Austria

Participating institutions
Federal Ministry of Social Affairs, Health, Care and Consumer Protection, www.sozialministerium.at
Ordensklinikum Linz, Elisabethinen, http://www.ordensklinikum.at

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Austria, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	ND	ND	90	90	90
Geographical representativeness	High	High	High	High	High
Hospital representativeness	High	High	High	High	High
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient days	ND	ND	ND	ND	ND

ND: no data available.
For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness, as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Austria, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	100	97	95	100

NA: not applicable. In 2020 there was no EARS-Net EQA.
For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Austria, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	37	5 394	8	37	5 579	7	35	5 122	9	35	5 659	9	36	6 388	8
Klebsiella pneumoniae	36	1 133	17	36	1 326	15	34	1 256	13	35	1 401	14	34	1 725	12
Peudomonas aeruginosa	36	727	18	36	788	16	34	726	15	34	753	13	34	894	14
***Acinetobacter* spp.**	22	69	12	25	80	16	21	101	7	21	100	13	21	101	9
Staphylococcus aureus	36	2 934	14	36	3 444	14	36	3 124	12	35	3 325	12	36	3 421	12
Streptococcus pneumoniae	34	301	10	33	347	16	34	476	14	34	647	14	33	735	12
Enterococcus faecalis	35	840	21	36	898	23	35	918	15	34	897	15	34	974	16
Enterococcus faecium	32	509	30	31	701	36	30	668	31	28	590	25	29	623	26

Labs: laboratories.
[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.
[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Austria

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	7.14	6.35	5.71	5.25	6.6	7.9	-	+10.6	+0.76	+91	-10	6.43	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	0.2	0.12	0.15	0.14	0.29	0.29	↑	+45	+0.09	+9	-2	0.2	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	2.17	1.56	1.22	1.51	1.81	2.21	-	+1.8	+0.04	+10	-6	2.04	4.48 (0.55–13.63)

ND, no data available; NA, not applicable.

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Austria

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	27.55^	26.95^	26.54	27.68^	30.73^	↑	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	6.35	5.71	5.25	6.6	7.9	-	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0.06	0.01	0.07	0.09	0.05	-	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	11.63	10.39	8.25	9.92	11.22	-	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	4.07	3.81	3.16	3.08^	4.00^	-	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1.83	1.13	1.09^	1.21^	1.54^	-	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	1.1	1.59	1.46	2.37	3	↑	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	0.12	0.15	0.14	0.29	0.29	↑	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	1.69	1.95	1.46	2.21	2.45	↑	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	0.5	0.52	0.42	0.59^	0.75^	↑	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	0.37	0.34	0.21^	0.38^	0.59^	-	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	0.70^	0.81^	0.85^	0.82^	0.91^	-	1.81 (0.26–7.45)
	Ceftazidime resistance	0.81	1.19	0.94	0.96	1.15	-	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	1.29	1.46	1.37	1.23	1.38	-	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	1.21	1.49	1.29	0.68^	0.99	-	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0.14^	0.22^	0.20^	0.12^	0.18^	-	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	0.17^	0.15^	0.28^	0.15^	0.32^	-	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	0.06	0.09^	0.04	0.09	0.01	-	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.09	0.14	0.01	0.06^	0.01^	-	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	0.06	0.1	0.00^	0.07^	0.04^	-	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	0.05	0.09^	0.00^	0.04^	0.00^	-	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	1.56	1.22	1.51	1.81	2.21	↑	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.12^	0.21	0.27	0.49	0.69	↑	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.42	0.6	0.63	0.82	0.92	↑	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.07^	0.1	0.11	0.23	0.36	↑	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	0.46^	0.46^	0.35^	0.49^	0.46^	-	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	0.22	0.17	0.22	0.22	0.24	-	1.96 (0.00–9.97)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Austria, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	4 798	46	4 805	45.1	4 669	45.9	4 885	46.4	5 384	47	54.7 (34.4–71.1)	-
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	5 376	9.5	5 537	8.3	5 096	8.3	5 491	9.9	6 170	10.6	16.0 (6.8–38.7)	↑*
	Carbapenem (imipenem/meropenem) resistance	5 141	0.1	5 206	0	4 973	0.1	5 351	0.1	5 887	0.1	0.3 (0.0–2.5)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	5 373	17.3	5 539	15.1	4 788	13.9	5 409	15	5 966	15.5	22.5 (9.9–49.3)	↓
	Aminoglycoside (gentamicin/tobramycin) resistance	5 219	6.2	5 320	5.8	4 653	5.5	4 705	5.4	5 382	6.1	10.4 (4.5–29.6)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	5 192	2.8	5 286	1.7	4 307	2	4 489	2.2	5 072	2.5	5.5 (1.2–21.7)	-
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	1 124	7.8	1 305	9.8	1 233	9.6	1 384	14	1 697	14.6	32.9 (4.9–84.3)	↑*
	Carbapenem (imipenem/meropenem) resistance	1 055	0.9	1 229	1	1 247	0.9	1 335	1.8	1 624	1.5	11.3 (0.0–67.6)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	1 129	12	1 303	12	1 183	10	1 303	13.9	1 612	12.5	31.4 (0.0–80.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	1 085	3.7	1 235	3.4	1 157	2.9	1 208	4	1 516	4.1	21.5 (0.0–73.8)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1 076	2.8	1 227	2.2	1 066	1.6	1 115	2.8	1 420	3.5	18.8 (0.0–71.5)	-
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	624	9	643	10.1	607	11.4	598	11.2	760	9.9	16.4 (3.9–53.7)	-
	Ceftazidime resistance	688	9.4	741	13	664	11.4	717	11	843	11.3	13.8 (2.8–51.5)	-
	Carbapenem (imipenem/meropenem) resistance	683	15.1	737	15.9	677	16.4	711	14.2	827	13.8	15.9 (1.5–53.4)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	676	14.3	722	16.6	659	15.8	653	8.6	822	10	15.3 (4.9–51.9)	↓*
	Aminoglycoside (tobramycin) resistance	426	2.6	438	4.1	436	3.7	444	2.3	521	2.9	7.0 (0.0–44.6)	-
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	355	3.9	279	4.3	255	9	287	4.2	405	6.4	10.0 (0.0–47.5)	-
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	69	7.2	70	10	94	3.2	97	7.2	93	1.1	31.6 (0.0–94.1)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	69	10.1	80	13.8	94	1.1	87	5.7	81	1.2	33.2 (0.0–95.2)	↓*
	Aminoglycoside (gentamicin/tobramycin) resistance	66	7.6	75	10.7	74	0	71	8.5	82	3.7	29.0 (1.8–89.9)	-
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	66	6.1	70	10	67	0	58	5.2	60	0	27.0 (0.0–89.5)	↓*
Staphylococcus aureus	MRSA[d]	2 843	4.4	3 159	3.1	3 108	3.9	3 297	4.5	3 404	5.3	14.2 (1.9–46.0)	↑*
Streptococcus pneumoniae	Penicillin non-wild-type[e]	258	3.9	324	5.2	460	4.8	618	6.5	693	8.2	17.3 (0.0–36.6)	↑*
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	295	11.5	335	14.3	468	10.9	630	10.6	717	10.6	19.0 (4.0–44.2)	-
	Combined penicillin non-wild-type and resistance to macrolides[e]	252	2.4	315	2.5	452	2	606	3.1	679	4.4	11.1 (0.0–25.6)	↑*
Enterococcus faecalis	High-level gentamicin resistance	258	14.3	255	14.5	299	9.4	334	12	331	11.5	22.6 (4.8–49.2)	-
Enterococcus faecium	Vancomycin resistance	507	3.6	697	2	666	2.7	589	3.1	617	3.2	16.5 (0.0–61.7)	-

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; –indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Austria, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	1	4.2	0	0	1	4.2	22	91.7	24	100
	Ceftazidime-avibactam	1	4.2	0	0	1	4.2	22	91.7	24	100
	Imipenem-relebactam	2	8.3	0	0	4	16.7	18	75	24	100
	Meropenem-vaborbactam	4	16.7	0	0	5	20.8	15	62.5	24	100
Peudomonas aeruginosa	Cefiderocol	12	10.5	0	0	0	0	102	89.5	114	100
	Ceftazidime-avibactam	2	1.8	0	0	5	4.4	107	93.9	114	100
	Ceftolozane-tazobactam	9	7.9	0	0	5	4.4	100	87.7	114	100
	Imipenem-relebactam	2	1.8	0	0	5	4.4	107	93.9	114	100
	Meropenem-vaborbactam	2	1.8	1	0.9	6	5.3	105	92.1	114	100
***Acinetobacter* spp.**	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: no data. For example if no carbapenem-resistant isolates were reported.

Belgium

Participating institutions
Sciensano, www.sciensano.be

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Belgium, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)					
Laboratories collecting *S. pneumoniae*	91	91	91	91	91
Laboratories collecting other species	36	43	42	42	40
Geographical representativeness					
Laboratories collecting *S. pneumoniae*	High	High	High	High	High
Laboratories collecting other species	High	High	High	High	Medium
Hospital representativeness					
Laboratories collecting *S. pneumoniae*	High	High	Medium	Medium	High
Laboratories collecting other species	High	High	Medium	Medium	Medium
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient-days	129.6[a]	100.8[a]	115.8[a]	115.7[a]	145.0[a]

[a] Not including *S. pneumoniae* network

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Belgium, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	94	94	88	100

NA: not applicable. In 2020 there was no EARS-Net EQA.

For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Belgium, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	28	4 320	NA	31	4 722	NA	31	4 540	NA	31	4 961	NA	29	5 318	NA
Klebsiella pneumoniae	27	912	NA	30	926	NA	29	888	NA	30	979	NA	29	1 167	NA
Peudomonas aeruginosa	28	504	NA	30	479	NA	29	456	NA	30	467	NA	29	548	NA
***Acinetobacter* spp.**	23	161	NA	28	169	NA	27	170	NA	27	197	NA	26	226	NA
Staphylococcus aureus	28	1 455	NA	30	1 615	NA	30	1 501	NA	31	1 717	NA	29	1 882	NA
Streptococcus pneumoniae	89	858	27	82	843	24	80	1 457	24	85	1 712	22	81	2 081	23
Enterococcus faecalis	29	669	NA	31	712	NA	31	642	NA	30	702	NA	29	747	NA
Enterococcus faecium	26	494	NA	29	502	NA	29	424	NA	29	455	28	29	527	NA

Labs: laboratories.

NA: not applicable.

[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.

[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Belgium

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	13.19#	10.29	7.84	8.07#	10.14#	13.39#	-	+1.5	+0.2	+71	-12	11.61	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	0.27#	0.24	0.26	0.25#	0.47#	0.44#	↑	+63	+0.17	+22	-2	0.26	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	2.62#	2.43	1.33	1.27#	2.07#	2.96#	-	+13	+0.34	+50	-6	2.46	4.48 (0.55–13.63)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

One or more of the three representativeness indicators (geographical, hospital and/or isolate representativeness) were not reported as 'High'. The results should be interpreted with caution.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Belgium

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	54.6	48.72	48.70#	52.45#	64.29#	-	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	10.29	7.84	8.07#	10.14#	13.39#	-	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0.02	0.04	0.06#	0.08#	0.11#	-	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	18.83	17.59	16.29#	18.33#	22.91#	-	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	7.76	5.21	4.89^#	6.20^#	7.40^#	-	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2.99	1.43	1.56^#	2.17^#	2.56^#	-	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	4.34	3.52	3.30#	3.95#	5.18#	-	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	0.24	0.26	0.25#	0.47#	0.44#	↑	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	5.01	3.54	3.66#	4.34#	5.71#	-	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	2.87	1.67	1.58^#	1.85^#	2.31^#	-	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2.27	1.37	1.25^#	1.46^#	2.01^#	-	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	1.35	0.97	1.06#	1.16#	1.31#	-	1.81 (0.26–7.45)
	Ceftazidime resistance	1.06	0.74	0.82#	0.83#	0.72#	-	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	1.42	1.03	1.37#	1.09#	0.80#	↓	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	1.78	1.35	1.37#	1.48#	1.12#	↓	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0.46^	0.36^	0.27^#	0.30^#	0.38^#	-	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	0.55^	0.40^	0.45^#	0.34^#	0.40^#	-	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	0.05	0.04	0.08#	0.16#	0.17#	↑	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.53^	0.36^	0.27#	0.34#	0.30#	-	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	0.1	0.16	0.04^#	0.14^#	0.13^#	-	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	0.02^	0.04^	0.00^#	0.04^#	0.06^#	-	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	2.43	1.33	1.27#	2.07#	2.96#	-	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	1.18	1.44	1.94#	2.11#	2.85	↑	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	1.56	1.32	2.00#	2.38#	3.2	↑	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.72	0.79	1.11#	1.22#	1.76	↑	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	0.94^	0.60^	0.45^#	0.67^#	0.95^#	-	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	0.34	0.28	0.12#	0.34#	0.38#	-	1.96 (0.00–9.97)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

