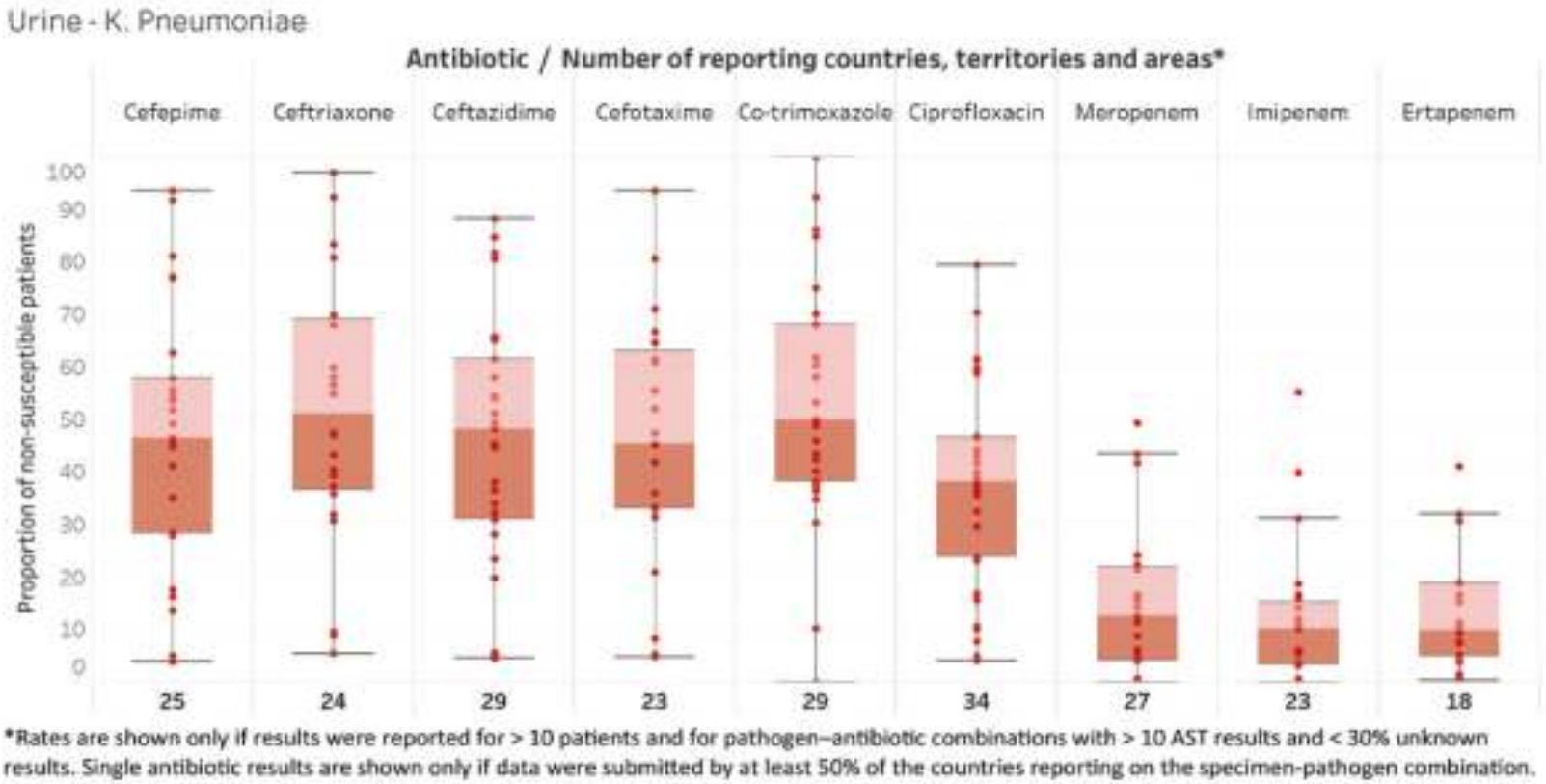
Urine - E. coli



*Rates are shown only if results were reported for > 10 patients and for pathogen–antibiotic combinations with > 10 AST results and < 30% unknown results. Single antibiotic results are shown only if data were submitted by at least 50% of the countries reporting on the specimen-pathogen combination.

Siprofloksasin %8.4 den %92.9 kadar değişiyor

K.pneumoniae

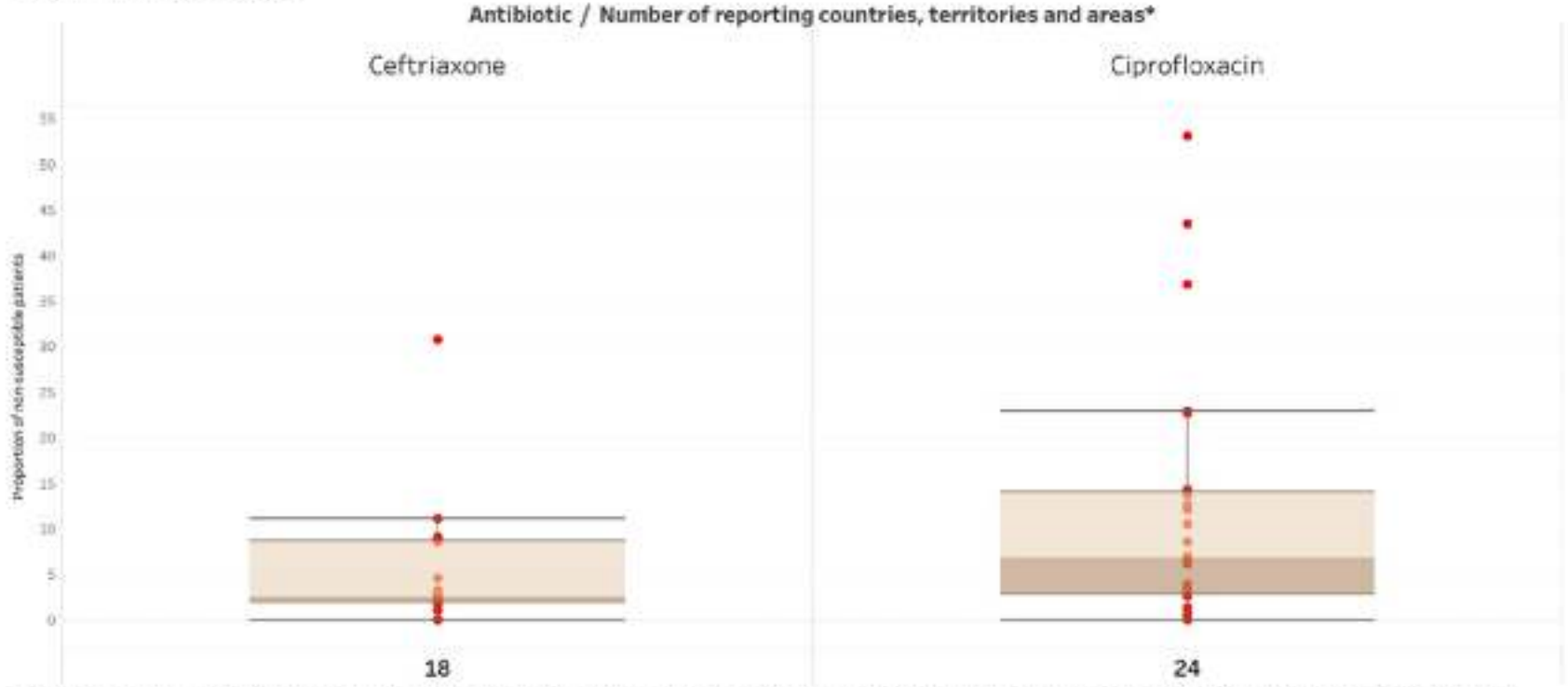


Siprofloksasin %4.1 den %79.4 e kadar değişiyor

Salmonella spp.

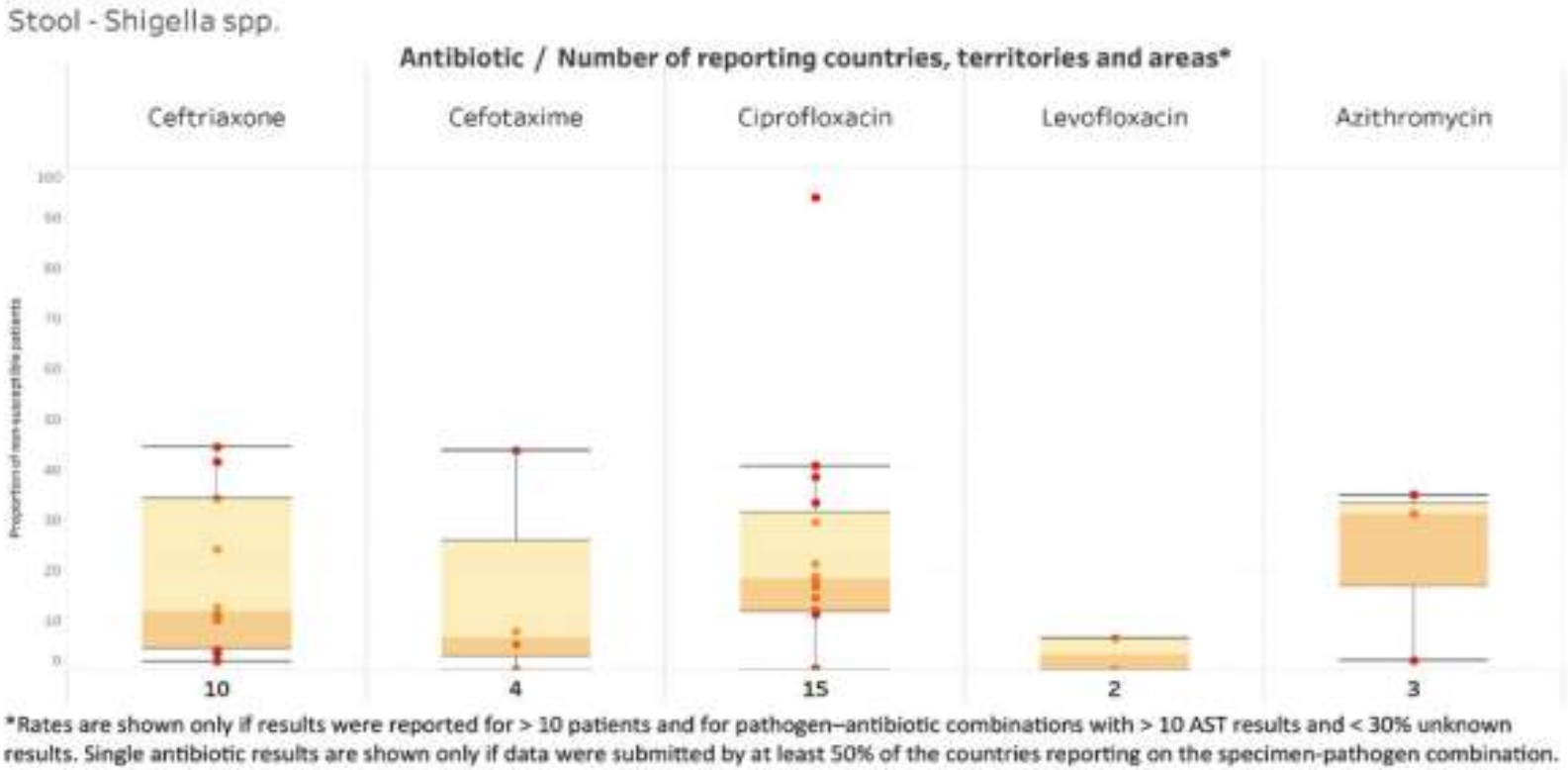
2.1.4.3 Gastroenteric infections

Stool - Salmonella spp.