One or more of the three representativeness indicators (geographical, hospital and/or isolate representativeness) were not reported as 'High'. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Belgium, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	4 009	56.5	4 389	55.2	4 205	56.6	4 648	55.7	5 300	57.3	54.7 (34.4–71.1)	-
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	4 320	9.9	4 721	8.3	4 500	8.8	4 956	10.1	5 311	11.9	16.0 (6.8–38.7)	↑*
	Carbapenem (imipenem/meropenem) resistance	4 126	0	4 722	0	4 296	0.1	4 958	0.1	5 156	0.1	0.3 (0.0–2.5)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	4 320	18.1	4 721	18.5	4 536	17.5	4 957	18.2	5 313	20.4	22.5 (9.9–49.3)	↑*
	Aminoglycoside (gentamicin/tobramycin) resistance	4 312	7.5	4 267	6.1	3 733	6.4	4 039	7.6	4 246	8.2	10.4 (4.5–29.6)	↑*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	4 312	2.9	4 265	1.7	3 694	2.1	4 033	2.7	4 240	2.9	5.5 (1.2–21.7)	-
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	912	19.7	926	18.9	879	18.3	979	19.9	1 167	21	32.9 (4.9–84.3)	-
	Carbapenem (imipenem/meropenem) resistance	881	1.1	926	1.4	835	1.4	979	2.3	1 116	1.9	11.3 (0.0–67.6)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	911	22.8	926	19	887	20.2	978	21.9	1 166	23.2	31.4 (0.0–80.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	910	13.1	858	9.7	726	10.6	794	11.5	960	11.4	21.5 (0.0–73.8)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	909	10.3	858	7.9	716	8.5	793	9.1	959	9.9	18.8 (0.0–71.5)	-
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	503	11.1	478	10	438	11.9	462	12.3	548	11.3	16.4 (3.9–53.7)	-
	Ceftazidime resistance	489	9	464	8	421	9.5	451	9.1	547	6.2	13.8 (2.8–51.5)	-
	Carbapenem (imipenem/meropenem) resistance	474	12.4	479	10.6	452	14.8	465	11.6	546	7	15.9 (1.5–53.4)	↓*
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	503	14.7	479	14	456	14.7	466	15.7	547	9.7	15.3 (4.9–51.9)	-
	Aminoglycoside (tobramycin) resistance	304	6.3	257	7	190	6.8	209	7.2	292	6.2	7.0 (0.0–44.6)	-
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	289	8	243	8.2	166	13.3	199	8.5	290	6.6	10.0 (0.0–47.5)	-
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	160	1.3	167	1.2	168	2.4	194	4.1	223	3.6	31.6 (0.0–94.1)	↑
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	141	15.6	146	12.3	156	8.3	196	8.7	226	6.2	33.2 (0.0–95.2)	↓*
	Aminoglycoside (gentamicin/tobramycin) resistance	148	2.7	153	5.2	143	1.4	149	4.7	186	3.2	29.0 (1.8–89.9)	-
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	127	0.8	130	1.5	129	0	145	1.4	185	1.6	27.0 (0.0–89.5)	-
Staphylococcus aureus	MRSA[d]	1 455	6.9	1 614	4.1	1 492	4.2	1 700	6	1 882	7.4	14.2 (1.9–46.0)	↑
Streptococcus pneumoniae	Penicillin non-wild-type[e]	858	14.5	843	18	1 457	14.1	1 712	13.1	2 081	14.8	17.3 (0.0–36.6)	-
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	858	19.1	843	16.5	1 457	14.6	1 712	14.8	2 081	16.5	19.0 (4.0–44.2)	-
	Combined penicillin non-wild-type and resistance to macrolides[e]	858	8.7	843	9.8	1 457	8	1 712	7.6	2 081	9.1	11.1 (0.0–25.6)	-
Enterococcus faecalis	High-level gentamicin resistance	296	13.2	351	8.5	325	6.8	363	9.1	460	9.8	22.6 (4.8–49.2)	-
Enterococcus faecium	Vancomycin resistance	491	2.9	502	2.8	423	1.4	454	3.7	526	3.4	16.5 (0.0–61.7)	-

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; –indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Belgium, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	2	40	0	0	1	20	2	40	5	100
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	0	0	0	0	1	4.8	20	95.2	21	100
	Ceftazidime-avibactam	5	23.8	0	0	3	14.3	13	61.9	21	100
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	1	4.8	0	0	0	0	20	95.2	21	100
Peudomonas aeruginosa	Cefiderocol	1	2.6	0	0	0	0	37	97.4	38	100
	Ceftazidime-avibactam	21	55.3	0	0	10	26.3	7	18.4	38	100
	Ceftolozane-tazobactam	8	21.1	0	0	3	7.9	27	71.1	38	100
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	0	0	0	0	2	5.3	36	94.7	38	100
Acinetobacter spp.	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: no data. For example if no carbapenem-resistant isolates were reported.

Bulgaria

Participating institutions
National Center of Infectious and Parasitic Diseases,
https://ncipd.org/index.php?option=com_content&view=featured&Itemid=730&lang=en

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Bulgaria, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	45	45	45	45	45
Geographical representativeness	Medium	Medium	Medium	Medium	Medium
Hospital representativeness	Medium	Medium	Medium	Medium	Medium
Isolate representativeness	Medium	Medium	Medium	Medium	Medium
Blood culture sets/1 000 patient days	10.4	11.4	11.3	12.8	12.2

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Bulgaria, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	96	100	100	83

NA: not applicable. In 2020 there was no EARS-Net EQA.
For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Bulgaria, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	23	261	19	22	263	15	18	239	21	20	306	25	20	336	25
Klebsiella pneumoniae	19	249	48	19	242	47	20	260	43	19	405	53	19	466	53
Peudomonas aeruginosa	17	70	51	15	83	45	14	76	54	17	84	54	18	87	46
***Acinetobacter* spp.**	14	129	60	18	217	70	15	160	66	16	183	74	15	210	76
Staphylococcus aureus	23	220	22	19	211	15	20	233	22	22	290	27	18	320	31
Streptococcus pneumoniae	9	28	21[c]	6	11	NA	10	27	30[c]	10	31	45	10	43	44
Enterococcus faecalis	19	165	41	21	190	37	20	145	30	19	168	40	18	161	47
Enterococcus faecium	16	77	57	13	148	62	15	145	54	19	128	53	15	131	53

Labs: laboratories.
NA: not applicable.
[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.
[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).
[c] A small number of isolates were tested (n < 30), and the percentage of isolates from ICUs should be interpreted with caution.

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Bulgaria

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	4.05#	3.24#	2.95#	2.92#	3.68#	3.75#	-	-7.4*	-0.30*	-42*	0	4.05	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	2.24#	2.19#	3.52#	3.91#	7.75#	10.62#	↑	+374.1	+8.38	+528	-4	2.15	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	1.43#	0.78#	0.96#	0.85#	1.49#	1.13#	-	-21.0*	-0.30*	-27*	-3	1.39	4.48 (0.55–13.63)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

One or more of the three representativeness indicators (geographical, hospital and/or isolate representativeness) were not reported as 'High'. The results should be interpreted with caution.

* Target reached.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Bulgaria

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	5.21#	4.85#	5.00#	6.62#	6.43#	↑	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	3.24#	2.95#	2.92#	3.68#	3.75#	-	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0.06#	0.03#	0.00#	0.03#	0.06#	-	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	3.36#	2.65#	2.95#	3.94#	3.07#	-	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	2.25^#	2.14#	1.77#	2.81#	2.33#	-	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1.23^#	1.17#	1.04#	1.74#	1.16#	-	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	6.16#	6.19#	6.48#	11.13#	13.25#	↑	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	2.19#	3.52#	3.91#	7.75#	10.62#	↑	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	5.22#	5.41#	5.40#	10.01#	12.61#	↑	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	4.82#	5.25#	5.12#	10.01#	11.60#	↑	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	4.13#	4.56#	4.39#	8.87#	11.23#	↑	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	1.54#	1.24#	1.29#	1.18#	1.11#	-	1.81 (0.26–7.45)
	Ceftazidime resistance	1.30#	1.31#	1.50#	1.22#	1.03#	-	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	1.03#	0.93#	1.08#	1.03#	0.92#	-	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	1.27#	0.90#	1.04#	0.96#	1.11#	-	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0.55^#	0.72#	0.70^#	0.59#	0.37^#	-	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	0.86^#	0.90#	0.87^#	0.96#	0.41^#	-	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	3.75#	5.96#	4.53#	5.98#	7.19#	↑	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	3.75#	6.14#	4.60#	6.28#	7.30#	↑	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	3.44#	6.24#	4.64#	5.98#	7.08#	↑	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	3.30#	5.50#	4.28#	5.56#	6.89#	↑	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	0.78#	0.96#	0.85#	1.49#	1.13#	↑	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.08#	0.04#	0.23#	0.29#	0.49#	↑	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.11#	0.08#	0.23#	0.45#	0.78#	↑	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.04#	0.00#	0.12#	0.16#	0.45#	↑	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	2.58#	3.02#	2.16#	2.29#	2.43#	-	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	0.21#	0.53#	0.32#	0.26#	0.72#	-	1.96 (0.00–9.97)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

One or more of the three representativeness indicators (geographical, hospital and/or isolate representativeness) were not reported as 'High'. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Bulgaria, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	261	66.7	263	61.2	239	68.6	306	67	336	59.2	54.7 (34.4–71.1)	-
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	261	41.4	263	37.3	239	40.2	306	37.3	336	34.5	16.0 (6.8–38.7)	-
	Carbapenem (imipenem/meropenem) resistance	261	0.8	263	0.4	239	0	306	0.3	336	0.6	0.3 (0.0–2.5)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	261	42.9	263	33.5	239	40.6	306	39.9	336	28.3	22.5 (9.9–49.3)	↓*
	Aminoglycoside (gentamicin/tobramycin) resistance	219	34.2	263	27	239	24.3	306	28.4	336	21.4	10.4 (4.5–29.6)	↓*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	219	18.7	263	14.8	239	14.2	306	17.6	336	10.7	5.5 (1.2–21.7)	-
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	249	79.1	242	81.4	260	78.5	405	81.5	466	84.3	32.9 (4.9–84.3)	-
	Carbapenem (imipenem/meropenem) resistance	249	28.1	242	46.3	260	47.3	405	56.8	466	67.6	11.3 (0.0–67.6)	↑*
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	249	67.1	242	71.1	260	65.4	405	73.3	466	80.3	31.4 (0.0–80.3)	↑*
	Aminoglycoside (gentamicin/tobramycin) resistance	230	67	242	69	260	61.9	405	73.3	466	73.8	21.5 (0.0–73.8)	↑*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	230	57.4	242	59.9	260	53.1	405	64.9	466	71.5	18.8 (0.0–71.5)	↑*
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	70	64.3	83	43.4	76	48.7	84	38.1	87	34.5	16.4 (3.9–53.7)	↓*
	Ceftazidime resistance	70	54.3	83	45.8	76	56.6	84	39.3	87	32.2	13.8 (2.8–51.5)	↓*
	Carbapenem (imipenem/meropenem) resistance	70	42.9	83	32.5	76	40.8	84	33.3	87	28.7	15.9 (1.5–53.4)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	70	52.9	83	31.3	76	39.5	84	31	87	34.5	15.3 (4.9–51.9)	↓
	Aminoglycoside (tobramycin) resistance	50	32	83	25.3	55	36.4	84	19	49	20.4	7.0 (0.0–44.6)	-
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	50	50	83	31.3	55	45.5	84	31	49	22.4	10.0 (0.0–47.5)	↓*
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	129	82.9	217	77.9	160	79.4	183	86.3	210	90.5	31.6 (0.0–94.1)	↑*
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	129	82.9	217	80.2	160	80.6	183	90.7	210	91.9	33.2 (0.0–95.2)	↑*
	Aminoglycoside (gentamicin/tobramycin) resistance	129	76	217	81.6	160	81.3	183	86.3	210	89	29.0 (1.8–89.9)	↑*
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	129	72.9	217	71.9	160	75	183	80.3	210	86.7	27.0 (0.0–89.5)	↑*
Staphylococcus aureus	MRSA[d]	220	11.8	211	15.2	233	12	290	15.9	320	10.9	14.2 (1.9–46.0)	-
Streptococcus pneumoniae	Penicillin non-wild-type[e]	28	7.1[f]	11	NA	27	22.2[f]	31	22.6	43	27.9	17.3 (0.0–36.6)	NA
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	28	10.7[f]	11	NA	27	22.2[f]	31	35.5	43	44.2	19.0 (4.0–44.2)	NA
	Combined penicillin non-wild-type and resistance to macrolides[e]	28	3.6[f]	11	NA	27	11.1[f]	31	12.9	43	25.6	11.1 (0.0–25.6)	NA
Enterococcus faecalis	High-level gentamicin resistance	165	47.9	190	48.4	145	44.8	168	38.7	161	42.9	22.6 (4.8–49.2)	-
Enterococcus faecium	Vancomycin resistance	77	7.8	148	10.1	145	6.2	128	5.5	131	14.5	16.5 (0.0–61.7)	-

NA, not applicable.

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; –indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

[f] A small number of isolates were tested (n < 30), and the percentage resistance should be interpreted with caution.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Bulgaria, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Peudomonas aeruginosa	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftolozane-tazobactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acinetobacter spp.	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: no data. For example if no carbapenem-resistant isolates were reported.

Croatia

Participating institutions

Reference Center for Antimicrobial Resistance Surveillance University Hospital for Infectious Diseases (Dr Fran Mihaljević), Zagreb, https://bfm.hr/referentni-centar-za-pracenje-rezistencijebakterija-na-antibotike/

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Croatia, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	80	100	90	90	90
Geographical representativeness	High	High	High	High	High
Hospital representativeness	High	High	High	High	High
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient days	109	38.3	34	29	39.1

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Croatia, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	87	97	97	97

NA: not applicable. In 2020 there was no EARS-Net EQA.

For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Croatia, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	19	828	7	19	729	12	23	989	13	24	1 310	14	19	1 058	8
Klebsiella pneumoniae	16	270	20	18	361	32	22	369	30	22	568	27	19	500	22
Peudomonas aeruginosa	18	165	32	15	214	45	20	263	37	21	367	37	17	249	34
***Acinetobacter* spp.**	14	225	73	18	408	75	21	291	60	20	266	53	17	216	41
Staphylococcus aureus	19	424	16	18	600	30	21	618	21	24	735	20	19	587	14
Streptococcus pneumoniae	12	55	17	14	80	23	20	83	18	19	131	20	13	125	9
Enterococcus faecalis	16	162	23	17	199	38	20	215	25	24	224	24	19	214	25
Enterococcus faecium	16	88	28	14	113	50	18	133	37	22	150	33	18	137	28

Labs: laboratories.

[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.

[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Croatia

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	5.31	4.22	3.34	4.93	7.56	5.9	-	+11.1	+0.59	+12	0	5.31	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	1.2	1.57	2.87	2.52	4.53	4.49	↑	+274.2	+3.29	+125	-4	1.15	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	2.73	3.82	5.18	5.44	6.35	5.03	↑	+84.2	+2.3	+83	-6	2.57	4.48 (0.55–13.63)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Croatia

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	14.69	10.06	15.67	21.21	17.29	-	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	4.22	3.34	4.93	7.56	5.9	↑	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0	0	0.03	0.06	0	-	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	7.55	5.18	8.45	11.11	8.78	-	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	3.79	2.11	4.53	6.67	5.5	↑	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2.22	1.29	2.12	4.13	2.88	-	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	4.34	5.55	5.73	9.03	8.95	↑	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	1.57	2.87	2.52	4.53	4.49	↑	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	4.47	5.7	5.59	9.23	8.92	↑	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	3.17	4.11	4.35	6.06	5.96	↑	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2.96	3.82	3.95	5.51	5.58	↑	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	0.52	0.55	0.95	1.07	1.06	↑	1.81 (0.26–7.45)
	Ceftazidime resistance	0.95	0.92	1.66	2.05	1.67	↑	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	1.54	1.66	2.64	3.03	2.39	↑	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	1.17	1.04	2.01	3.29	1.93	↑	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	ND	ND	ND	ND	ND	NA	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	ND	ND	ND	ND	ND	NA	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	6.68	10.03	8.22	7.33	5.7	-	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	6.78	10.01	8.16	7.3	5.75	-	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	6.68	9.91	7.93	6.98	5.5	-	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	6.56	9.81	7.88	6.84	5.38	-	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	3.82	5.18	5.44	6.35	5.03	-	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.4	0.32^	0.46	0.46	0.66	-	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.68	0.45	0.63	0.63	0.72	-	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.28	0.27^	0.43	0.29	0.35	-	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	1.88	1.91	2.32	1.9	1.84	-	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	0.89	1.11	1.37	1.01	2.19	↑	1.96 (0.00–9.97)

ND, no data available; NA, not applicable.

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Croatia, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	827	57.7	728	55.8	981	55.8	1 284	57.2	1 051	57.2	54.7 (34.4–71.1)	-
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	827	16.6	726	18.6	987	17.4	1 309	20	1 057	19.4	16.0 (6.8–38.7)	-
	Carbapenem (imipenem/meropenem) resistance	820	0	686	0	980	0.1	1 301	0.2	1 054	0	0.3 (0.0–2.5)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	826	29.7	721	29	975	30.3	1 298	29.7	1 047	29.1	22.5 (9.9–49.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	828	14.9	725	11.7	985	16	1 300	17.8	1 055	18.1	10.4 (4.5–29.6)	↑*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	825	8.7	714	7.3	973	7.6	1 289	11.1	1 046	9.6	5.5 (1.2–21.7)	↑*
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	270	52.2	361	62	369	54.2	565	55.4	498	62.4	32.9 (4.9–84.3)	-
	Carbapenem (imipenem/meropenem) resistance	267	19.1	353	32.9	367	24	567	27.7	498	31.3	11.3 (0.0–67.6)	↑*
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	268	54.1	360	63.9	363	53.7	565	56.6	497	62.4	31.4 (0.0–80.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	270	38.1	356	46.6	366	41.5	561	37.4	497	41.6	21.5 (0.0–73.8)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	268	35.8	355	43.4	362	38.1	557	34.3	495	39.2	18.8 (0.0–71.5)	-
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	164	10.4	209	10.5	260	12.7	364	10.2	247	15	16.4 (3.9–53.7)	-
	Ceftazidime resistance	164	18.9	212	17.5	258	22.5	364	19.5	242	24	13.8 (2.8–51.5)	-
	Carbapenem (imipenem/meropenem) resistance	165	30.3	214	31.3	263	35	366	28.7	247	33.6	15.9 (1.5–53.4)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	165	23	213	19.7	261	26.8	366	31.1	247	27.1	15.3 (4.9–51.9)	↑*
	Aminoglycoside (tobramycin) resistance	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.0 (0.0–44.6)	NA
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.0 (0.0–47.5)	NA
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	225	96.4	407	99.5	291	98.6	265	95.8	213	93	31.6 (0.0–94.1)	↓*
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	224	98.2	405	99.8	289	98.6	262	96.6	214	93.5	33.2 (0.0–95.2)	↓*
	Aminoglycoside (gentamicin/tobramycin) resistance	225	96.4	405	98.8	288	96.2	262	92.4	213	89.7	29.0 (1.8–89.9)	↓*
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	224	95.1	402	98.5	286	96.2	259	91.5	210	89	27.0 (0.0–89.5)	↓*
Staphylococcus aureus	MRSA[d]	424	29.2	600	34.8	611	31.1	732	30.1	587	29.8	14.2 (1.9–46.0)	-
Streptococcus pneumoniae	Penicillin non-wild-type[e]	55	23.6	71	18.3	83	19.3	127	12.6	124	18.5	17.3 (0.0–36.6)	-
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	55	40	79	22.8	83	26.5	130	16.9	125	20	19.0 (4.0–44.2)	↓*
	Combined penicillin non-wild-type and resistance to macrolides[e]	55	16.4	70	15.7	83	18.1	126	7.9	124	9.7	11.1 (0.0–25.6)	↓
Enterococcus faecalis	High-level gentamicin resistance	161	37.9	195	39.5	212	38.2	217	30.4	212	30.2	22.6 (4.8–49.2)	↓
Enterococcus faecium	Vancomycin resistance	88	33	113	39.8	131	36.6	149	23.5	137	55.5	16.5 (0.0–61.7)	↑*

ND, no data available; NA, not applicable.

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; −indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Croatia, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Peudomonas aeruginosa	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftolozane-tazobactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
***Acinetobacter* spp.**	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: no data. For example if no carbapenem-resistant isolates were reported.

Cyprus

Participating institutions

Microbiology Department, Nicosia General Hospital, https://shso.org.cy/clinic/mikroviologiko/

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Cyprus, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	75	75	75	82	82
Geographical representativeness	High	High	High	High	High
Hospital representativeness	High	High	High	High	High
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient days	60.9	73.8	84.4	69.4	70.6

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Cyprus, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	100	100	100	90

NA: not applicable. In 2020 there was no EARS-Net EQA.

For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Cyprus, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	4	114	9	4	192	13	5	225	14	8	331	NA	8	400	NA
Klebsiella pneumoniae	4	86	29	4	141	35	5	199	36	9	220	33	8	326	NA
Peudomonas aeruginosa	4	64	37	4	103	42	5	98	36	8	105	29	8	161	43
***Acinetobacter* spp.**	4	58	60	3	216	80	5	203	64	9	136	60	7	127	66
Staphylococcus aureus	4	106	11	4	177	39	5	197	21	8	229	13	8	235	NA
Streptococcus pneumoniae	3	5	NA	4	11	NA	5	14	NA	6	31	27	7	21	NA
Enterococcus faecalis	4	75	41	4	139	57	5	126	39	9	149	31	8	173	40
Enterococcus faecium	3	43	32	4	84	46	5	109	39	9	127	38	7	147	52

Labs: laboratories.

NA: not applicable.

[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.

[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Cyprus

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	6.2	5.11	9.37	10.76	15.23	19.56	↑	+215.5	+13.36	+135	-5	5.89	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	2.61	2.55	5.51	9.87	9.8	19.81	↑	+659	+17.2	+169	-5	2.48	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	6.85	7.81	11.31	14.59	15.5	13.63	↑	+99	+6.78	+72	-18	5.62	4.48 (0.55–13.63)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Cyprus

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	11.56	19.94	20.78	29.93	30.79^	↑	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	5.11	9.37	10.76	15.23	19.56	↑	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0	0.3	0.29	0.4	1.26	↑	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	8.26	14.73	15.03	18.81	24.86	↑	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	3.6	5.65	5.01	8.08	9.21	↑	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2.25	3.12	3.83	5.56	6.44	↑	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	7.06	11.46	18.72	17.62	28.02	↑	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	2.55	5.51	9.87	9.8	19.81	↑	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	6.46	10.42	15.18	16.03	28.77	↑	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	2.85	7.44	10.91	9.67	17.16	↑	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2.25	7.14	9.28	8.61	16.15	↑	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	2.1	2.23	4.42	3.97	7.45	↑	1.81 (0.26–7.45)
	Ceftazidime resistance	1.65	1.93	3.98	2.52	4.42	↑	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	1.95	3.72	4.72	3.44	4.8	↑	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	1.95	2.68	4.27	2.52	5.55	↑	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0.45^	0.15^	0.88^	0.66^	2.02^	↑	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	0.90^	1.19^	2.95^	1.72^	3.15^	↑	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	7.06	29.61	28.15	15.36	13.38	-	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	7.21	29.46	28.44	15.5	13.5	-	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	6.76	28.57	24.46	14.97	12.37	-	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	6.61	28.27	24.32	14.57	12.11	-	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	7.81	11.31	14.59	15.5	13.63	↑	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.3	0.74	0.74	0.93	0.76^	-	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.3	0.6	0.88	1.06	1.01	-	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.15	0.6	0.59	0.53	0.63^	-	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	0.45	1.64	1.47	1.99^	3.79^	↑	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	2.85	6.4	8.99	9.01	9.97	↑	1.96 (0.00–9.97)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Cyprus, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	114	67.5	191	70.2	223	63.2	328	68.9	343	71.1	54.7 (34.4–71.1)	-
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	114	29.8	192	32.8	225	32.4	331	34.7	400	38.8	16.0 (6.8–38.7)	↑*
	Carbapenem (imipenem/meropenem) resistance	114	0	192	1	212	0.9	331	0.9	400	2.5	0.3 (0.0–2.5)	↑
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	114	48.2	192	51.6	220	46.4	331	42.9	400	49.3	22.5 (9.9–49.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	114	21.1	192	19.8	224	15.2	330	18.5	400	18.3	10.4 (4.5–29.6)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	114	13.2	192	10.9	219	11.9	330	12.7	400	12.8	5.5 (1.2–21.7)	-
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	86	54.7	141	54.6	199	63.8	220	60.5	326	68.1	32.9 (4.9–84.3)	↑
	Carbapenem (imipenem/meropenem) resistance	86	19.8	141	26.2	184	36.4	220	33.6	324	48.5	11.3 (0.0–67.6)	↑*
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	86	50	141	49.6	191	53.9	220	55	326	69.9	31.4 (0.0–80.3)	↑*
	Aminoglycoside (gentamicin/tobramycin) resistance	85	22.4	136	36.8	197	37.6	215	34	326	41.7	21.5 (0.0–73.8)	↑
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	85	17.6	136	35.3	189	33.3	215	30.2	326	39.3	18.8 (0.0–71.5)	↑
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	63	22.2	102	14.7	96	31.3	105	28.6	158	37.3	16.4 (3.9–53.7)	↑*
	Ceftazidime resistance	63	17.5	102	12.7	97	27.8	105	18.1	161	21.7	13.8 (2.8–51.5)	-
	Carbapenem (imipenem/meropenem) resistance	63	20.6	102	24.5	97	33	105	24.8	160	23.8	15.9 (1.5–53.4)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	63	20.6	103	17.5	92	31.5	105	18.1	161	27.3	15.3 (4.9–51.9)	-
	Aminoglycoside (tobramycin) resistance	49	6.1	69	1.4	64	9.4	80	6.3	90	17.8	7.0 (0.0–44.6)	↑
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	49	12.2	69	11.6	63	31.7	80	16.3	88	28.4	10.0 (0.0–47.5)	↑
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	58	81	216	92.1	202	94.6	134	86.6	126	84.1	31.6 (0.0–94.1)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	58	82.8	216	91.7	202	95.5	135	86.7	126	84.9	33.2 (0.0–95.2)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	58	77.6	214	89.7	202	82.2	135	83.7	121	81	29.0 (1.8–89.9)	-
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	58	75.9	214	88.8	202	81.7	133	82.7	120	80	27.0 (0.0–89.5)	-
Staphylococcus aureus	MRSA[d]	106	49.1	177	42.9	195	50.8	229	51.1	235	46	14.2 (1.9–46.0)	-
Streptococcus pneumoniae	Penicillin non-wild-type[e]	5	NA	11	NA	14	NA	31	22.6	18	NA	17.3 (0.0–36.6)	NA
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	5	NA	11	NA	13	NA	31	25.8	21	38.1[f]	19.0 (4.0–44.2)	NA
	Combined penicillin non-wild-type and resistance to macrolides[e]	5	NA	11	NA	13	NA	31	12.9	18	NA	11.1 (0.0–25.6)	NA
Enterococcus faecalis	High-level gentamicin resistance	75	4	138	8	124	8.1	126	11.9	114	26.3	22.6 (4.8–49.2)	↑*
Enterococcus faecium	Vancomycin resistance	43	44.2	84	51.2	109	56	127	53.5	147	53.7	16.5 (0.0–61.7)	-

NA, not applicable.

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; −indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

[f] A small number of isolates were tested (n < 30), and the percentage resistance should be interpreted with caution.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Cyprus, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	1	10	0	0	0	0	9	90	10	100
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	15	9.6	0	0	6	3.8	136	86.6	157	100
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	6	3.8	0	0	1	0.6	150	95.5	157	100
Peudomonas aeruginosa	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	4	10.5	0	0	0	0	34	89.5	38	100
	Ceftolozane-tazobactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acinetobacter spp.	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: no data. For example if no carbapenem-resistant isolates were reported.