*Rates are shown only if results were reported for > 10 patients and for pathogen–antibiotic combinations with > 10 AST results and < 30% unknown results. Single antibiotic results are shown only if data were submitted by at least 50% of the countries reporting on the specimen-pathogen combination.

Shigella spp.



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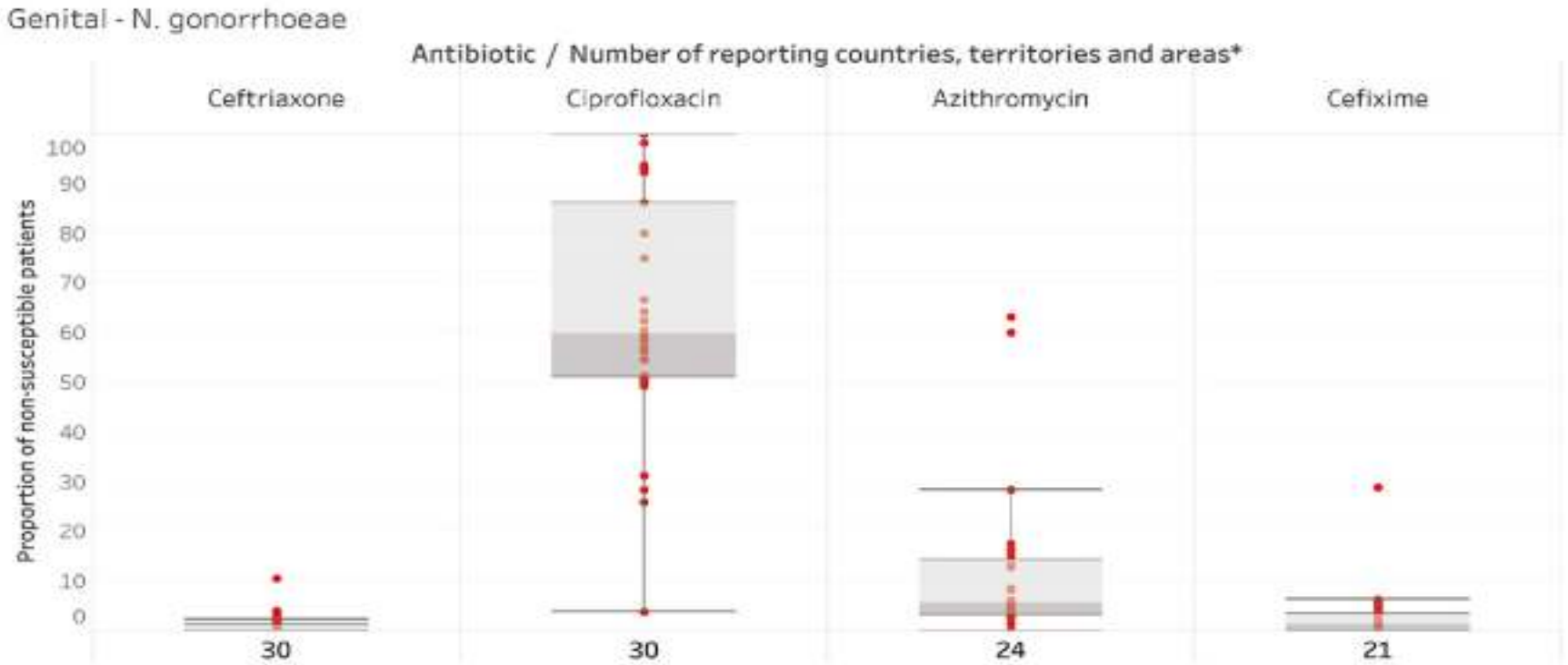
N. gonorrhoeae

2.1.4.4 Genital infections



*Rates are shown only if results were reported for > 10 patients and for pathogen–antibiotic combinations with > 10 AST results and < 30% unknown results. Single antibiotic results are shown only if data were submitted by at least 50% of the countries reporting on the specimen-pathogen combination.

TR dahil değil
Kan ve BOS izolatları

E.coli

İzolatların yarısından fazlası en az bir antimikrobiyal gruba dirençli
Çeşitli antimikrobiyallere karşı kombine direnç
Direnç yüzdeleri genellikle düşük
Karbapenem direnci nadir

Table 3.1. *Escherichia coli*. Total number of invasive isolates tested (N)* and percentage resistance (%) per phenotype, EU/EEA countries, 2018

Resistance pattern	Number of isolates	Percentage (%) of total**
Fully susceptible	**49905**	**41.7**
Single resistance (to indicated antimicrobial group)		
Total (all single resistance)	**41 526**	**34.7**
Aminopenicillins	38093	31.8
Fluoroquinolones	3211	2.7
Other antimicrobial groups	222	0.2
Resistance to two antimicrobial groups		
Total (all two-group combinations)	**13056**	**10.9**
Aminopenicillins + fluoroquinolones	7964	6.6
Aminopenicillins + third-generation cephalosporins	2894	2.4
Aminopenicillins + aminoglycosides	2039	1.7
Other antimicrobial group combinations	159	0.1
Resistance to three antimicrobial groups		
Total (all three-group combinations)	**9335**	**7.8**
Aminopenicillins + third-generation cephalosporins + fluoroquinolones	5967	5.0
Aminopenicillins + fluoroquinolones + aminoglycosides	2814	2.3
Other antimicrobial group combinations	554	0.5
Resistance to four antimicrobial groups		
Total (all four-group combinations)	**5938**	**5.0**
Aminopenicillins + third-generation cephalosporins + fluoroquinolones + aminoglycosides	5904	4.9
Other antimicrobial group combinations	34	<0.1
Resistance to five antimicrobial groups		
Aminopenicillins + third-generation cephalosporins + fluoroquinolones + aminoglycosides + carbapenems	40	<0.1

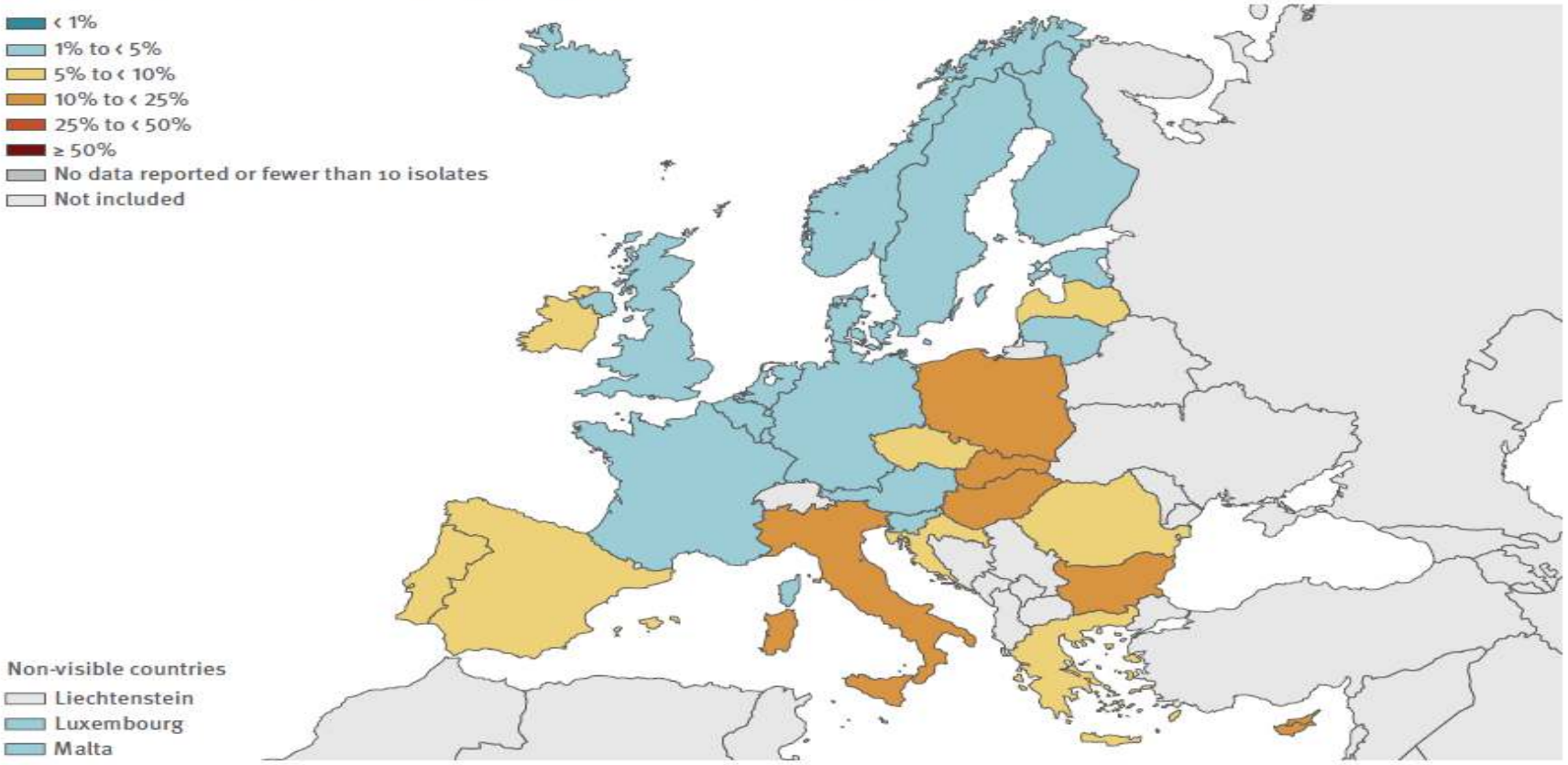
Only resistance combinations >1% of the total are specified.

* Only isolates with complete susceptibility information for aminopenicillins, fluoroquinolones, third-generation cephalosporins, aminoglycosides and carbapenems were included in the analysis.