Czechia

Participating institutions

National Institute of Public Health, http://www.szu.cz

National Reference Laboratory for Antibiotics, https://szu.cz/odborna-centra-a-pracoviste/centrum-epidemiologie-a-mikrobiologie/oddeleni-bakterialni-rezistence-na-antibiotika-a-sbirka-kultur/nrl-pro-antibiotika

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Czechia, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	80	80	80	70	70
Geographical representativeness	High	High	High	High	High
Hospital representativeness	High	High	High	High	High
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient days	19.7	21.3	21.7	18.2	23.4

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Czechia, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	88	92	100	98

NA: not applicable. In 2020 there was no EARS-Net EQA.

For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Czechia, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	48	3 005	14	40	2 939	16	40	3 579	14	40	3 897	14	41	4 282	13
Klebsiella pneumoniae	48	1 476	30	43	1 618	33	44	1 638	23	46	1 669	22	46	1 767	21
Peudomonas aeruginosa	48	559	37	43	596	37	43	645	31	42	611	31	46	712	29
***Acinetobacter* spp.**	20	82	44	21	122	52	18	85	50	21	91	48	26	102	31
Staphylococcus aureus	48	2 090	24	44	2 279	26	45	2 417	21	44	2 308	20	42	2 317	19
Streptococcus pneumoniae	43	204	32	46	228	23	47	394	30	48	479	24	47	487	24
Enterococcus faecalis	44	584	35	40	764	37	40	640	25	39	708	30	40	693	22
Enterococcus faecium	44	413	36	40	581	46	40	381	33	38	402	36	38	415	30

Labs: laboratories.

[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.

[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Czechia

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	6.56	4.65	4.94	6.25	8.15	8.83	↑	+34.6	+2.27	+264	-5	6.23	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	0.09^	0.07^	0.16^	0.24^	0.26^	0.41^	↑	+355.6	+0.32	+34	-2	0.09	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	3.06	2.28	2.51	2.15	2.92	2.79	-	-8.8*	-0.27*	-22*	-6	2.88	4.48 (0.55–13.63)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

* Target reached.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Czechia

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	18.45	17.63	21.87	26.48	28.99	↑	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	4.65	4.94	6.25	8.15	8.83	↑	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0.02^	0.00^	0.04^	0.00^	0.03^	-	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	7.07	6.75	7.73	8.81	10.73	↑	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	3.57	3.29	3.99	5.01	5.36	↑	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1.88	1.93	2.06	2.49	2.67	↑	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	7.9	9.39	9.65	10.19	10.22	↑	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	0.07^	0.16^	0.24^	0.26^	0.41^	↑	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	7.62	8.08	8.4	8.34	8.11	-	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	7.33	7.86	7.76	8.06	8.1	-	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	5.96	6.4	6.36	6.23	6.16	-	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	1.31	1.48	1.91	1.89	1.6	-	1.81 (0.26–7.45)
	Ceftazidime resistance	1.24	1.34	1.75	1.65	1.49	-	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	1.03	1.13	1.58	1.62	1.47	↑	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	1.86	1.86	2.13	1.83	1.78	-	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0.86	0.88	1.27	1.07	0.86	-	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	0.99	1.06	1.34	1.23	1	-	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	0.32	0.76	0.39	0.45	0.34	-	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.34	0.76	0.42	0.46	0.37	-	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	0.33	0.72	0.38	0.42	0.28	-	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	0.29	0.72	0.37	0.41	0.28	-	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	2.28	2.51	2.15	2.92	2.79	↑	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.11	0.15	0.3	0.26	0.38	↑	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.16	0.28	0.48	0.65	0.71	↑	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.05	0.09	0.12	0.08	0.24	↑	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	2.06	3.42	2.33	2.47	2.87	-	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	0.79	0.85	0.89	1.1	1	-	1.96 (0.00–9.97)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Czechia, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	2 997	52.7	2 934	51.4	3 564	51.6	3 892	51.6	4 271	51.8	54.7 (34.4–71.1)	-
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	2 997	13.3	2 934	14.4	3 566	14.8	3 892	15.9	4 269	15.8	16.0 (6.8–38.7)	↑*
	Carbapenem (imipenem/meropenem) resistance	1 500	0.1	1 342	0	1 685	0.2	1 846	0	1 998	0.1	0.3 (0.0–2.5)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	2 997	20.2	2 934	19.7	3 564	18.2	3 889	17.2	4 268	19.2	22.5 (9.9–49.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	2 999	10.2	2 935	9.6	3 567	9.4	3 892	9.8	4 269	9.6	10.4 (4.5–29.6)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2 995	5.4	2 934	5.6	3 564	4.9	3 889	4.9	4 268	4.8	5.5 (1.2–21.7)	-
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	1 474	45.9	1 618	49.7	1 638	49.6	1 669	46.3	1 767	44.1	32.9 (4.9–84.3)	-
	Carbapenem (imipenem/meropenem) resistance	1 232	0.5	1 348	1	1 326	1.5	1 372	1.5	1 437	2.2	11.3 (0.0–67.6)	↑*
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	1 474	44.2	1 618	42.8	1 638	43.2	1 669	37.9	1 767	35	31.4 (0.0–80.3)	↓*
	Aminoglycoside (gentamicin/tobramycin) resistance	1 474	42.5	1 618	41.6	1 638	39.9	1 669	36.6	1 767	35	21.5 (0.0–73.8)	↓*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1 473	34.6	1 618	33.9	1 638	32.7	1 669	28.3	1 767	26.6	18.8 (0.0–71.5)	↓*
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	550	20.4	590	21.5	640	25.2	610	23.4	711	17.2	16.4 (3.9–53.7)	-
	Ceftazidime resistance	559	19	596	19.3	645	22.8	611	20.5	711	16	13.8 (2.8–51.5)	-
	Carbapenem (imipenem/meropenem) resistance	559	15.7	595	16.3	645	20.6	610	20.2	712	15.7	15.9 (1.5–53.4)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	559	28.4	596	26.7	645	27.8	611	22.7	711	19.1	15.3 (4.9–51.9)	↓*
	Aminoglycoside (tobramycin) resistance	559	13.2	596	12.6	645	16.6	611	13.3	710	9.3	7.0 (0.0–44.6)	-
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	550	15.5	589	15.4	640	17.7	609	15.3	710	10.7	10.0 (0.0–47.5)	↓*
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	82	32.9	122	53.3	85	38.8	91	37.4	102	25.5	31.6 (0.0–94.1)	↓*
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	82	35.4	122	53.3	85	41.2	91	38.5	102	27.5	33.2 (0.0–95.2)	↓*
	Aminoglycoside (gentamicin/tobramycin) resistance	82	34.1	122	50.8	85	37.6	91	35.2	102	20.6	29.0 (1.8–89.9)	↓*
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	82	30.5	122	50.8	85	36.5	91	34.1	102	20.6	27.0 (0.0–89.5)	↓*
Staphylococcus aureus	MRSA[d]	2 089	9.3	2 279	9.4	2 417	7.5	2 304	9.6	2 301	9.3	14.2 (1.9–46.0)	-
Streptococcus pneumoniae	Penicillin non-wild-type[e]	204	4.4	228	5.7	394	6.3	479	4.2	487	6	17.3 (0.0–36.6)	-
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	204	6.9	228	10.5	394	10.2	479	10.2	487	11.1	19.0 (4.0–44.2)	-
	Combined penicillin non-wild-type and resistance to macrolides[e]	204	2	228	3.5	394	2.5	479	1.3	487	3.7	11.1 (0.0–25.6)	-
Enterococcus faecalis	High-level gentamicin resistance	583	30.2	762	38.5	639	30.7	707	26.4	675	32.4	22.6 (4.8–49.2)	-
Enterococcus faecium	Vancomycin resistance	410	16.6	578	12.6	379	19.8	401	20.7	415	18.3	16.5 (0.0–61.7)	↑*

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; −indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Czechia, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	6	19.4	0	0	0	0	25	80.6	31	100
	Cefiderocol	14	45.2	0	0	7	22.6	10	32.3	31	100
	Ceftazidime-avibactam	6	19.4	0	0	21	67.7	4	12.9	31	100
	Imipenem-relebactam	4	12.9	0	0	21	67.7	6	19.4	31	100
	Meropenem-vaborbactam	4	12.9	0	0	23	74.2	4	12.9	31	100
Peudomonas aeruginosa	Cefiderocol	53	47.3	0	0	12	10.7	47	42	112	100
	Ceftazidime-avibactam	73	65.2	0	0	21	18.8	18	16.1	112	100
	Ceftolozane-tazobactam	70	62.5	0	0	24	21.4	18	16.1	112	100
	Imipenem-relebactam	50	44.6	0	0	32	28.6	30	26.8	112	100
	Meropenem-vaborbactam	50	44.6	0	0	40	35.7	22	19.6	112	100
Acinetobacter spp.	Cefiderocol	25	96.2	0	0	1	3.8	0	0	26	100

ND: no data. For example if no carbapenem-resistant isolates were reported.

Denmark

Participating institutions
Statens Serum Institut, https://www.ssi.dk/
Danish Study Group for Antimicrobial Resistance Surveillance (DANRES), www.danmap.org

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Denmark, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	100	100	100	100	100
Geographical representativeness	High	High	High	High	High
Hospital representativeness	High	High	High	High	High
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient days	236.4	251	261.2	261.7	265.8

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS–Net EQA, Denmark, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	100	91	80	67

NA: not applicable. In 2020 there was no EARS–Net EQA.
For more information about the EARS–Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS–Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Denmark, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	10	5 878	3	10	6 025	3	10	5 940	5	10	5 873	5	10	6 003	8
Klebsiella pneumoniae	10	1 415	4	10	1 346	4	10	1 360	5	10	1 410	7	9	1 425	8
Peudomonas aeruginosa	10	505	4	10	517	5	10	498	4	10	462	6	10	488	10
***Acinetobacter* spp.**	9	66	6	10	103	11	10	99	4	10	90	8	10	99	9
Staphylococcus aureus	10	2 390	5	10	2 545	5	10	2 502	6	10	2 473	8	10	2 335	8
Streptococcus pneumoniae	10	351	NA	10	334	NA	10	543	7	10	607	6	10	602	7
Enterococcus faecalis	10	651	7	10	686	7	10	660	7	10	643	10	10	596	7
Enterococcus faecium	10	795	20	10	802	28	10	638	22	10	614	25	10	588	23

Labs: laboratories.
NA: not applicable.
[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.
b Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only 'f there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

MRSA, third–generation cephalosporin–resistant *Escherichia coli*, and carbapenem–resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Denmark

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	6.61	6.08^	5.72^	6.01^	5.61^	6.09^	–	–7.9*	–0.52*	–21*	–5	6.28	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	0.07	0.19	0.1	0.1	0.08	0.1	–	+42.9	+0.03	+2	–2	0.07	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	0.83	0.7	0.79	0.61^	0.47^	0.55^	↓	–33.7*	–0.28*	–15*	–3	0.81	4.48 (0.55–13.63)

[a] Incidence was estimated using the EARS–Net data reported to EpiPulse Cases. Each de–duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A–agglutination test) are accepted as a marker for MRSA.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

* Target reached.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Denmark

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	44.38	42.65	42.24	39.54	41.64	↓	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	6.08^	5.72^	6.01^	5.61^	6.09^	–	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0.15	0.1	0.02	0.03	0.05	↓	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	11.32	10.79	10.74	10.28	10.69	–	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	5.58	4.49	4.78	4.42	4.53	↓	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1.46^	1.13^	1.33^	1.18^	1.06^	–	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	1.31^	1.08	1.11	1.21^	1.27	–	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	0.19	0.1	0.1	0.08	0.1	–	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	1.84	1.64	1.74	1.67	1.93	–	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	0.79	0.48	0.61	0.62	0.7	–	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	0.38^	0.24	0.29	0.35^	0.30^	–	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	0.38	0.45	0.37	0.35	0.32	–	1.81 (0.26–7.45)
	Ceftazidime resistance	0.26	0.19	0.22	0.22	0.22	–	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	0.38	0.31	0.2	0.25	0.12	↓	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.27	0.29	0.24	0.46	0.4	–	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0.00^	0.00^	0.00^	0.03^	0.03^	–	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	0.03^	0.05^	0.12^	0.08^	0.05^	–	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	0.05	0.1	0.09	0.03	0.07	–	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.15	0.27	0.27	0.13	0.17	–	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	0.05	0.12	0.09	0.03	0.08	–	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	0.05	0.1	0.05	0.03	0.05	–	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	0.7	0.79	0.61^	0.47^	0.55^	–	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.41	0.55	0.27	0.37	0.47	–	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.22	0.29	0.29	0.37	0.65^	↑	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.14	0.17	0.07	0.19	0.25^	–	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	0.38^	ND	0.07^	0.02^	0.02^	NA	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	1.31	1.46	1.29	1.11	1.31	–	1.96 (0.00–9.97)

ND, no data available; NA, not applicable.

[a] Incidence was estimated using the EARS–Net data reported to EpiPulse Cases. Each de–duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)a, by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population–weighted mean and trend, Denmark, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	5 864	44.1	6 001	41.5	5 883	42.2	5 799	40.5	5 941	41.8	54.7 (34.4–71.1)	↓*
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	5 286	6.7	5 416	6.2	5 326	6.6	5 272	6.3	5 369	6.8	16.0 (6.8–38.7)	-
	Carbapenem (imipenem/meropenem) resistance	5 840	0.2	5 845	0.1	5 580	0	5 430	0	5 544	0.1	0.3 (0.0–2.5)	↓*
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	5 870	11.2	6 016	10.5	5 892	10.7	5 828	10.5	5 944	10.7	22.5 (9.9–49.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	5 870	5.5	6 017	4.4	5 909	4.8	5 839	4.5	5 959	4.5	10.4 (4.5–29.6)	↓*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	5 277	1.6	5 409	1.2	5 299	1.5	5 237	1.3	5 326	1.2	5.5 (1.2–21.7)	-
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	1 264	6	1 228	5.1	1 244	5.2	1 261	5.7	1 291	5.9	32.9 (4.9–84.3)	-
	Carbapenem (imipenem/meropenem) resistance	1 413	0.8	1 324	0.5	1 312	0.5	1 326	0.4	1 361	0.4	11.3 (0.0–67.6)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	1 414	7.6	1 346	7.1	1 345	7.6	1 396	7.1	1 409	8.2	31.4 (0.0–80.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	1 412	3.3	1 344	2.1	1 348	2.7	1 401	2.6	1 415	3	21.5 (0.0–73.8)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1 261	1.7	1 228	1.1	1 232	1.4	1 251	1.7	1 279	1.4	18.8 (0.0–71.5)	-
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	505	4.4	517	5	495	4.4	461	4.6	488	3.9	16.4 (3.9–53.7)	-
	Ceftazidime resistance	471	3.2	482	2.3	473	2.7	429	3	461	2.8	13.8 (2.8–51.5)	-
	Carbapenem (imipenem/meropenem) resistance	503	4.4	514	3.5	494	2.4	457	3.3	482	1.5	15.9 (1.5–53.4)	↓*
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	505	3.2	517	3.3	495	2.8	461	5.9	488	4.9	15.3 (4.9–51.9)	↑*
	Aminoglycoside (tobramycin) resistance	61	0	226	0	267	0	265	0.8	287	0.7	7.0 (0.0–44.6)	-
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	61	3.3	225	1.3	265	2.6	263	1.9	287	1	10.0 (0.0–47.5)	-
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	64	4.7	102	5.9	96	5.2	90	2.2	99	4	31.6 (0.0–94.1)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	65	13.8	103	15.5	96	16.7	89	9	99	10.1	33.2 (0.0–95.2)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	65	4.6	100	7	97	5.2	89	2.2	98	5.1	29.0 (1.8–89.9)	-
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	63	4.8	99	6.1	93	3.2	88	2.3	98	3.1	27.0 (0.0–89.5)	-
Staphylococcus aureus	MRSA[d]	2 390	1.7	2 545	1.8	1 945	1.9	1 870	1.5	1 763	1.9	14.2 (1.9–46.0)	-
Streptococcus pneumoniae	Penicillin non-wild-type[e]	351	6.8	334	9.6	539	3	596	3.7	598	4.7	17.3 (0.0–36.6)	↓*
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	351	3.7	334	5.1	503	3.4	553	4	537	7.3	19.0 (4.0–44.2)	↑*
	Combined penicillin non-wild-type and resistance to macrolides[e]	351	2.3	334	3	503	0.8	551	2	537	2.8	11.1 (0.0–25.6)	-
Enterococcus faecalis	High-level gentamicin resistance	187	11.8	ND	ND	5	NA	3	NA	3	NA	22.6 (4.8–49.2)	NA
Enterococcus faecium	Vancomycin resistance	793	9.6	800	10.6	632	12	609	10.8	584	13.4	16.5 (0.0–61.7)	↑*

ND, no data available; NA, not applicable.

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; −indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A–agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non–wild–type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild–type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem–resistant isolates, by bacterial species and antimicrobial agent, Denmark, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Peudomonas aeruginosa	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftolozane-tazobactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
***Acinetobacter* spp.**	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: no data. For example if no carbapenem–resistant isolates were reported.

Estonia

Participating institutions
Estonian Health Board, https://www.terviseamet.ee/et
East-Tallinn Central Hospital, https://itk.ee/
Tartu University Hospital, https://www.kliinikum.ee/partnerile/uhendlabor/

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Estonia, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	100	100	100	100	100
Geographical representativeness	High	High	High	High	High
Hospital representativeness	High	High	High	High	High
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient days	35.8	39.2	39.9	40.2	38.4

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Estonia, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	91	100	100	91

NA: not applicable. In 2020 there was no EARS-Net EQA.
For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Estonia, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	9	979	7	9	930	6	9	1 003	8	9	1 103	NA	10	1 178	NA
Klebsiella pneumoniae	9	199	13	9	235	14	9	235	13	9	303	NA	10	308	NA
Peudomonas aeruginosa	9	79	20	9	87	23	9	86	16	8	79	23	9	119	32
***Acinetobacter* spp.**	4	12	NA	3	5	NA	3	3	NA	7	14	NA	7	26	24[c]
Staphylococcus aureus	9	367	11	9	398	8	9	407	8	9	448	NA	10	448	NA
Streptococcus pneumoniae	9	80	8	9	110	7	9	152	5	9	191	NA	9	207	NA
Enterococcus faecalis	9	108	19	7	85	9	9	96	14	9	128	22	8	105	NA
Enterococcus faecium	8	61	16	6	83	35	9	85	28	8	78	33	8	72	33

Labs: laboratories.
NA: not applicable.
[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.
[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).
[c] A small number of isolates were tested (n < 30), and the percentage of isolates from ICUs should be interpreted with caution.

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Estonia

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	7.93	6.09	5.64	8.86	9.08	8.07	-	+1.8	+0.14	+6	-10	7.14	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	0.00^	0.00^	0.15	0.23^	0.44^	0.29^	↑	NA	+0.29	+4	0	0	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	0.83	0.83	0.45	0.68	0.66	1.09	-	+31.3	+0.26	+4	-3	0.81	4.48 (0.55–13.63)

NA, not applicable.

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Estonia

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	14.52^	10.45^	8.94^	14.50^	15.79^	-	31.68^ (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	6.09	5.64	8.86	9.08	8.07	↑	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0.00^	0.00^	0.08^	0.00^	0.00^	-	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	10.16	9.32	12.09	10.25	11.57	-	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	3.99	3.83	4.2	3.88	4	-	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1.13	1.43	2.1	1.46	2.11^	-	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	1.73	2.26	2.63	2.86	3.06	↑	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	0.00^	0.15	0.23^	0.44^	0.29^	↑	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	2.56	2.93	2.85	3.66	2.76	-	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	1.2	1.35	1.43	1.68	1.24	-	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1.05	0.98	1.13	1.17	0.87^	-	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	0.53	0.45	0.68	0.29	0.58	-	1.81 (0.26–7.45)
	Ceftazidime resistance	0.38	0.23	0.53	0.22	0.36	-	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	0.75	0.98	0.98	0.73	0.58	-	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.6	1.05	0.9	0.73	0.65	-	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0.00^	0.00^	0.00^	0.07^	0.07^	-	0.58^ (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	ND	0.00^	0.00^	0.00^	0.00^	NA	0.79^ (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	0.15	0.08	0.08	0.22	0.22	-	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.00^	0.08^	0.08^	0.22^	0.15^	-	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	0.00^	0.08^	0.00^	0.22^	0.15^	-	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	0.00^	0.08^	0.00^	0.15^	0.15^	-	2.03^ (0.00–12.29)
Staphylococcus aureus	MRSA[c]	0.83	0.45	0.68	0.66	1.09	-	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.3	0.38	0.53	0.44^	0.73^	-	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.53	0.45^	1.20^	1.83	2.76	↑	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.15	0.30^	0.38^	0.29^	0.44^	-	0.55^ (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	1.2	0.60^	0.38^	0.51	0.51	↓	2.20^ (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	0.15	0.45	0.68	0.66	0.22	-	1.96 (0.00–9.97)

ND, no data available; NA, not applicable.

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Estonia, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	422	45.7	338	41.1	274	43.4	520	38.1	529	41	54.7 (34.4–71.1)	-
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	979	8.3	929	8.1	1 003	11.8	1 084	11.4	1 116	9.9	16.0 (6.8–38.7)	↑*
	Carbapenem (imipenem/meropenem) resistance	861	0	826	0	854	0.1	894	0	921	0	0.3 (0.0–2.5)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	959	14.1	922	13.4	987	16.3	1 054	13.3	1 088	14.6	22.5 (9.9–49.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	968	5.5	926	5.5	1 001	5.6	1 074	4.9	1 074	5.1	10.4 (4.5–29.6)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	948	1.6	917	2.1	985	2.8	1 040	1.9	1 029	2.8	5.5 (1.2–21.7)	-
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	199	11.6	235	12.8	235	14.9	301	13	294	14.3	32.9 (4.9–84.3)	-
	Carbapenem (imipenem/meropenem) resistance	173	0	218	0.9	204	1.5	263	2.3	235	1.7	11.3 (0.0–67.6)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	197	17.3	235	16.6	235	16.2	297	16.8	288	13.2	31.4 (0.0–80.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	197	8.1	235	7.7	235	8.1	300	7.7	282	6	21.5 (0.0–73.8)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	196	7.1	235	5.5	235	6.4	296	5.4	272	4.4	18.8 (0.0–71.5)	-
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	77	9.1	87	6.9	84	10.7	79	5.1	116	6.9	16.4 (3.9–53.7)	-
	Ceftazidime resistance	77	6.5	83	3.6	82	8.5	78	3.8	116	4.3	13.8 (2.8–51.5)	-
	Carbapenem (imipenem/meropenem) resistance	79	12.7	87	14.9	85	15.3	73	13.7	109	7.3	15.9 (1.5–53.4)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	76	10.5	84	16.7	84	14.3	77	13	114	7.9	15.3 (4.9–51.9)	-
	Aminoglycoside (tobramycin) resistance	1	NA	9	NA	6	NA	13	NA	25	4.0[f]	7.0 (0.0–44.6)	NA
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	ND	ND	5	NA	3	NA	13	NA	25	0.0[f]	10.0 (0.0–47.5)	NA
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	11	NA	5	NA	3	NA	14	NA	25	12.0[f]	31.6 (0.0–94.1)	NA
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	7	NA	2	NA	2	NA	11	NA	17	NA	33.2 (0.0–95.2)	NA
	Aminoglycoside (gentamicin/tobramycin) resistance	5	NA	2	NA	1	NA	10	NA	16	NA	29.0 (1.8–89.9)	NA
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	5	NA	2	NA	1	NA	10	NA	16	NA	27.0 (0.0–89.5)	NA
Staphylococcus aureus	MRSA[d]	367	3	398	1.5	407	2.2	436	2.1	442	3.4	14.2 (1.9–46.0)	-
Streptococcus pneumoniae	Penicillin non-wild-type[e]	79	5.1	109	4.6	152	4.6	127	4.7	168	6	17.3 (0.0–36.6)	-
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	76	9.2	98	6.1	132	12.1	186	13.4	205	18.5	19.0 (4.0–44.2)	↑*
	Combined penicillin non-wild-type and resistance to macrolides[e]	75	2.7	97	4.1	132	3.8	122	3.3	167	3.6	11.1 (0.0–25.6)	-
Enterococcus faecalis	High-level gentamicin resistance	107	15	73	11	75	6.7	125	5.6	100	7	22.6 (4.8–49.2)	↓*
Enterococcus faecium	Vancomycin resistance	61	3.3	83	7.2	85	10.6	77	11.7	68	4.4	16.5 (0.0–61.7)	-

ND, no data available; NA, not applicable.

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; −indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

[f] A small number of isolates were tested (n < 30), and the percentage resistance should be interpreted with caution.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Estonia, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	3	75	0	0	0	0	1	25	4	100
	Ceftazidime-avibactam	3	75	0	0	0	0	1	25	4	100
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Peudomonas aeruginosa	Cefiderocol	1	12.5	0	0	0	0	7	87.5	8	100
	Ceftazidime-avibactam	3	37.5	0	0	0	0	5	62.5	8	100
	Ceftolozane-tazobactam	3	37.5	0	0	0	0	5	62.5	8	100
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acinetobacter spp.	Cefiderocol	1	33.3	0	0	0	0	2	66.7	3	100

ND: no data. For example if no carbapenem-resistant isolates were reported.

Finland

Participating institutions

Finnish Institute for Health and Welfare, Department of Health Security, www.thl.fi

Finnish Study Group for Antimicrobial Resistance (FiRe), www.finres.fi

Finnish Hospital Infection Program (SIRO), https://thl.fi/en/web/infectious-diseases-and-vaccinations/diseases-and-disease-control/healthcare-associated-infections

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Finland, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	96	96	87	84	82
Geographical representativeness	High	High	High	High	High
Hospital representativeness	High	High	High	High	High
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient days	175.1	143.9	188.6	195.8	188.7

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Finland, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	88	92	100	92

NA: not applicable. In 2020 there was no EARS-Net EQA.

For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Finland, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	18	5 375	NA	19	5 802	NA	15	4 575	NA	15	4 269	NA	12	4 132	NA
Klebsiella pneumoniae	17	901	NA	19	971	NA	14	794	NA	15	727	NA	12	869	NA
Peudomonas aeruginosa	17	433	NA	19	451	NA	14	422	NA	15	367	NA	12	382	NA
***Acinetobacter* spp.**	12	37	NA	14	47	NA	10	28	NA	10	33	NA	10	42	NA
Staphylococcus aureus	18	2 188	NA	19	2 423	NA	15	2 418	NA	15	2 103	NA	12	2 294	NA
Streptococcus pneumoniae	18	293	NA	17	303	NA	15	470	NA	14	513	NA	11	483	NA
Enterococcus faecalis	18	566	NA	19	654	NA	14	490	NA	15	460	NA	11	424	NA
Enterococcus faecium	18	259	NA	18	262	NA	14	238	NA	13	196	NA	6	154	NA

Labs: laboratories.

NA: not applicable.

[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.