** Not adjusted for population differences in the reporting countries.

E.coli

Figure 3.6. ***Escherichia coli*****. Percentage (%) of invasive isolates with combined resistance to third-generation cephalosporins, fluoroquinolones and aminoglycosides, by country, EU/EEA countries, 2018**



K.pneumoniae

İzolatların 1/3 den fazlası en az bir antimikrobiyal gruba dirençli

Çeşitli antimikrobiyallere karşı kombine direnç

Direnç yüzdeleri *E.coli den yüksek*

Karbapenem direnci %10 nun üzerinde

Table 3.8. *Klebsiella pneumoniae*. Total number of invasive isolates tested (N)* and percentage resistance (%) per phenotype, EU/EEA countries, 2018

Resistance pattern	Number of isolates	Percentage (%) of total**
Fully susceptible	22732	62.8
Single resistance (to indicated antimicrobial group)		
Total (all single resistance)	**2624**	**7.2**
Third-generation cephalosporins	1354	3.7
Fluoroquinolones	1064	2.9
Other antimicrobial groups	206	0.6
Resistance to two antimicrobial groups		
Total (all two-group combinations)	**2772**	**7.7**
Third-generation cephalosporins + fluoroquinolones	1750	4.8
Third-generation cephalosporins + aminoglycosides	525	1.5
Fluoroquinolones + aminoglycosides	401	1.1
Other antimicrobial group combinations	96	0.3
Resistance to three antimicrobial groups		
Total (all three-group combinations)	**6279**	**17.3**
Third-generation cephalosporins + fluoroquinolones + aminoglycosides	4978	13.7
Third-generation cephalosporins + fluoroquinolones + carbapenems	1185	3.3
Other antimicrobial group combinations	116	0.3
Resistance to four antimicrobial groups		
Third-generation cephalosporins + fluoroquinolones + aminoglycosides + carbapenems	**1799**	**5.0**

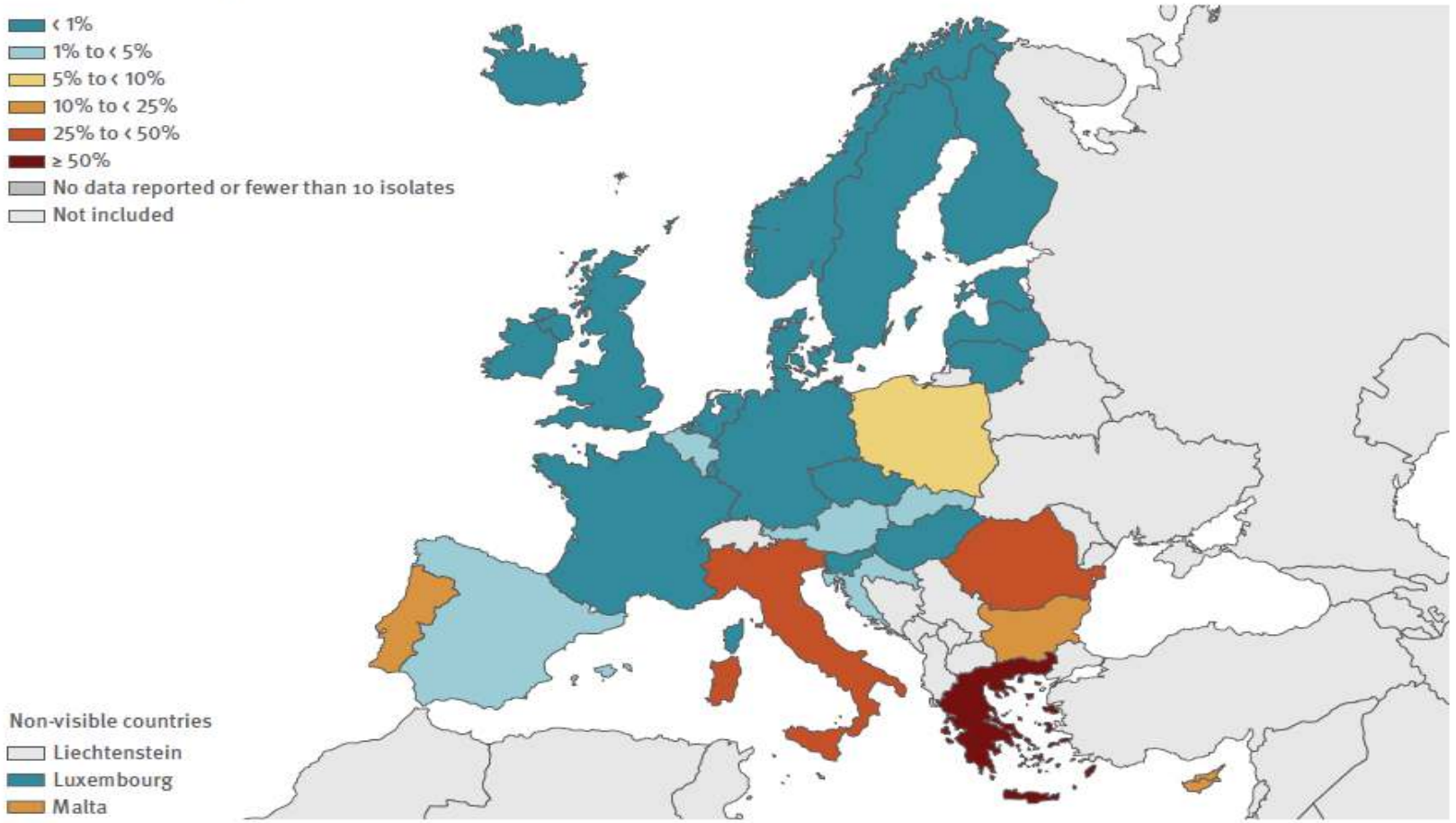
Only resistance combinations >1% of the total are specified.

* Only isolates with complete susceptibility information for fluoroquinolones, third-generation cephalosporins, aminoglycosides and carbapenems were included in the analysis.

** Not adjusted for population differences in the reporting countries.

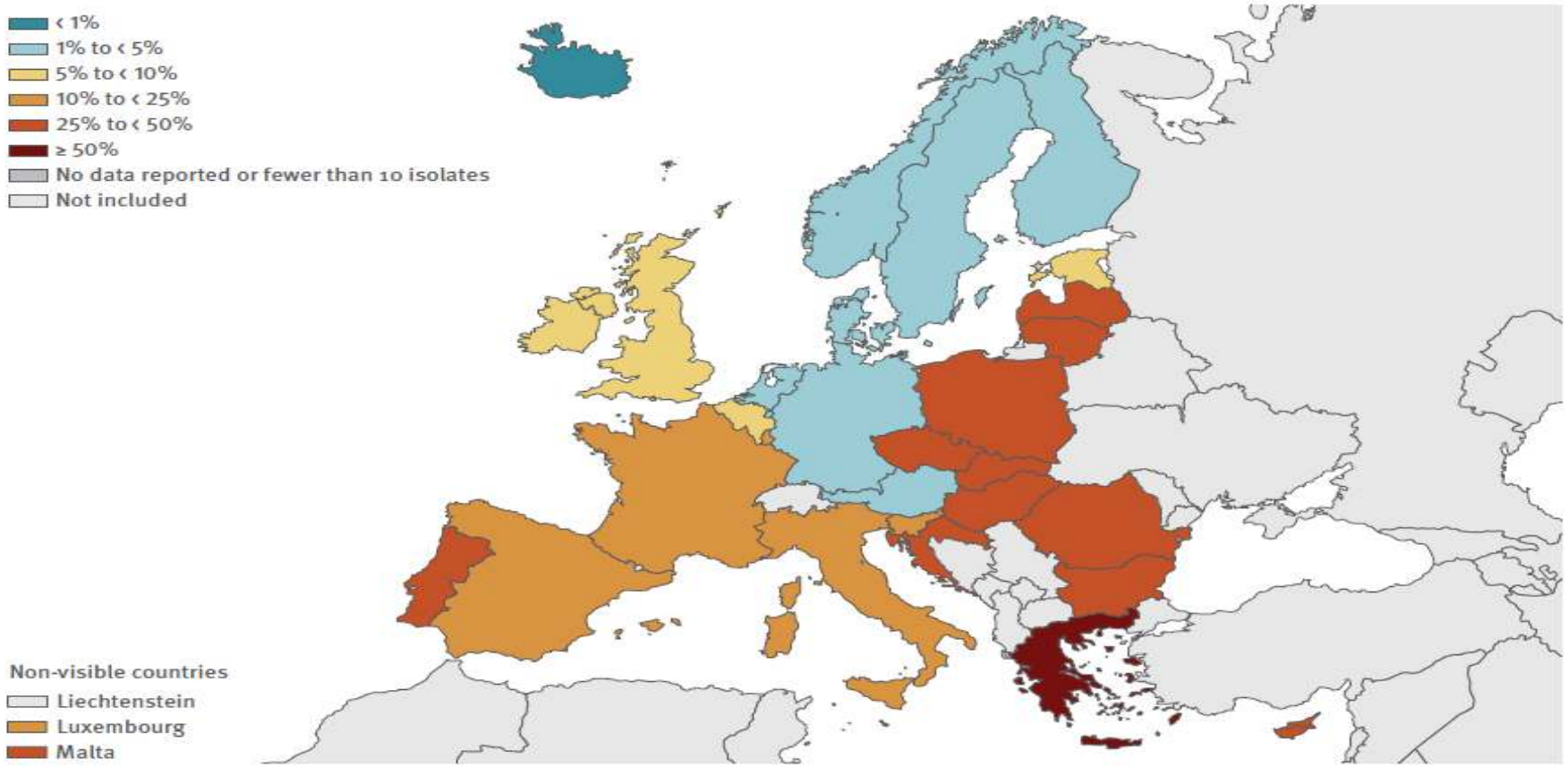
K.pneumoniae

Figure 3.11. *Klebsiella pneumoniae*. Percentage (%) of invasive isolates with resistance to carbapenems, by country, EU/EEA countries, 2018



K.pneumoniae

Figure 3.12. *Klebsiella pneumoniae*. Percentage (%) of invasive isolates with combined resistance to fluoroquinolones, third-generation cephalosporins and aminoglycosides, by country, EU/EEA countries, 2018



P.aeruginosa

Karbapenem direnci %5

Diğer antimikrobiyallere karşı direnç oranı daha düşük

Table 3.14. *Pseudomonas aeruginosa*. Total number of invasive isolates tested (N)* and percentage resistance (%) per phenotype, EU/EEA countries, 2018

Resistance pattern	Number of isolates	Percentage (%) of total**
Fully susceptible (to tested antibiotics)	12196	67.9
Single resistance (to indicated antimicrobial group)		
Total (all single resistance types)	**2311**	**12.9**
Carbapenems	894	5.0
Fluoroquinolones	756	4.2
[Piperacillin ± tazobactam]	346	1.9
Aminoglycosides	211	1.2
Ceftazidime	104	0.6
Resistance to two antimicrobial groups		
Total (all two groups combinations)	**1360**	**7.6**
[Piperacillin ± tazobactam] + ceftazidime	571	3.2
Fluoroquinolones + aminoglycosides	246	1.4
Fluoroquinolones + carbapenems	181	1.0
Other antimicrobial group combinations	362	2.0
Resistance to three antimicrobial groups		
Total (all three group combinations)	**739**	**4.1**
Fluoroquinolones + aminoglycosides + carbapenems	169	0.9
Other antimicrobial group combinations	570	3.2
Resistance to four antimicrobial groups		
Total (all four group combinations)	**616**	**3.4**
[Piperacillin ± tazobactam] + fluoroquinolones + aminoglycosides + carbapenems	235	1.3
Fluoroquinolones + ceftazidime + aminoglycosides + carbapenems	139	0.8
Other antimicrobial group combinations	242	1.3
Resistance to five antimicrobial groups		
[Piperacillin ± tazobactam] + fluoroquinolones + ceftazidime + aminoglycosides + carbapenems	731	4.1

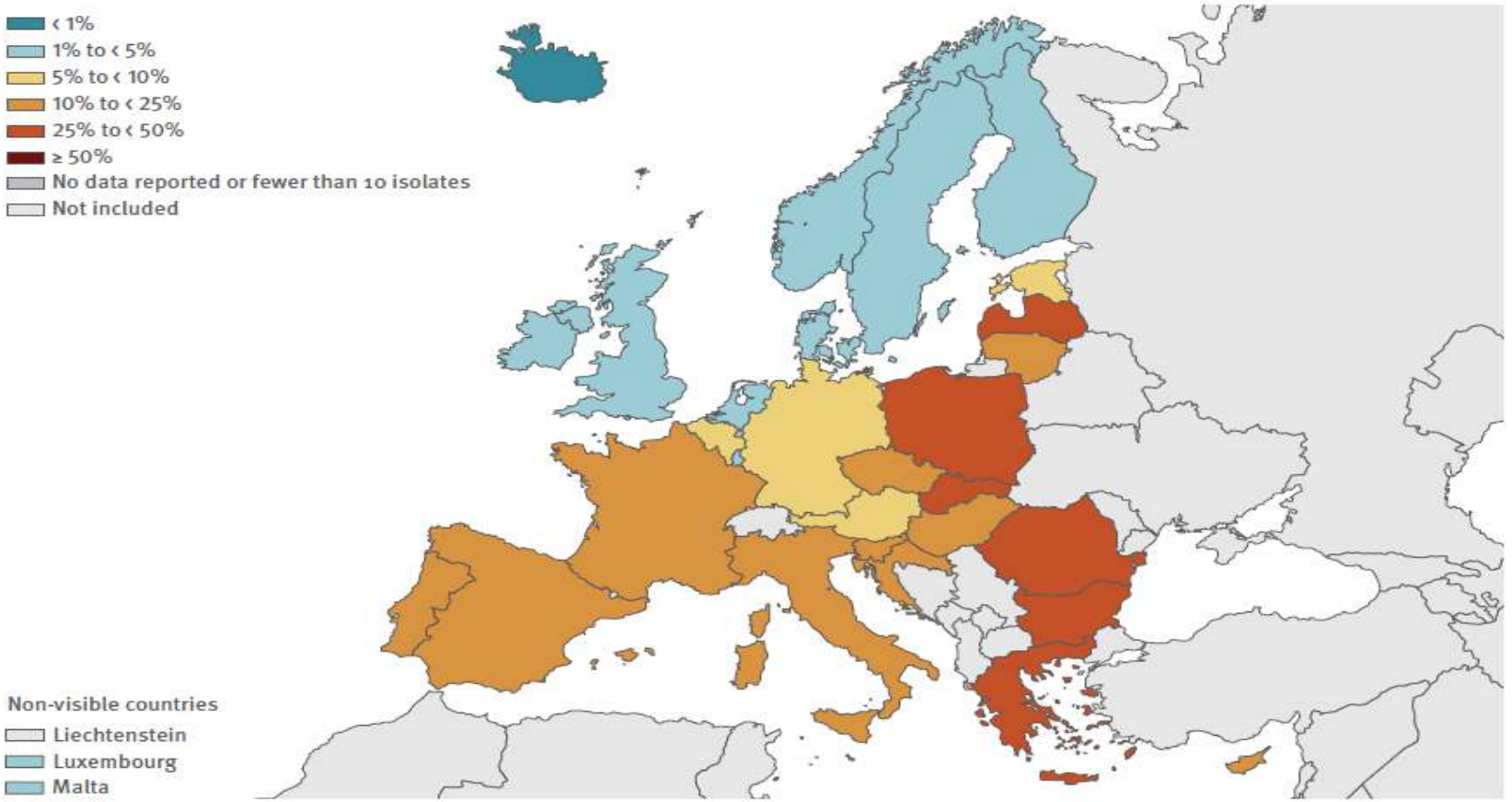
Only resistance combinations >1% of the total are specified.

* Only isolates with complete susceptibility information for at least three antimicrobial groups among piperacillin/tazobactam, fluoroquinolones, ceftazidime, aminoglycosides and carbapenems were included in the analysis.

** Not adjusted for population differences in the reporting countries.

P.aeruginosa

Figure 3.18. *Pseudomonas aeruginosa*. Percentage (%) of invasive isolates with combined resistance (resistance to three or more antimicrobial groups among piperacillin ± tazobactam, ceftazidime, fluoroquinolones, aminoglycosides and carbapenems), by country, EU/EEA countries, 2018



Acinetobacter spp.

Karbapenem + Florokinolon + Aminoglikozid direnci % 45.7

Table 3.21. *Acinetobacter* spp. Total number of invasive isolates tested (N)* and percentage resistance (%) per phenotype, EU/EEA countries, 2018

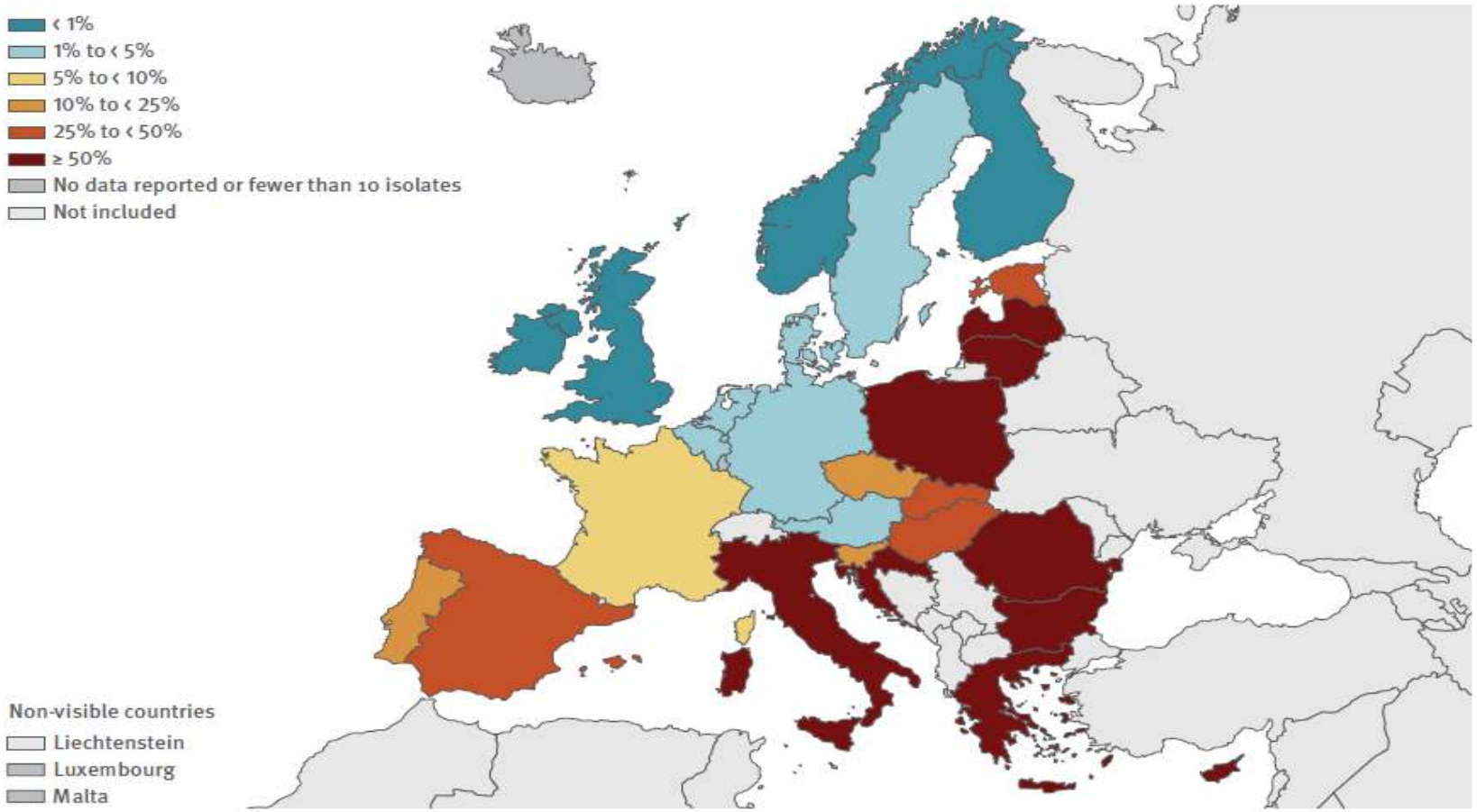
Resistance pattern	Number of isolates	% of total**
Fully susceptible	2721	43.6
Single resistance (to indicated antimicrobial group)		
Total (any single resistance)	**238**	**3.8**
Fluoroquinolones	134	2.1
Aminoglycosides	67	1.1
Carbapenems	37	0.6
Resistance to two antimicrobial groups		
Total (any two-group combinations)	**427**	**6.8**
Fluoroquinolones + carbapenems	318	5.1
Fluoroquinolones + aminoglycosides	104	1.7
Aminoglycosides + carbapenems	5	0.1
Resistance to three antimicrobial groups		
Fluoroquinolones + aminoglycosides + carbapenems	**2848**	**45.7**

* Only isolates with complete susceptibility information for fluoroquinolones, aminoglycosides and carbapenems were included in the analysis.

** Not adjusted for population differences in the reporting countries.

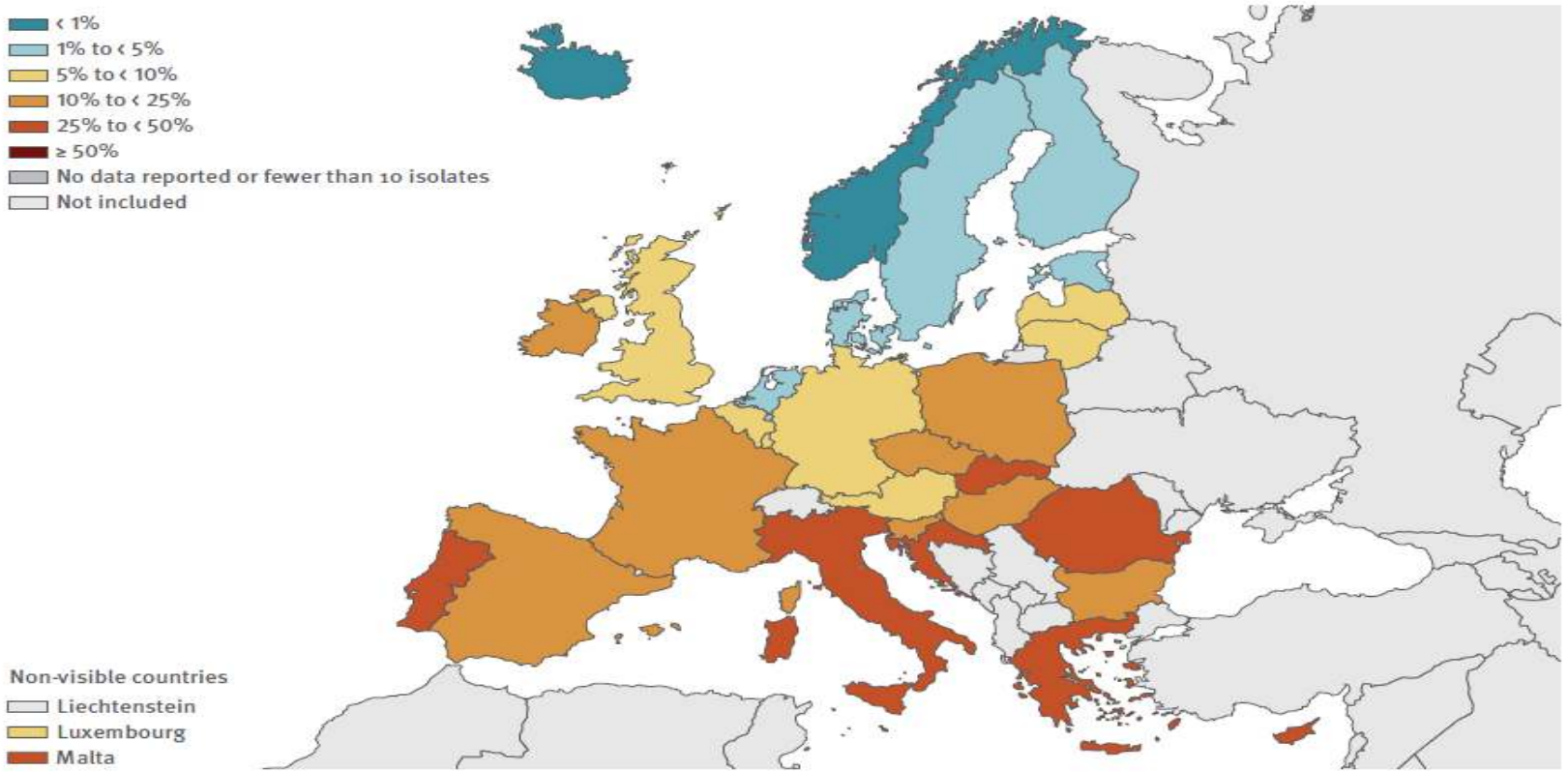
Acinetobacter spp.