[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Finland

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	8.02	7.26	7.21	5.78	6.46	6.7	↓	-16.5*	-1.32*	-67*	-10	7.22	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	0.06	0.02	0	0	0.02	0.04	-	-33.3*	-0.02*	-1*	-2	0.06	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	1.06	1.07	1.19	1.12	1.28	1.83	↑	+72.6	+0.77	+44	-3	1.03	4.48 (0.55–13.63)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

* Target reached.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Finland

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	18.83^	18.97^	17.61^	17.76^	15.80^	↓	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	7.26	7.21	5.78	6.46	6.7	-	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0.02	0	0	0.02	0.04	-	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	10.63	10.45	9.38	9.39	8.86	↓	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	5.79	4.52	4.02	4.39	4.09	↓	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1.96	1.92	1.72	1.93	1.63	-	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	1.23	1.02	0.79	1.35	2.05	-	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	0.02	0	0	0.02	0.04	-	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	1.24	1	0.93	1.39	1.35	-	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	0.98	0.77	0.39	0.81	0.59	-	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	0.58	0.4	0.29	0.51	0.39	-	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	0.45	0.4	0.33	0.34	0.33	-	1.81 (0.26–7.45)
	Ceftazidime resistance	0.43	0.41	0.31	0.28	0.33	-	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	0.3	0.36	0.44	0.53	0.2	-	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.83	0.83	0.64	0.58	0.54	↓	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0.11	0.08	0.04	0.09	0.07	-	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	0.28	0.13	0.12	0.15	0.09	↓	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	0.04	0.02	0.02	0	0	-	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.06	0.02	0.02	0	0	-	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	0.02	0.02	0.02	0.02	0.02	-	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	0.02	0.02	0.02	0	0	-	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	1.07	1.19	1.12	1.28	1.83	↑	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.55^	0.68^	0.58^	0.73^	1.31	↑	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.64	0.75	1.08	1.2	1.11	↑	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.34^	0.40^	0.31^	0.45^	0.74	↑	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	ND	ND	ND	ND	ND	NA	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	0.02	0.02	0.04	0.02	0.02	-	1.96 (0.00–9.97)

ND, no data available; NA, not applicable.

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Finland, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	2 928	34.1	3 177	31.7	2 615	32.5	2 550	32.5	2 109	34.4	54.7 (34.4–71.1)	-
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	5 367	7.2	5 799	6.6	4 568	6.1	4 262	7.1	4 132	7.5	16.0 (6.8–38.7)	-
	Carbapenem (imipenem/meropenem) resistance	5 375	0	5 801	0	4 575	0	4 268	0	4 132	0	0.3 (0.0–2.5)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	5 354	10.5	5 802	9.6	4 572	9.9	4 261	10.3	4 131	9.9	22.5 (9.9–49.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	5 373	5.7	5 802	4.1	4 367	4.4	4 241	4.8	4 132	4.5	10.4 (4.5–29.6)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	5 346	1.9	5 799	1.8	4 357	1.9	4 227	2.1	4 131	1.8	5.5 (1.2–21.7)	-
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	901	7.2	971	5.6	794	4.8	727	8.7	868	10.8	32.9 (4.9–84.3)	↑*
	Carbapenem (imipenem/meropenem) resistance	901	0.1	971	0	793	0	727	0.1	868	0.2	11.3 (0.0–67.6)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	893	7.4	971	5.5	794	5.7	727	8.9	868	7.1	31.4 (0.0–80.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	901	5.8	971	4.2	764	2.5	726	5.2	868	3.1	21.5 (0.0–73.8)	↓*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	893	3.5	971	2.2	764	1.8	726	3.3	867	2.1	18.8 (0.0–71.5)	-
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	433	5.5	450	4.7	421	3.8	364	4.4	375	4	16.4 (3.9–53.7)	-
	Ceftazidime resistance	433	5.3	451	4.9	422	3.6	367	3.5	382	3.9	13.8 (2.8–51.5)	-
	Carbapenem (imipenem/meropenem) resistance	433	3.7	451	4.2	422	5	367	6.8	382	2.4	15.9 (1.5–53.4)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	431	10.2	451	9.8	422	7.3	365	7.4	382	6.5	15.3 (4.9–51.9)	↓*
	Aminoglycoside (tobramycin) resistance	433	1.4	451	0.9	422	0.5	367	1.1	382	0.8	7.0 (0.0–44.6)	-
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	431	3.5	450	1.6	421	1.4	362	1.9	375	1.1	10.0 (0.0–47.5)	↓
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	37	5.4	47	2.1	28	3.6[f]	33	0	42	0	31.6 (0.0–94.1)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	36	8.3	47	2.1	28	3.6[f]	33	0	42	0	33.2 (0.0–95.2)	↓
	Aminoglycoside (gentamicin/tobramycin) resistance	37	2.7	47	2.1	28	3.6[f]	33	3	42	2.4	29.0 (1.8–89.9)	-
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	36	2.8	47	2.1	28	3.6[f]	33	0	42	0	27.0 (0.0–89.5)	-
Staphylococcus aureus	MRSA[d]	2 188	2.6	2 423	2.6	2 418	2.2	2 103	2.9	2 294	3.7	14.2 (1.9–46.0)	↑
Streptococcus pneumoniae	Penicillin non-wild-type[e]	252	11.5	247	14.6	339	8.3	419	8.1	483	12.4	17.3 (0.0–36.6)	-
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	288	11.8	301	13.3	470	11.1	499	11.2	482	10.6	19.0 (4.0–44.2)	-
	Combined penicillin non-wild-type and resistance to macrolides[e]	247	7.3	245	8.6	339	4.4	405	5.2	482	7.1	11.1 (0.0–25.6)	-
Enterococcus faecalis	High-level gentamicin resistance	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	22.6 (4.8–49.2)	NA
Enterococcus faecium	Vancomycin resistance	259	0.4	261	0.4	238	0.8	196	0.5	154	0.6	16.5 (0.0–61.7)	-

ND, no data available; NA, not applicable.

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; –indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

[f] A small number of isolates were tested (n < 30), and the percentage resistance should be interpreted with caution.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Finland, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Peudomonas aeruginosa	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftolozane-tazobactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
***Acinetobacter* spp.**	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: no data. For example if no carbapenem-resistant isolates were reported.

France

Participating institutions

Santé Publique France, www.santepubliquefrance.fr

Since 2020: Surveillance and Prevention of Antimicrobial RESistance in hospital settings (SPARES), https://www.preventioninfection.fr/

National Reference Centre for Pneumococci, https://cnr-pneumo.com/

Up to 2019: French National Observatory for the Epidemiology of Bacterial Resistance to Antimicrobials (ONERBA), through three participating networks: Azay-Résistance, Île-de-France, Réussir, https://onerba.org/

Population and hospitals contributing data: coverage, representativeness and blood culture rate, France, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)					
Laboratories collecting *S. pneumoniae* (CNRP)	38	56	55	57	58
Laboratories collecting other species (SPARES)	48	55	55	0	57
Geographical representativeness					
Laboratories collecting *S. pneumoniae* (CNRP)	High	High	High	High	High
Laboratories collecting other species (SPARES)	High	High	High	Low	High
Hospital representativeness					
Laboratories collecting *S. pneumoniae* (CNRP)	High	High	High	High	High
Laboratories collecting other species (SPARES)	HIgh	High	High	Low	High
Isolate representativeness					
Laboratories collecting *S. pneumoniae* (CNRP)	High	High	High	High	High
Laboratories collecting other species (SPARES)	High	High	High	Low	High
Blood culture sets/1 000 patient-days	54.5	54.6	58.5	ND	61.5

ND: no data available.

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, France, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	ND	75	72	84

ND: no data available.

NA: not applicable. In 2020 there was no EARS-Net EQA.

For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, France, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	779	18 939	8	743	18 796	8	720	17 744	8	ND	ND	ND	796	21 699	8
Klebsiella pneumoniae	558	5 078	16	545	4 985	17	527	5 105	14	ND	ND	ND	602	6 405	13
Peudomonas aeruginosa	490	3 656	26	489	3 918	26	468	3 574	20	ND	ND	ND	496	4 088	17
***Acinetobacter* spp.**	241	710	10	219	737	11	238	870	13	ND	ND	ND	291	1 248	12
Staphylococcus aureus	672	10 967	12	661	11 809	13	625	10 731	12	ND	ND	ND	668	12 373	11
Streptococcus pneumoniae	127	668	NA	194	1 339	NA	162	928	NA	188	1 181	NA	162	1 101	NA
Enterococcus faecalis	508	4 456	21	511	4 736	22	494	4 135	16	ND	ND	ND	542	5 473	14
Enterococcus faecium	295	1 428	28	311	1 567	27	291	1 504	24	ND	ND	ND	349	2 197	20

Labs: laboratories.

ND: no data available.

NA: not applicable.

[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.

[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, France

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	8.6	5.52	4.2	4.01	ND	5.74	NA	-33.3*	-2.86*	-1 830*	-10	7.74	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	0.22	0.08	0.1	0.13	ND	0.19	NA	-13.6*	-0.03*	-22*	-2	0.22	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	5.61	4.02	3.41	2.97	ND	3.06	NA	-45.5*	-2.55*	-1 664*	-18	4.6	4.48 (0.55–13.63)

ND, no data available; NA, not applicable.

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

* Target reached.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, France

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	29.48	24.87	24.33	ND	28.32	NA	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	5.52	4.2	4.01	ND	5.74	NA	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0.02	0.02	0.05	ND	0.08	NA	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	9.15	7.32	6.9	ND	7.53	NA	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	3.67	2.76	2.62^	ND	3.50^	NA	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1.59	1.2	1.07^	ND	1.39^	NA	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	4.35	3.4	3.42	ND	4.39	NA	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	0.08	0.1	0.13	ND	0.19	NA	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	4.34	3.29	3.32	ND	3.65	NA	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	2.78	2.2	2.12	ND	2.33	NA	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2.38	1.84	1.74	ND	1.82^	NA	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	1.81	1.63	1.42^	ND	1.45^	NA	1.81 (0.26–7.45)
	Ceftazidime resistance	1.41	1.27	1.07	ND	1.15	NA	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	1.4	1.25	1.06	ND	1.06	NA	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	1.64	1.44	1.23	ND	1.17	NA	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0.53^	0.44^	0.45^	ND	0.32^	NA	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	0.80^	0.67^	0.54^	ND	0.51^	NA	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	0.07	0.06	0.08	ND	0.1	NA	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.18	0.13	0.14	ND	0.17	NA	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	0.17	0.11	0.14^	ND	0.12	NA	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	0.04^	0.04^	0.05^	ND	0.05^	NA	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	4.02	3.41	2.97	ND	3.06	NA	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.84	1.13	0.84	0.93	1.01	-	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.56	0.81	0.62	0.73	0.79	-	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.48	0.72	0.53	0.62	0.68	-	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	ND	ND	ND	ND	ND	NA	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	0.02	0.02	0.03	ND	0.03	NA	1.96 (0.00–9.97)

ND, no data available; NA, not applicable.

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, France, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	17 674	53.9	17 706	52.3	17 191	52.8	ND	ND	20 590	53.7	54.7 (34.4–71.1)	NA
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	18 857	9.5	18 735	8.3	17 722	8.4	ND	ND	21 395	10.5	16.0 (6.8–38.7)	NA
	Carbapenem (imipenem/meropenem) resistance	17 838	0	17 546	0.1	16 989	0.1	ND	ND	20 417	0.2	0.3 (0.0–2.5)	NA
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	18 569	15.9	18 446	14.8	17 517	14.7	ND	ND	21 298	13.8	22.5 (9.9–49.3)	NA
	Aminoglycoside (gentamicin/tobramycin) resistance	17 786	6.7	17 653	5.8	15 900	6.2	ND	ND	19 404	7	10.4 (4.5–29.6)	NA
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	17 433	2.9	17 301	2.6	15 681	2.6	ND	ND	19 049	2.8	5.5 (1.2–21.7)	NA
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	5 045	27.8	4 973	25.4	5 097	25	ND	ND	6 331	27.1	32.9 (4.9–84.3)	NA
	Carbapenem (imipenem/meropenem) resistance	4 796	0.5	4 727	0.8	4 965	1	ND	ND	6 051	1.2	11.3 (0.0–67.6)	NA
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	5 001	28.1	4 889	25	5 040	24.6	ND	ND	6 290	22.6	31.4 (0.0–80.3)	NA
	Aminoglycoside (gentamicin/tobramycin) resistance	4 767	18.8	4 706	17.4	4 703	16.8	ND	ND	5 852	15.6	21.5 (0.0–73.8)	NA
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	4 692	16.4	4 617	14.9	4 644	14	ND	ND	5 750	12.4	18.8 (0.0–71.5)	NA
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	3 417	17.1	3 580	17	3 136	16.8	ND	ND	3 662	15.4	16.4 (3.9–53.7)	NA
	Ceftazidime resistance	3 574	12.8	3 754	12.5	3 375	11.9	ND	ND	3 766	11.9	13.8 (2.8–51.5)	NA
	Carbapenem (imipenem/meropenem) resistance	3 583	12.6	3 850	12.1	3 498	11.3	ND	ND	3 908	10.6	15.9 (1.5–53.4)	NA
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	3 585	14.8	3 785	14.1	3 359	13.7	ND	ND	3 792	12	15.3 (4.9–51.9)	NA
	Aminoglycoside (tobramycin) resistance	3 059	5.6	3 297	4.9	3 033	5.6	ND	ND	3 548	3.5	7.0 (0.0–44.6)	NA
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	2 896	8.9	3 044	8.2	2 804	7.2	ND	ND	3 195	6.3	10.0 (0.0–47.5)	NA
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	692	3.3	720	3.1	857	3.5	ND	ND	1 211	3.3	31.6 (0.0–94.1)	NA
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	653	9	672	7.1	791	6.4	ND	ND	1 194	5.7	33.2 (0.0–95.2)	NA
	Aminoglycoside (gentamicin/tobramycin) resistance	661	8.3	673	6.1	757	7	ND	ND	1 174	3.8	29.0 (1.8–89.9)	NA
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	628	1.9	626	2.4	700	2.6	ND	ND	1 117	1.9	27.0 (0.0–89.5)	NA
Staphylococcus aureus	MRSA[d]	10 763	12.1	11 536	11	10 628	10.4	ND	ND	12 060	9.9	14.2 (1.9–46.0)	NA
Streptococcus pneumoniae	Penicillin non-wild-type[e]	668	32.3	1 339	32	928	33.7	1 181	30.7	1 101	36.6	17.3 (0.0–36.6)	-
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	668	21.6	1 339	23	928	24.8	1 181	23.9	1 101	28.6	19.0 (4.0–44.2)	↑*
	Combined penicillin non-wild-type and resistance to macrolides[e]	668	18.4	1 339	20.3	928	21.3	1 181	20.3	1 101	24.7	11.1 (0.0–25.6)	↑*
Enterococcus faecalis	High-level gentamicin resistance	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	22.6 (4.8–49.2)	NA
Enterococcus faecium	Vancomycin resistance	1 385	0.6	1 517	0.5	1 470	0.7	ND	ND	2 056	0.5	16.5 (0.0–61.7)	NA

ND, no data available; NA, not applicable.