Figure 3.23. *Acinetobacter* spp. Percentage (%) of invasive isolates with combined resistance to fluoroquinolones, aminoglycosides and carbapenems, by country, EU/EEA countries, 2018



MRSA

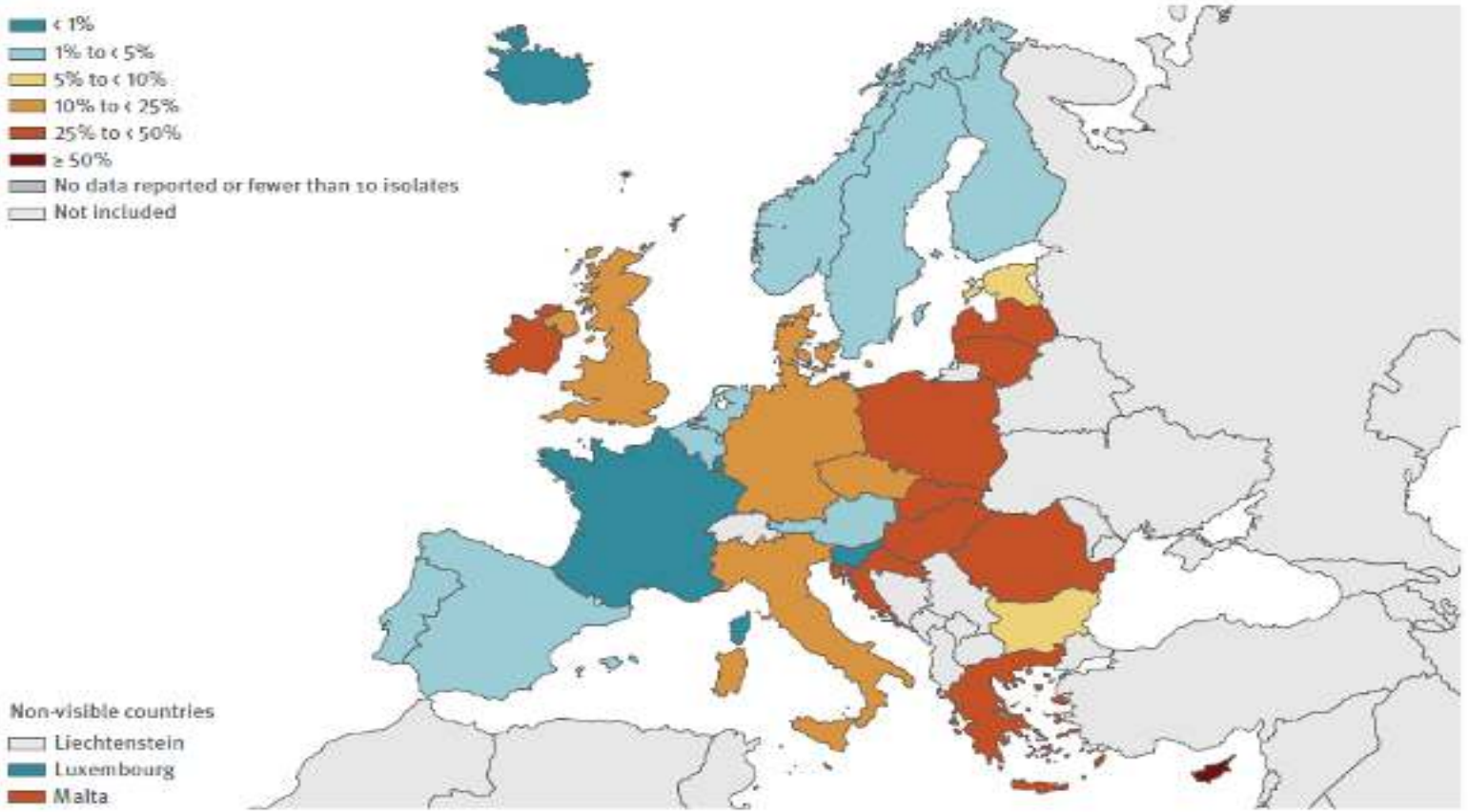
Figure 3.25. *Staphylococcus aureus*. Percentage (%) of invasive isolates with resistance to meticillin (MRSA), by country, EU/EEA countries, 2018



VRE

2015 de %10.5
2018 de %17.8

Figure 3.27. *Enterococcus faecium*. Percentage (%) of invasive isolates with resistance to vancomycin, by country, EU/EEA countries, 2018



World Health Organization
REGIONAL OFFICE FOR Europe

Central Asian and European Surveillance of Antimicrobial Resistance

Annual report 2019

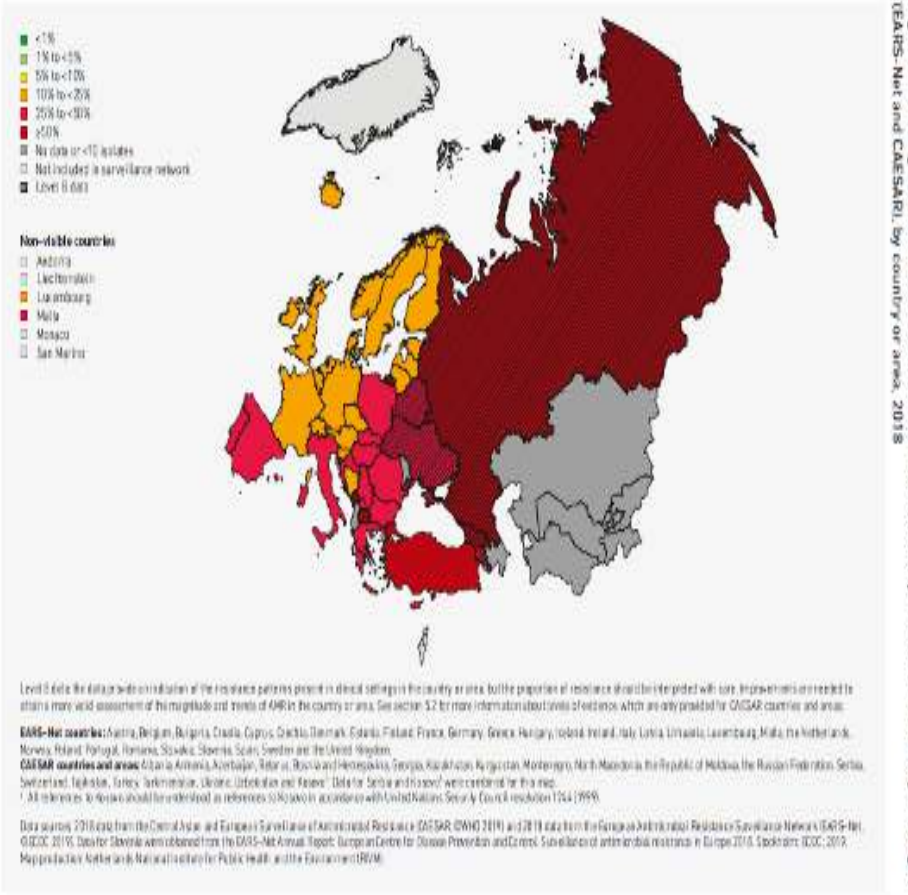
TR dahil değil
Kan ve BOS izolatları

CAESAR

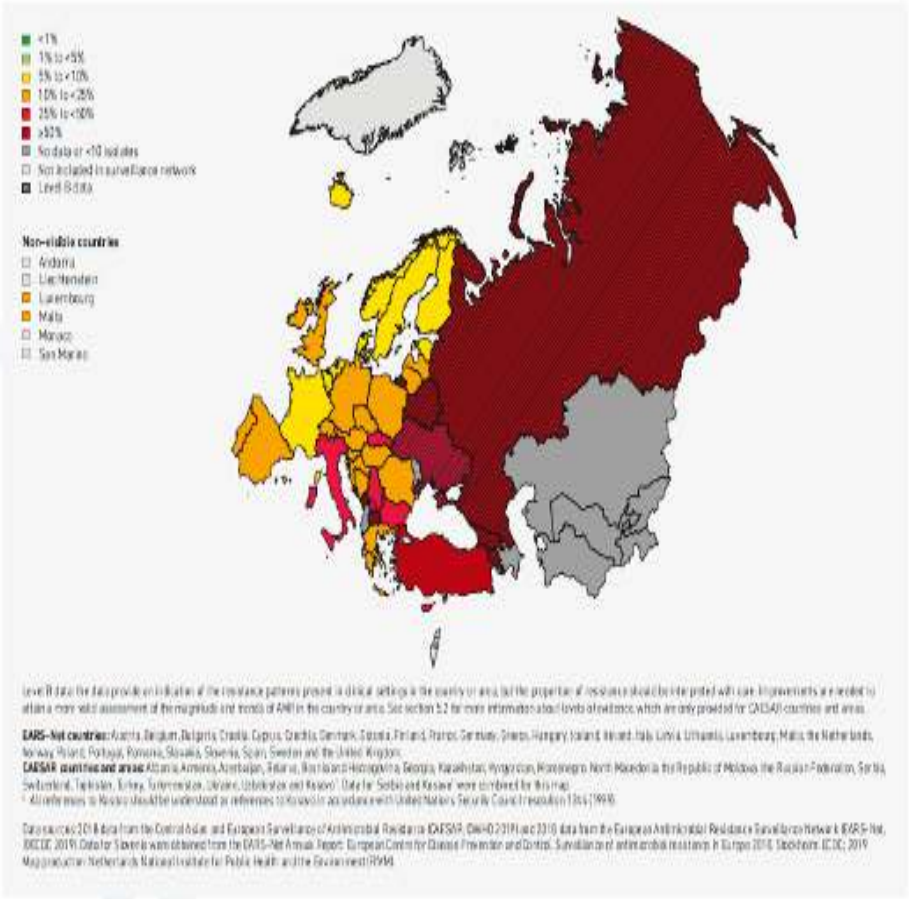
- *E. coli*
- *K. pneumoniae*
- *Salmonella* spp.
- *P. aeruginosa*
- *Acinetobacter* spp.
- *S. aureus*
- *S. pneumoniae*
- *E. faecalis*
- *E. faecium*

E.coli

Florokinolonlar

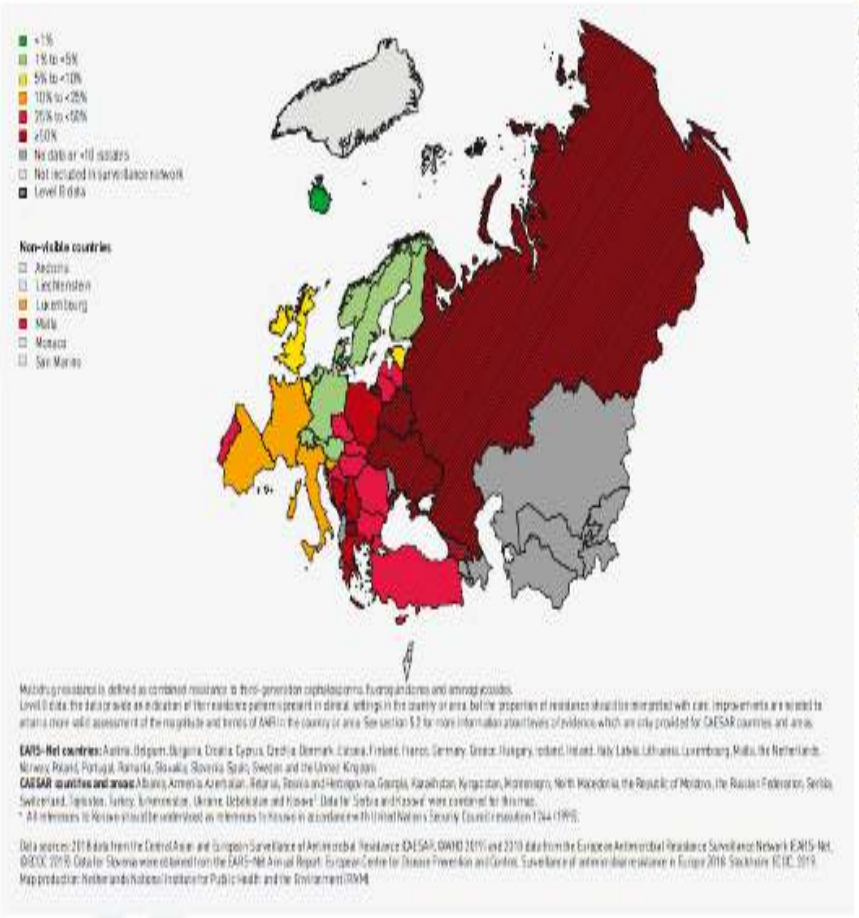


3. Kuşak sefalosporinler

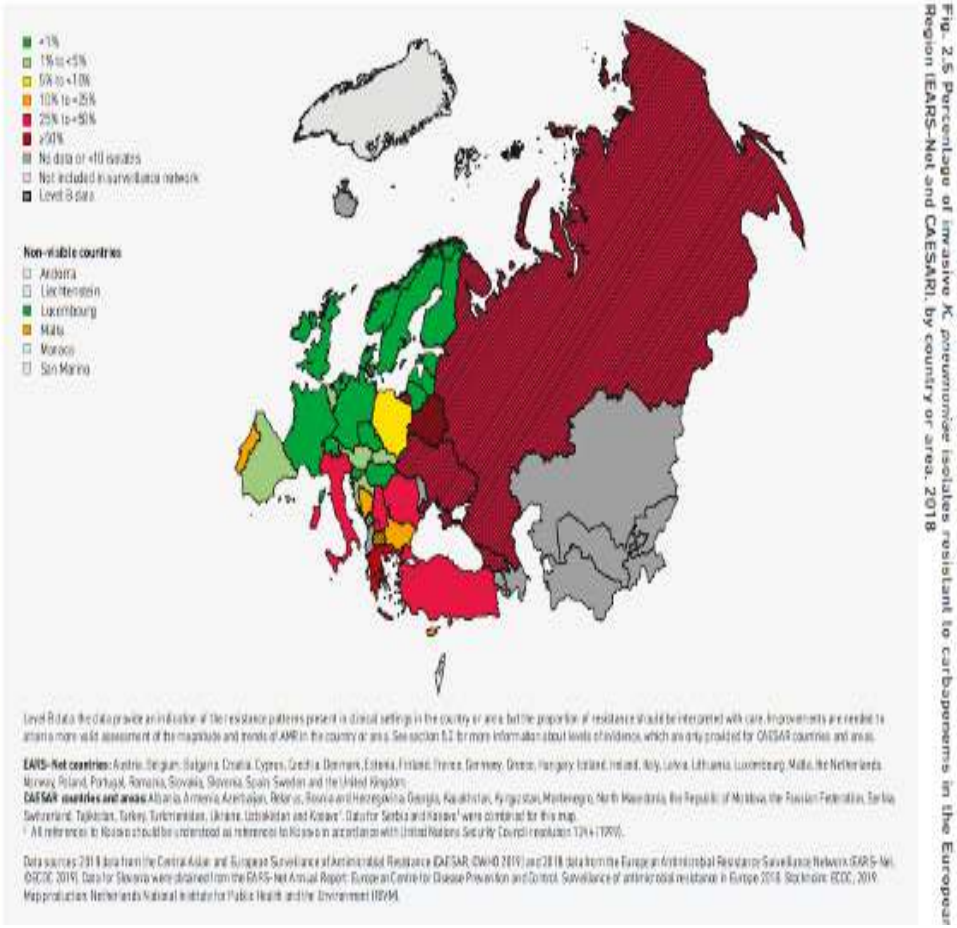


K.pneumoniae

MDR



CR



P.aeruginosa

MDR

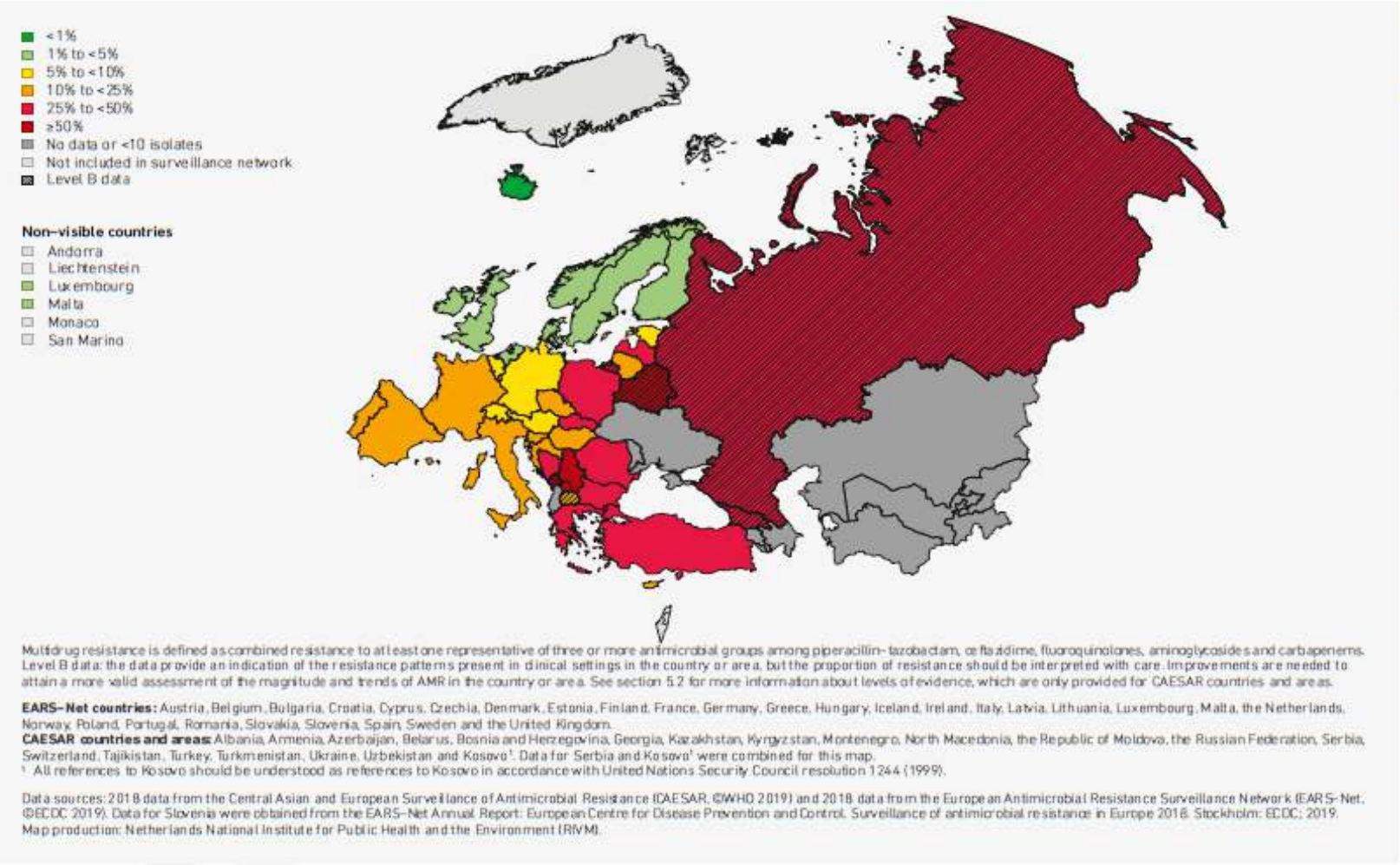


Fig. 2.6 Percentage of invasive *P. aeruginosa* isolates with multidrug resistance in the European Region (EARS-Net and CAESAR), by country or area, 2018

Multidrug resistance is defined as combined resistance to at least one representative of three or more antimicrobial groups among piperacillin–tazobactam, ceftazidime, fluoroquinolones, aminoglycosides and carbapenems. Level B data: the data provide an indication of the resistance patterns present in clinical settings in the country or area, but the proportion of resistance should be interpreted with care. Improvements are needed to attain a more valid assessment of the magnitude and trends of AMR in the country or area. See section 5.2 for more information about levels of evidence, which are only provided for CAESAR countries and areas.

EARS–Net countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.
CAESAR countries and areas: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Georgia, Kazakhstan, Kyrgyzstan, Montenegro, North Macedonia, the Republic of Moldova, the Russian Federation, Serbia, Switzerland, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan and Kosovo[1]. Data for Serbia and Kosovo[1] were combined for this map.
[1] All references to Kosovo should be understood as references to Kosovo in accordance with United Nations Security Council resolution 1244 (1999).

Data sources: 2018 data from the Central Asian and European Surveillance of Antimicrobial Resistance (CAESAR, ©WHO 2019) and 2018 data from the European Antimicrobial Resistance Surveillance Network (EARS-Net, ©ECDC 2019). Data for Slovenia were obtained from the EARS-Net Annual Report: European Centre for Disease Prevention and Control. Surveillance of antimicrobial resistance in Europe 2018. Stockholm: ECDC; 2019.
Map production: Netherlands National Institute for Public Health and the Environment (RIVM).

Acinetobacter spp.