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; −indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, France, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	0	0	0	0	4	12.9	27	87.1	31	100
	Ceftazidime-avibactam	5	16.1	0	0	7	22.6	19	61.3	31	100
	Imipenem-relebactam	0	0	0	0	3	9.7	28	90.3	31	100
	Meropenem-vaborbactam	2	6.5	0	0	1	3.2	28	90.3	31	100
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	6	8.2	0	0	1	1.4	66	90.4	73	100
	Ceftazidime-avibactam	17	23.3	0	0	20	27.4	36	49.3	73	100
	Imipenem-relebactam	1	1.4	0	0	2	2.7	70	95.9	73	100
	Meropenem-vaborbactam	2	2.7	0	0	2	2.7	69	94.5	73	100
Peudomonas aeruginosa	Cefiderocol	16	3.9	0	0	0	0	399	96.1	415	100
	Ceftazidime-avibactam	84	20.2	4	1	25	6	302	72.8	415	100
	Ceftolozane-tazobactam	123	29.6	2	0.5	26	6.3	264	63.6	415	100
	Imipenem-relebactam	10	2.4	0	0	7	1.7	398	95.9	415	100
	Meropenem-vaborbactam	4	1	0	0	5	1.2	406	97.8	415	100
Acinetobacter spp.	Cefiderocol	7	17.5	0	0	4	10	29	72.5	40	100

ND: no data. For example if no carbapenem-resistant isolates were reported.

Germany

Participating institutions
Robert Koch Institute, www.rki.de

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Germany, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	33	35	42	43	50
Geographical representativeness	High	High	High	High	High
Hospital representativeness	Medium	Medium	Medium	Medium	High
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient days	ND	ND	ND	ND	ND

ND: no data available.
For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Germany, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	97	97	91	100

NA: not applicable. In 2020 there was no EARS-Net EQA.
For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Germany, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	52	28 462	15	56	29 024	15	72	33 982	16	66	36 329	15	101	47 141	14
Klebsiella pneumoniae	52	5 994	24	56	6 539	25	72	7 446	24	66	8 126	24	100	10 950	21
Peudomonas aeruginosa	52	2 662	25	55	2 866	29	72	3 214	28	66	3 581	26	99	4 621	24
***Acinetobacter* spp.**	50	609	21	53	606	19	70	759	21	65	854	17	91	1 076	15
Staphylococcus aureus	52	14 431	23	56	15 804	23	72	18 907	22	66	19 069	21	100	23 913	20
Streptococcus pneumoniae	52	1 357	27	54	1 249	27	72	2 565	24	66	3 563	23	99	4 863	22
Enterococcus faecalis	52	4 630	24	56	4 938	25	72	5 788	24	66	5 851	22	101	7 486	20
Enterococcus faecium	52	3 918	47	55	4 732	49	72	5 087	46	66	5 203	43	99	6 663	39

Labs: laboratories.
[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.
[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Germany

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	12.02#	10.74#	9.07#	9.15#	9.75#	11.98	-	-0.3	-0.04	+22	-12	10.58	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	0.20#	0.11#	0.18#	0.23#	0.24#	0.33	↑	+65	+0.13	+109	-2	0.2	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	3.56#	2.91#	2.64#	2.15#	2.32#	2.43	↓	-31.7*	-1.13*	-933*	-10	3.2	4.48 (0.55–13.63)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

One or more of the three representativeness indicators (geographical, hospital and/or isolate representativeness) were not reported as 'High'. The results should be interpreted with caution.

* Target reached.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Germany

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	48.94#	44.66#	43.86#	44.75#	53.1	-	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	10.74#	9.07#	9.15#	9.75#	11.98	-	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0.02#	0.04#	0.03#	0.04#	0.07	↑	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	17.14#	14.61#	14.74#	16.65#	19.06	-	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	7.41#	5.28#	4.74#	5.10#	5.7	-	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2.71#	2.11#	1.72#	1.94#	2.09	-	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	2.38#	2.33#	2.26#	2.25#	2.81	-	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	0.11#	0.18#	0.23#	0.24#	0.33	↑	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	2.54#	2.41#	2.54#	2.62#	2.94	↑	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	1.17#	0.93#	0.87#	0.85#	0.85	↓	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	0.77#	0.57#	0.64#	0.62#	0.6	-	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	1.12#	1.30#	1.28#	1.30#	1.46	↑	1.81 (0.26–7.45)
	Ceftazidime resistance	0.96#	1.04#	0.94#	0.97#	0.95	-	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	1.35#	1.46#	1.22#	1.24#	1.45	-	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	1.03#	0.98#	0.90#	0.90#	0.91	-	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0.17^#	0.17#	0.19#	0.16#	0.18^	-	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	0.59^#	0.60^#	0.59#	0.59#	0.53^	-	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	0.07#	0.09#	0.08#	0.07#	0.06	-	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.11#	0.12#	0.11#	0.10#	0.1	-	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	0.09#	0.08#	0.09^#	0.06#	0.09^	-	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	0.04^#	0.05#	0.05^#	0.04#	0.04^	-	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	2.91#	2.64#	2.15#	2.32#	2.43	↓	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.29#	0.32#	0.42#	0.60#	0.66	↑	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.35#	0.27#	0.45#	0.63#	0.74	↑	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.10#	0.09#	0.19#	0.26#	0.29	↑	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	1.38^#	1.33^#	1.30^#	1.32^#	1.27^	-	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	3.18#	3.51#	2.67#	1.87#	1.72	↓	1.96 (0.00–9.97)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

One or more of the three representativeness indicators (geographical, hospital and/or isolate representativeness) were not reported as 'High'. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Germany, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	28 227	47.6	28 500	45.6	33 372	45.9	34 966	46.4	45 621	48.6	54.7 (34.4–71.1)	↑*
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	28 461	10.4	29 021	9.1	33 978	9.4	36 319	9.7	47 131	10.6	16.0 (6.8–38.7)	↑*
	Carbapenem (imipenem/meropenem) resistance	28 458	0	29 015	0	33 974	0	36 323	0	47 030	0.1	0.3 (0.0–2.5)	↑*
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	28 446	16.5	28 997	14.7	33 949	15.2	36 235	16.7	46 906	17	22.5 (9.9–49.3)	↑*
	Aminoglycoside (gentamicin/tobramycin) resistance	27 124	7.5	27 447	5.6	32 255	5.1	34 368	5.4	43 021	5.5	10.4 (4.5–29.6)	↓*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	27 110	2.7	27 427	2.2	32 232	1.9	34 301	2	42 860	2	5.5 (1.2–21.7)	↓*
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	5 988	10.9	6 538	10.4	7 445	10.6	8 125	10	10 943	10.7	32.9 (4.9–84.3)	-
	Carbapenem (imipenem/meropenem) resistance	5 991	0.5	6 538	0.8	7 445	1.1	8 126	1.1	10 928	1.2	11.3 (0.0–67.6)	↑*
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	5 991	11.7	6 422	10.9	7 443	11.9	8 111	11.7	10 923	11.2	31.4 (0.0–80.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	5 746	5.6	6 217	4.3	7 132	4.3	7 764	4	10 045	3.5	21.5 (0.0–73.8)	↓*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	5 740	3.7	6 099	2.7	7 130	3.1	7 751	2.9	10 023	2.5	18.8 (0.0–71.5)	↓*
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	2 641	11.7	2 842	13.3	3 202	14	3 566	13.2	4 596	13.3	16.4 (3.9–53.7)	-
	Ceftazidime resistance	2 660	9.9	2 861	10.6	3 209	10.3	3 572	9.8	4 612	8.6	13.8 (2.8–51.5)	↓*
	Carbapenem (imipenem/meropenem) resistance	2 662	13.9	2 864	14.8	3 209	13.2	3 579	12.5	4 618	13.1	15.9 (1.5–53.4)	↓*
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	2 662	10.6	2 865	10	3 209	9.8	3 577	9.1	4 613	8.3	15.3 (4.9–51.9)	↓*
	Aminoglycoside (tobramycin) resistance	2 374	2	2 600	1.9	2 993	2.2	3 349	1.7	3 946	1.9	7.0 (0.0–44.6)	-
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	2 351	6.9	2 573	6.8	2 975	6.9	3 331	6.4	3 920	5.7	10.0 (0.0–47.5)	↓*
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	607	3.1	605	4.3	758	3.6	854	3	1 075	2.2	31.6 (0.0–94.1)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	598	4.8	603	5.6	753	5	853	4.5	1 072	4	33.2 (0.0–95.2)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	549	4.7	549	4.2	683	4.7	787	2.7	900	4.1	29.0 (1.8–89.9)	-
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	548	2.2	546	2.9	681	2.8	786	1.9	898	1.7	27.0 (0.0–89.5)	-
Staphylococcus aureus	MRSA[d]	14 427	5.5	15 796	4.9	18 898	4	19 057	4.4	23 887	4.2	14.2 (1.9–46.0)	↓*
Streptococcus pneumoniae	Penicillin non-wild-type[e]	1 315	6	1 196	7.8	2 483	6	3 501	6.3	4 767	5.8	17.3 (0.0–36.6)	-
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	1 324	7.2	1 188	6.6	2 471	6.3	3 423	6.6	4 676	6.6	19.0 (4.0–44.2)	-
	Combined penicillin non-wild-type and resistance to macrolides[e]	1 282	2.1	1 136	2.2	2 389	2.8	3 362	2.9	4 581	2.6	11.1 (0.0–25.6)	-
Enterococcus faecalis	High-level gentamicin resistance	2 352	16.2	2 670	14.5	4 034	11.3	4 322	11.1	5 110	10.4	22.6 (4.8–49.2)	↓*
Enterococcus faecium	Vancomycin resistance	3 906	22.3	4 721	21.6	5 081	18.3	5 190	13.1	6 650	10.8	16.5 (0.0–61.7)	↓*

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; −indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates[a], by bacterial species and antimicrobial agent, Germany, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	NA	NA	NA	NA	NA	NA	13	NA	28	100
	Ceftazidime-avibactam	16^	57.1^	0^	0^	5^	17.9^	7	25	28	100
	Imipenem-relebactam	NA	NA	NA	NA	NA	NA	15	NA	28	100
	Meropenem-vaborbactam	NA	NA	NA	NA	NA	NA	18	NA	28	100
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	27^	19.9^	0^	0^	52^	38.2^	57	41.9	136	100
	Ceftazidime-avibactam	51^	37.5^	0^	0^	56^	41.2^	29	21.3	136	100
	Imipenem-relebactam	18^	13.2^	0^	0^	35^	25.7^	83	61	136	100
	Meropenem-vaborbactam	5^	3.7^	0^	0^	17^	12.5^	114	83.8	136	100
Peudomonas aeruginosa	Cefiderocol	79^	13^	0^	0^	9^	1.5^	519	85.5	607	100
	Ceftazidime-avibactam	114^	18.8^	0^	0^	57^	9.4^	436	71.8	607	100
	Ceftolozane-tazobactam	118^	19.4^	1^	0.2^	30^	4.9^	458	75.5	607	100
	Imipenem-relebactam	25^	4.1^	0^	0^	17^	2.8^	565	93.1	607	100
	Meropenem-vaborbactam	15^	2.5^	0^	0^	33^	5.4^	559	92.1	607	100
Acinetobacter spp.	Cefiderocol	NA	NA	NA	NA	NA	NA	20	NA	24	100

ND: no data. For example if no carbapenem-resistant isolates were reported.

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

Greece

Participating institutions
National Public Health Organization, Central Public Health Laboratory, https://eody.gov.gr/en/

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Greece, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	30	42	68	68	68
Geographical representativeness	High	High	High	High	High
Hospital representativeness	High	High	High	High	High
Isolate representativeness	Medium	Medium	High	High	High
Blood culture sets/1 000 patient days	ND	ND	ND	ND	ND

ND: no data available.
For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Greece, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	85	90	90	95

NA: not applicable. In 2020 there was no EARS-Net EQA.
For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Greece, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	13	567	6	19	729	6	31	1 241	6	34	1 872	6	32	1 605	6
Klebsiella pneumoniae	12	728	38	19	1 418	49	30	1 814	37	35	2 207	30	32	1 777	25
Peudomonas aeruginosa	12	390	35	19	576	38	31	896	36	34	1 301	33	32	1 151	28
***Acinetobacter* spp.**	12	742	47	19	1 378	60	31	1 565	44	35	1 637	41	30	1 152	36
Staphylococcus aureus	13	449	14	19	584	13	31	922	11	36	1 174	10	33	1 062	9
Streptococcus pneumoniae	ND	ND	ND	ND	ND	ND	17	46	11	22	77	9	19	59	20
Enterococcus faecalis	11	376	28	19	687	38	31	971	27	34	1 046	27	33	829	23
Enterococcus faecium	12	460	39	18	964	47	29	1 181	34	33	1 284	24	31	983	22

Labs: laboratories.
ND: no data available.
[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.
[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Greece

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	2.58#	3.86#	3.52#	3.99	5.61	5.4	NA	+109.3	+2.82	+285	0	2.58	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	13.05#	14.96#	23.30#	18.02	21.44	14.89	NA	+14.1	+1.84	+149	-5	12.4	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	4.59#	5.60#	5.44#	4.96	6.51	5.54	NA	+20.7	+0.95	+84	-10	4.13	4.48 (0.55–13.63)

NA, not applicable.