MDR

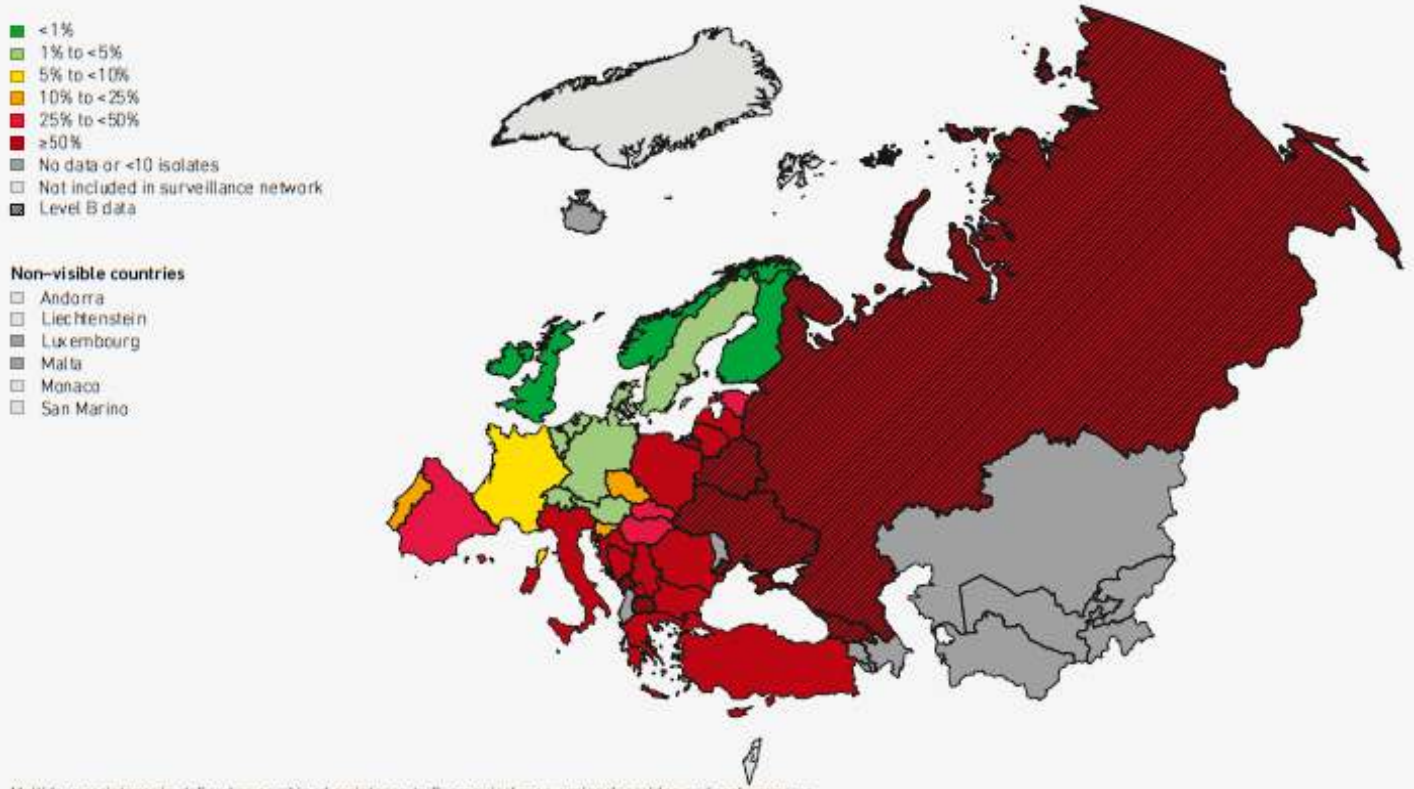


Fig. 2.7 Percentage of invasive *Acinetobacter* spp. isolates with multidrug resistance in the European Region (EARS-Net and CAESAR), by country or area, 2018

Multidrug resistance is defined as combined resistance to fluoroquinolones, aminoglycosides and carbapenems.
Level B data: the data provide an indication of the resistance patterns present in clinical settings in the country or area, but the proportion of resistance should be interpreted with care. Improvements are needed to attain a more valid assessment of the magnitude and trends of AMR in the country or area. See section 5.2 for more information about levels of evidence, which are only provided for CAESAR countries and areas.

EARS-Net countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.
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Map production: Netherlands National Institute for Public Health and the Environment (RIVM).

MRSA

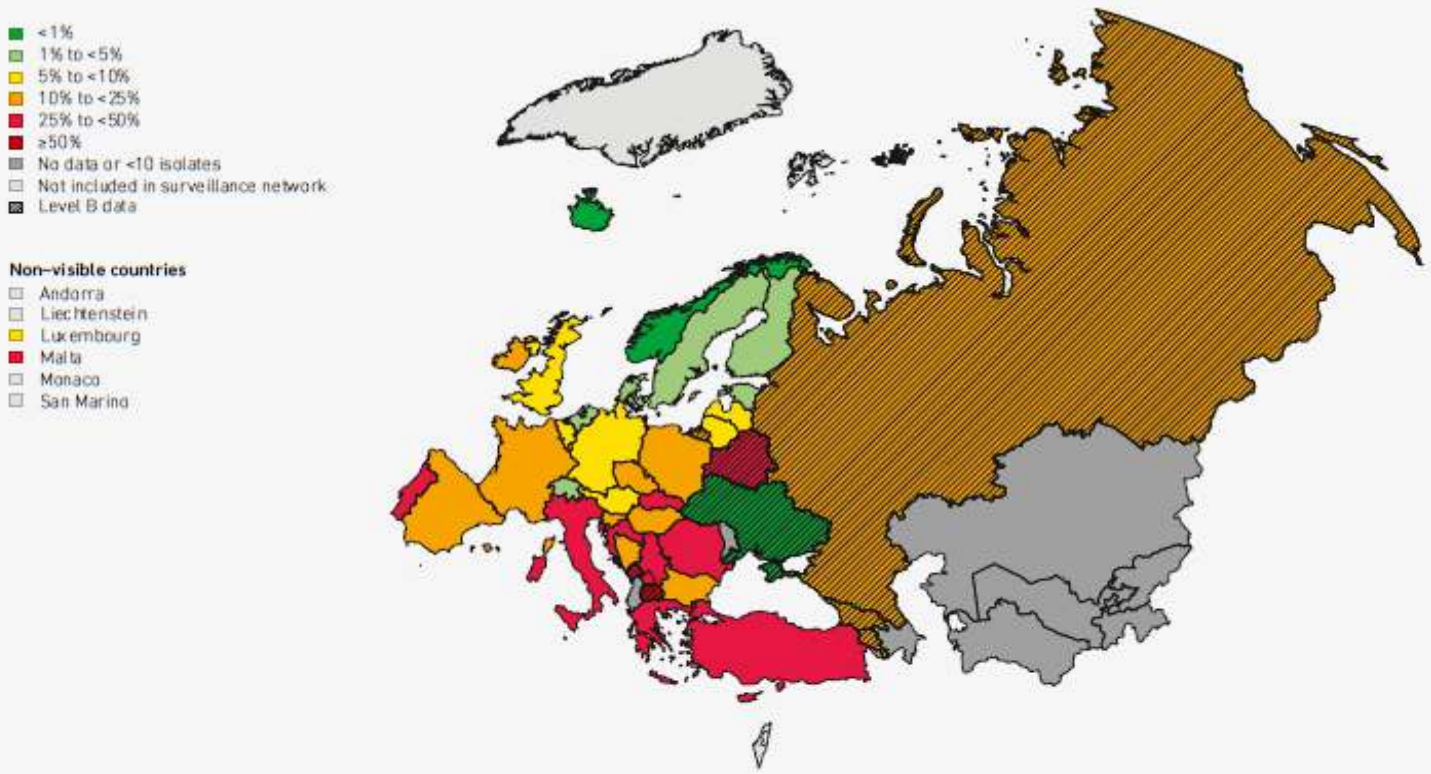

Fig. 2.8 Percentage of invasive *S. aureus* isolates resistant to methicillin (MRSA) in the European Region (EARS-Net and CAESAR), by country or area, 2018

Level B data: the data provide an indication of the resistance patterns present in clinical settings in the country or area, but the proportion of resistance should be interpreted with care. Improvements are needed to attain a more valid assessment of the magnitude and trends of AMR in the country or area. See section 5.2 for more information about levels of evidence, which are only provided for CAESAR countries and areas.

EARS-Net countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.
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Map production: Netherlands National Institute for Public Health and the Environment (RIVM).

VRE

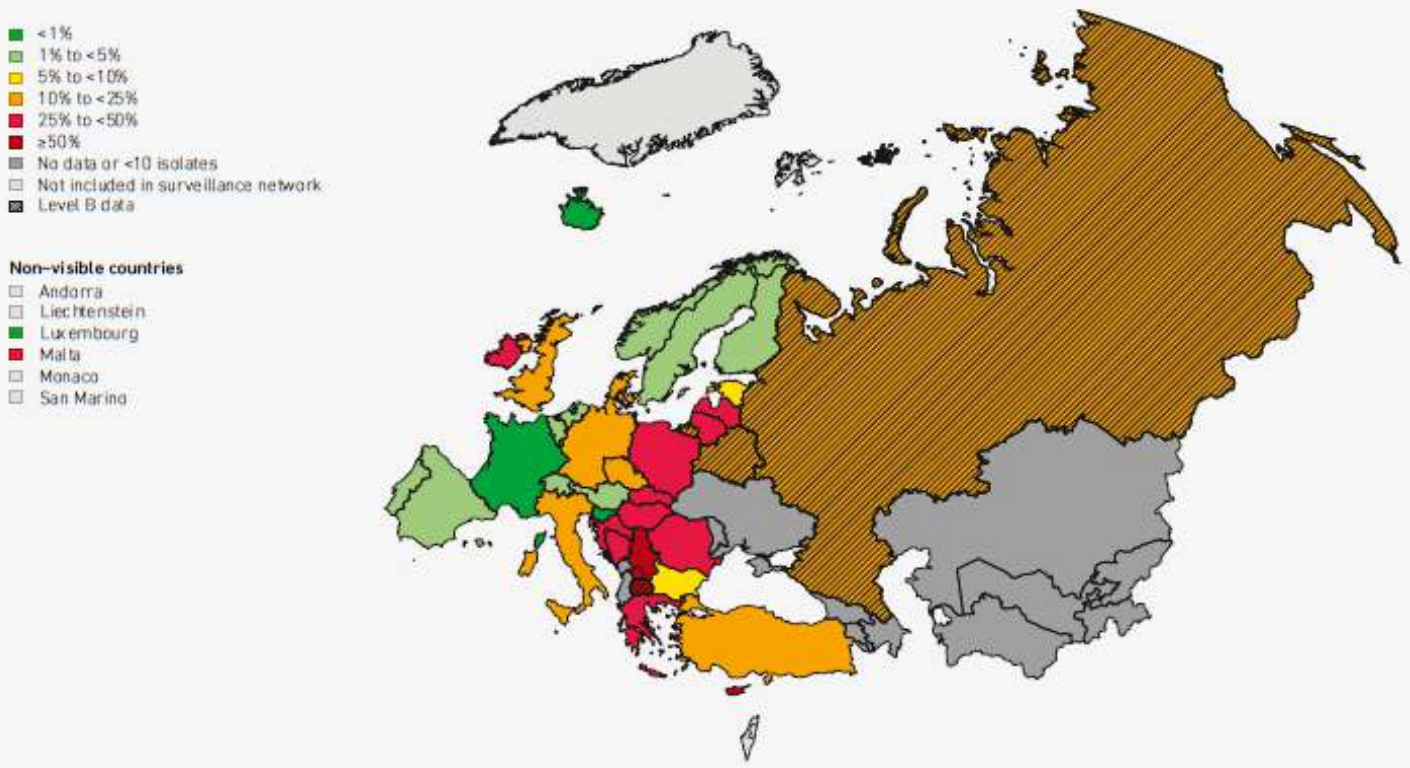

Fig. 2.10 *Enterococcus faecium*. Percentage (%) of invasive isolates resistant to vancomycin in the European Region (EARS-Net and CAESAR), by country or area or area, 2018

Level B data: the data provide an indication of the resistance patterns present in clinical settings in the country or area, but the proportion of resistance should be interpreted with care. Improvements are needed to attain a more valid assessment of the magnitude and trends of AMR in the country or area. See section 5.2 for more information about levels of evidence, which are only provided for CAESAR countries and areas.

EARS-Net countries: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czechia, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden and the United Kingdom.
CAESAR countries and areas: Albania, Armenia, Azerbaijan, Belarus, Bosnia and Herzegovina, Georgia, Kazakhstan, Kyrgyzstan, Montenegro, North Macedonia, the Republic of Moldova, the Russian Federation, Serbia, Switzerland, Tajikistan, Turkey, Turkmenistan, Ukraine, Uzbekistan and Kosovo[1]. Data for Serbia and Kosovo[1] were combined for this map.
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Map production: Netherlands National Institute for Public Health and the Environment (RIVM).

CAESAR TÜRKİYE VERİLERİ

Table 6.61 Resistance levels for *E. coli* and *K. pneumoniae* among blood and CSF isolates in Turkey in 2018

Antibiotic (group)	*E. coli*			*K. pneumoniae*		
	N	%R	%I	N	%R	%I
Ampicillin/amoxicillin	4154	77	0	NA	NA	NA
Amoxicillin-clavulanic acid	3973	62	0	2872	76	0
Piperacillin-tazobactam	4564	21	4	3492	60	7
Cefotaxime/ceftriaxone	4721	52	1	3542	71	1
Ceftazidime	4474	43	8	3413	69	3
Ertapenem	4433	7	0	3329	50	0
Imipenem/meropenem	4759	3	2	3641	34	7
Gentamicin/tobramycin	4785	24	2	3632	46	2
Amikacin	4795	2	5	3669	23	5
Ciprofloxacin/levofloxacin/ofloxacin	4606	52	7	3557	63	6
Multidrug resistance*	4477	18	NA	3442	40	NA

NA – not applicable.
* Multidrug resistance is defined as combined resistance to at least one representative of three antimicrobial groups: fluoroquinolones (ciprofloxacin, levofloxacin and/or ofloxacin), third-generation cephalosporins (cefotaxime, ceftriaxone and/or ceftazidime) and aminoglycosides (gentamicin and/or tobramycin). Isolates with missing data on one or more of the groups are excluded from the analysis of multidrug resistance.

Table 6.62 Resistance levels for *Salmonella* spp. among blood and CSF isolates in Turkey in 2018

Antibiotic (group)	*Salmonella* spp.		
	N	%R	%I
Cefotaxime/ceftriaxone	23	0*	0*
Ceftazidime	19	0*	0*
Ertapenem	13	0*	0*
Imipenem/meropenem	17	0*	0*
Ciprofloxacin/levofloxacin	4	25*	0*

* A small number of isolates was tested (N < 30), and the percentage resistance should be interpreted with caution.

CAESAR TÜRKİYE VERİLERİ

Table 6.63 Resistance levels for *P. aeruginosa* and *Acinetobacter* spp. among blood and CSF isolates in Turkey in 2018

Antibiotic (group)	*P. aeruginosa*			*Acinetobacter* spp.		
	N	%R	%I	N	%R	%I
Piperacillin-tazobactam	1646	34	0	NA	NA	NA
Ceftazidime	1700	27	0	NA	NA	NA
Cefepime	1641	28	0	NA	NA	NA
Imipenem/meropenem	1682	38	3	2643	92	0
Gentamicin/tobramycin	1730	19	0	2704	79	0
Amikacin	1690	12	5	2619	69	4
Ciprofloxacin/levofloxacin	1674	33	0	2575	94	2
Multidrug resistance[a]	1451	28	NA	2526	79	NA

NA – not applicable.

[a] For *P. aeruginosa*, multidrug resistance is defined as combined resistance to at least one representative of three or more antimicrobial groups among piperacillin-tazobactam, ceftazidime, fluoroquinolones (ciprofloxacin and/or levofloxacin), aminoglycosides (gentamicin and/or tobramycin) and carbapenems (imipenem and/or meropenem). Isolates with missing data on three or more of the groups are excluded from the analysis of multidrug resistance.

For *Acinetobacter* spp., multidrug resistance is defined as combined resistance to at least one representative of three antimicrobial groups: fluoroquinolones (ciprofloxacin and/or levofloxacin), aminoglycosides (gentamicin and/or tobramycin) and carbapenems (imipenem and/or meropenem). Isolates with missing data on one or more of the groups are excluded from the analysis of multidrug resistance.

Table 6.64 Resistance levels for *S. aureus* among blood and CSF isolates in Turkey in 2018

Antibiotic (group)	*S. aureus*		
	N	%R	%I
MRSA[a]	3316	30	NA
Ciprofloxacin/levofloxacin/ofloxacin	3005	14	0
Vancomycin	3008	0	0
Rifampicin	296	24	5
Linezolid	3239	0	NA

NA – not applicable.

[a] MRSA is calculated as resistance to cefoxitin or, if not available, oxacillin.

Healthcare-associated Gram-negative bloodstream infections: antibiotic resistance and predictors of mortality

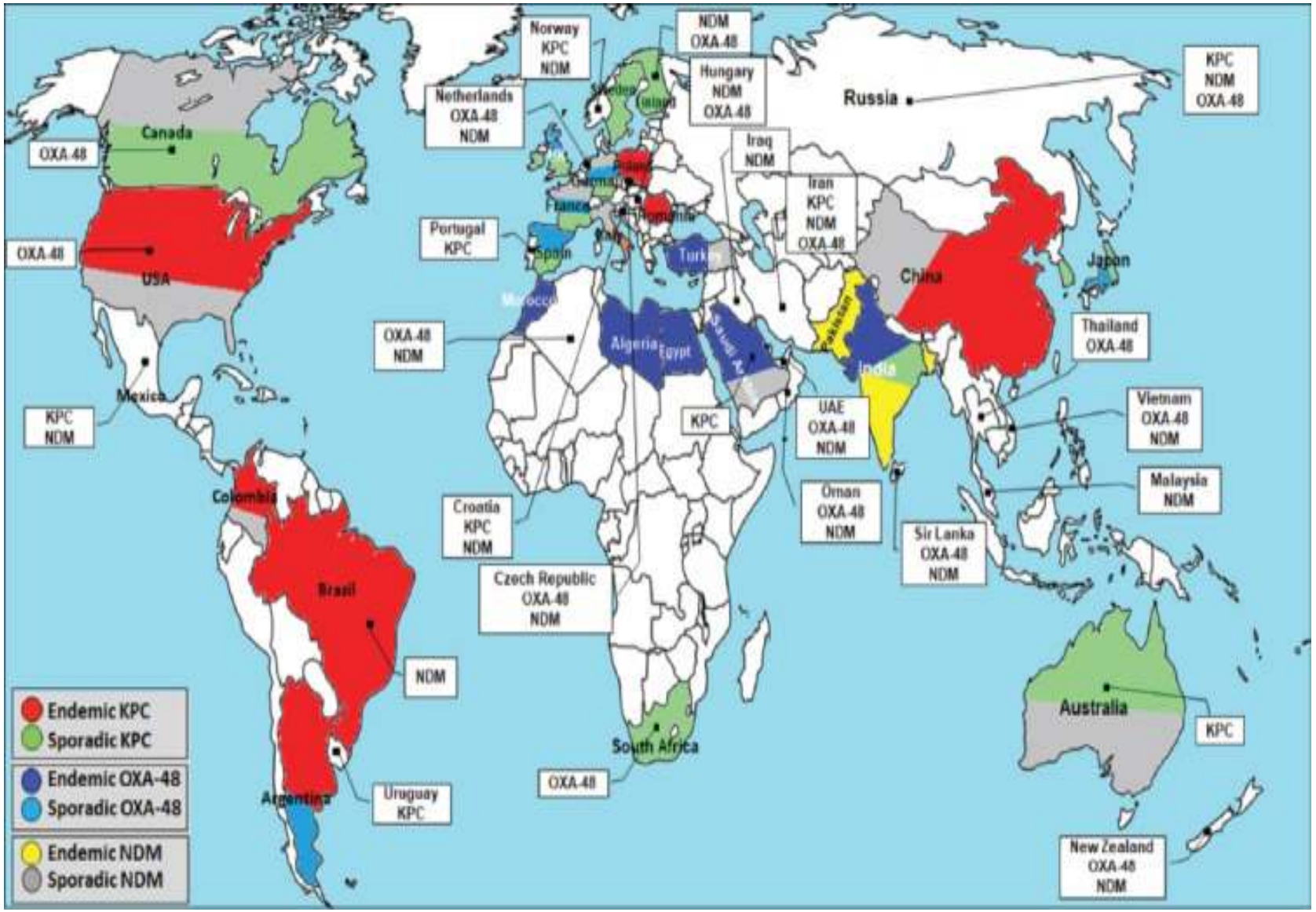
Table II

Antibiotic resistance rates in healthcare-associated Gram-negative bloodstream infections

Bacteria	Carbapenems N (%)	Fluoroquinolones N (%)	Third-generation cephalosporins N (%)	Aminoglycosides N (%)	Colistin N (%)
Acinetobacter baumannii	239 (94)	240 (94)	247 (97)	187 (73)	15 (6)
Klebsiella pneumoniae	88 (40)	130 (60)	159 (72)	56 (25)	14 (6)
Escherichia coli	13 (6.4)	128 (63)	143 (71)	47 (23)	0
Pseudomonas aeruginosa	32 (43)	36 (49)	37 (51)	19 (26)	1 (1)
Enterobacter cloacae	5 (16)	6 (19)	16 (53)	5 (16)	0

O. Ergonul et al. / Journal of Hospital Infection 94 (2016) 381-385

Karbapenemaz Epidemiyolojisi



Molecular Epidemiology of Carbapenem-resistant *Klebsiella pneumoniae* Isolates

Karbapeneme Dirençli *Klebsiella pneumoniae* Suşlarının Moleküler Epidemiyolojisi

Ismail Davarci[1], Seniha Senbayrak[2], Sebahat Aksaray[3], M. Esra Kocoglu[4], Mert Ahmet Kuskucu[5], Mustafa Samasti[4]

[1] Erzincan University, Mengücek Gazi Training and Research Hospital, Medical Microbiology Laboratory

Abstract

Aim: Carbapenem-resistant Klebsiella pneumoniae infection has become an important clinical problem with reduced therapeutic options. This study aimed to investigate the carbapenem resistance rates and responsible resistance genes in *K. pneumoniae* isolates derived from clinical samples collected in Istanbul.

45 karbapenem dirençli *K. pneumoniae* izolatı

32 blaOXA-48-pozitif
9 blaNDM-pozitif
1 blaVIM-1-pozitif

Anatolian Clinic the Journal of Medical Sciences ;2019:24 (1), 1-7

Global Antimicrobial Resistance and Use Surveillance System (GLASS) Report

Early implementation

2020

World Health Organization

Antimikrobiyal direnç ile ilgili 2019'da bildirilen Acil olaylar

Table 2.5. Summary of confirmed emerging AMR events reported by countries, January–December 2019

EVENT	SOURCE
Increase in number of cases of carbapenem-resistant Enterobacteriaceae	WHO epidemic intelligence
Outbreak of infections caused by extensively drug-resistant (XDR) *K. pneumoniae*	GLASS focal point
Increase in number of cases of New Delhi metallo-β-lactamase-producing carbapenem-resistant Enterobacteriaceae	WHO epidemic intelligence
Outbreak of carbapenem-resistant P. aeruginosa traced to hospitals	GLASS focal point
Increase in number of cases of azithromycin-non-susceptible *Salmonella* Newport infections	WHO epidemic intelligence
First detection of daptomycin resistance in a clinical methicillin-resistant *S. aureus* isolate	GLASS focal point
Increase in number of cases New Delhi metallo-β-lactamase-producing Enterobacteriales	IHR focal point
Bloodstream infections caused by *S. aureus*, Spa-type t11164 in the new-born intensive care unit	WHO epidemic intelligence
First detection of XDR *E. coli* with blaKPC and mcr-1 genes	IHR focal point
First detection of N. meningitidis serogroup Y with no sensitivity to cefotaxime	IHR focal point
Detection of Enterococcus faecalis with resistance to linezolid conferred by the presence of the optrA gene	IHR focal point
Two cases of XDR typhoid fever in	IHR focal point
Cluster of infections caused by resistant *Acinetobacter baumannii*	IHR focal point
Two cases of XDR *N. gonorrhoeae* infection diagnosed	IHR focal point

2050 için Öngörü ???

Bizi zor günler bekliyor