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

One or more of the three representativeness indicators (geographical, hospital and/or isolate representativeness) were not reported as 'High'. The results should be interpreted with caution.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Greece

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	7.81^#	7.42^#	7.63^	12.89^	10.52^	NA	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	3.86#	3.52#	3.99	5.61	5.4	NA	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0.09#	0.18#	0.26	0.41	0.27	NA	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	5.75#	5.51#	6.49	9.93	8.2	NA	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	3.27#	2.99#	3.27	5.32	4.16	NA	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1.83#	1.90#	1.72	2.89	2.62	NA	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	16.82#	25.37#	19.55	22.18	16.43	NA	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	14.96#	23.30#	18.02	21.44	14.89	NA	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	16.79#	25.28#	19.67	23.53	17.26	NA	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	13.62#	21.56#	16.99	19.53	14.24	NA	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	12.94#	20.98#	16.49	18.17	12.88^	NA	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	2.99^#	4.17^#	5.94	9.31	7.45^	NA	1.81 (0.26–7.45)
	Ceftazidime resistance	3.23^#	3.70#	5.28	9.15	7.61	NA	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	4.20#	4.28#	5.99	9.76	8.34	NA	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	4.45^#	4.59#	6.03	9.46	8.05	NA	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	2.67^#	2.74^#	3.43^	5.99^	5.06^	NA	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	1.80^#	2.68^#	3.47^	5.83^	4.91^	NA	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	21.77#	29.77#	20.36	21.18	14.59	NA	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	21.71#	29.70#	20.43	21.03	13.60^	NA	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	20.43#	25.86#	18.88	19.39	12.50^	NA	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	20.18#	25.71#	18.71	19.15	12.29^	NA	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	5.60#	5.44#	4.96	6.51	5.54	NA	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	ND	ND	0.19^	0.35^	0.21^	NA	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	ND	ND	0.21	0.27	0.27	NA	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	ND	ND	0.06^	0.14^	0.16^	NA	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	0.90^#	1.09^#	1.28^	1.13^	0.82^	NA	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	5.78#	8.70#	7.95	10.48	8.17	NA	1.96 (0.00–9.97)

ND, no data available; NA, not applicable.

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

One or more of the three representativeness indicators (geographical, hospital and/or isolate representativeness) were not reported as 'High'. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Greece, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	452	55.5	557	59.8	964	57.1	1 579	57.8	1 260	59	54.7 (34.4–71.1)	NA
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	567	21.9	727	21.7	1 235	23.3	1 739	22.8	1 498	25.5	16.0 (6.8–38.7)	NA
	Carbapenem (imipenem/meropenem) resistance	566	0.5	728	1.1	1 240	1.5	1 867	1.6	1 591	1.2	0.3 (0.0–2.5)	NA
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	565	32.7	728	33.9	1 239	37.8	1 861	37.8	1 596	36.3	22.5 (9.9–49.3)	NA
	Aminoglycoside (gentamicin/tobramycin) resistance	562	18.7	719	18.6	1 239	19	1 828	20.6	1 558	18.9	10.4 (4.5–29.6)	NA
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	561	10.5	717	11.9	1 231	10.1	1 703	12	1 454	12.7	5.5 (1.2–21.7)	NA
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	726	74.5	1 416	80.4	1 802	78.2	2 078	75.6	1 658	70.1	32.9 (4.9–84.3)	NA
	Carbapenem (imipenem/meropenem) resistance	726	66.3	1 418	73.7	1 803	72	2 179	69.7	1 748	60.2	11.3 (0.0–67.6)	NA
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	726	74.4	1 418	80	1 802	78.7	2 166	76.9	1 748	69.9	31.4 (0.0–80.3)	NA
	Aminoglycoside (gentamicin/tobramycin) resistance	718	61	1 399	69.1	1 803	67.9	2 136	64.7	1 691	59.6	21.5 (0.0–73.8)	NA
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	714	58.3	1 397	67.4	1 796	66.2	2 038	63.2	1 584	57.5	18.8 (0.0–71.5)	NA
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	270	35.6	513	36.5	847	50.5	1 212	54.4	982	53.7	16.4 (3.9–53.7)	NA
	Ceftazidime resistance	344	30.2	529	31.4	851	44.8	1 229	52.7	1 045	51.5	13.8 (2.8–51.5)	NA
	Carbapenem (imipenem/meropenem) resistance	378	35.7	576	33.3	887	48.7	1 294	53.4	1 105	53.4	15.9 (1.5–53.4)	NA
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	333	42.9	576	35.8	884	49.2	1 289	52	1 097	51.9	15.3 (4.9–51.9)	NA
	Aminoglycoside (tobramycin) resistance	301	28.6	432	28.5	601	41.1	920	46.1	803	44.6	7.0 (0.0–44.6)	NA
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	171	33.9	378	31.7	549	45.5	851	48.5	731	47.5	10.0 (0.0–47.5)	NA
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	740	94.6	1 377	96.9	1 531	95.9	1 574	95.3	1 097	94.1	31.6 (0.0–94.1)	NA
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	729	95.7	1 371	97.2	1 527	96.5	1 566	95.1	1 011	95.2	33.2 (0.0–95.2)	NA
	Aminoglycoside (gentamicin/tobramycin) resistance	727	90.4	1 269	91.4	1 527	89.1	1 558	88.1	997	88.7	29.0 (1.8–89.9)	NA
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	715	90.8	1 262	91.4	1 522	88.6	1 551	87.4	989	87.9	27.0 (0.0–89.5)	NA
Staphylococcus aureus	MRSA[d]	448	40.2	583	41.9	918	39	1 118	41.2	967	40.5	14.2 (1.9–46.0)	NA
Streptococcus pneumoniae	Penicillin non-wild-type[e]	ND	ND	ND	ND	30	46.7	64	39.1	52	28.8	17.3 (0.0–36.6)	NA
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	ND	ND	ND	ND	44	34.1	73	26	56	33.9	19.0 (4.0–44.2)	NA
	Combined penicillin non-wild-type and resistance to macrolides[e]	ND	ND	ND	ND	29	13.8f	60	16.7	50	22	11.1 (0.0–25.6)	NA
Enterococcus faecalis	High-level gentamicin resistance	298	9.7	517	9.5	755	12.2	762	10.5	587	9.9	22.6 (4.8–49.2)	NA
Enterococcus faecium	Vancomycin resistance	445	41.8	950	41.1	1 168	49.1	1 266	58.6	981	58.9	16.5 (0.0–61.7)	NA

ND, no data available; NA, not applicable.

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; −indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period. For Greece the change comprises the decrease in the number of laboratories reporting data, starting with 2019 data as EARS-Net was restricted to laboratories using EUCAST or EUCAST-harmonised methodology and breakpoints.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

[f] A small number of isolates were tested (n < 30), and the percentage resistance should be interpreted with caution.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Greece, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	6	31.6	0	0	7	36.8	6	31.6	19	100
	Imipenem-relebactam	2	10.5	0	0	5	26.3	12	63.2	19	100
	Meropenem-vaborbactam	3	15.8	0	0	6	31.6	10	52.6	19	100
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	310	29.4	12	1.1	406	38.6	325	30.9	1053	100
	Imipenem-relebactam	191	18.1	4	0.4	267	25.4	591	56.1	1053	100
	Meropenem-vaborbactam	230	21.8	4	0.4	313	29.7	506	48.1	1053	100
Peudomonas aeruginosa	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	75	12.7	0	0	384	65.1	131	22.2	590	100
	Ceftolozane-tazobactam	66	11.2	0	0	331	56.1	193	32.7	590	100
	Imipenem-relebactam	30	5.1	0	0	228	38.6	332	56.3	590	100
	Meropenem-vaborbactam	24	4.1	0	0	264	44.7	302	51.2	590	100
Acinetobacter spp.	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: no data. For example if no carbapenem-resistant isolates were reported.

Hungary

Participating institutions
National Public Health Center, www.oek.hu

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Hungary, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	90	90	90	90	90
Geographical representativeness	High	High	High	High	High
Hospital representativeness	High	High	High	High	High
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient days	17.2	22	18.4	19.5	21.9

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Hungary, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	100	93	96	96

NA: not applicable. In 2020 there was no EARS-Net EQA.
For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Hungary, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	29	1 963	15	30	2 474	16	27	2 567	13	23	2 761	10	23	3 068	7
Klebsiella pneumoniae	26	730	32	30	1 110	33	26	973	28	22	1 149	28	23	1 266	17
Peudomonas aeruginosa	26	779	44	30	1 226	57	25	1 016	45	23	950	37	23	1 017	30
***Acinetobacter* spp.**	24	534	NA	29	1 447	74	25	551	64	21	430	46	22	505	41
Staphylococcus aureus	28	1 513	23	29	2 359	22	24	2 072	17	22	2 028	16	21	2 204	11
Streptococcus pneumoniae	21	124	25	27	186	27	25	293	17	22	284	16	23	382	15
Enterococcus faecalis	28	962	49	31	1 562	55	25	1 020	38	24	946	29	23	1 020	24
Enterococcus faecium	27	471	NA	30	710	NA	24	531	40	22	449	38	22	458	30

Labs: laboratories.
NA: not applicable.
[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.
[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Hungary

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	5.65	4.49	5.75	6.64	6.81	7.37	↑	+30.4	+1.72	+154	0	5.65	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	0.09	0.06	0.11	0.57	0.76	0.97	↑	+977.8	+0.88	+84	-2	0.09	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	4.15	3.61	5.2	4.97	4.85	4.42	-	+6.5	+0.27	+18	-10	3.73	4.48 (0.55–13.63)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Hungary

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	12.02	15.12	15.64	16.72	17.98	↑	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	4.49	5.75	6.64	6.81	7.37	↑	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0	0	0.06	0.07	0.03	-	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	6.76	7.88	8.5	8.22	8.88	↑	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	3.71	4.93	4.79	4.71	4.65	-	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1.94	2.79	3.06	2.94	2.76	-	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	3.34	4.9	4.54	5.59	5.83	↑	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	0.06	0.11	0.57	0.76	0.97	↑	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	3.38	4.73	4.32	5.01	5.29	↑	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	2.89	4.02	3.64	4.18	4.16	↑	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2.62	3.64	3.14	3.51	3.22	-	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	1.79	2.66	2.17	2.03	1.96	-	1.81 (0.26–7.45)
	Ceftazidime resistance	1.81	2.76	2.08	1.96	1.74	-	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	2.99	4.81	3.64	3.4	3.62	-	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	1.94	3.09	2.12	1.72	1.62	-	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0.99	1.37	1.04	0.86	0.93	-	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	1.33	2.16	1.43	1.37	1.39	-	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	4.44	13.69	3.65	2.29	2.82	↓	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	4.64	14.08	4.03	2.43	2.92	↓	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	4.38	13.39	2.96	1.96	2.57	↓	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	4.17	13.06	2.76	1.83	2.43	↓	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	3.61	5.2	4.97	4.85	4.42	-	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.13	0.26	0.21	0.23	0.37	↑	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.23	0.3	0.36	0.46	0.59	↑	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.11	0.13	0.15	0.2	0.21	-	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	4.66	7.19	4.21	3.66	3.12^	↓	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	1.87	3.3	2.18	1.98	1.9	-	1.96 (0.00–9.97)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Hungary, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	1 804	58.6	2 263	58.5	2 335	58.4	2 519	57.4	2 778	55.8	54.7 (34.4–71.1)	↓*
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	1 962	20.1	2 470	20.4	2 565	22.6	2 756	21.3	3 067	20.7	16.0 (6.8–38.7)	-
	Carbapenem (imipenem/meropenem) resistance	1 917	0	2 391	0	2 515	0.2	2 688	0.2	3 005	0.1	0.3 (0.0–2.5)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	1 958	30.3	2 460	28	2 531	29.3	2 732	26	3 051	25.1	22.5 (9.9–49.3)	↓*
	Aminoglycoside (gentamicin/tobramycin) resistance	1 954	16.7	2 469	17.5	2 561	16.3	2 754	14.8	3 058	13.1	10.4 (4.5–29.6)	↓*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1 950	8.8	2 452	10	2 526	10.6	2 726	9.3	3 041	7.8	5.5 (1.2–21.7)	-
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	728	40.4	1 110	38.6	972	40.7	1 149	42	1 264	39.8	32.9 (4.9–84.3)	-
	Carbapenem (imipenem/meropenem) resistance	721	0.7	1 092	0.9	948	5.3	1 136	5.8	1 249	6.7	11.3 (0.0–67.6)	↑*
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	728	40.8	1 096	37.8	953	39.6	1 139	38	1 250	36.5	31.4 (0.0–80.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	727	34.9	1 107	31.8	973	32.6	1 149	31.4	1 260	28.5	21.5 (0.0–73.8)	↓*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	723	31.8	1 093	29.2	952	28.8	1 139	26.6	1 244	22.3	18.8 (0.0–71.5)	↓*
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	774	20.3	1 195	19.5	1 008	18.8	942	18.6	1 012	16.7	16.4 (3.9–53.7)	↓
	Ceftazidime resistance	772	20.6	1 221	19.8	1 014	17.9	947	17.8	1 005	14.9	13.8 (2.8–51.5)	↓*
	Carbapenem (imipenem/meropenem) resistance	779	33.8	1 226	34.3	1 016	31.2	950	30.9	1 016	30.7	15.9 (1.5–53.4)	↓*
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	777	22	1 221	22.2	1 014	18.2	948	15.7	1 012	13.8	15.3 (4.9–51.9)	↓*
	Aminoglycoside (tobramycin) resistance	761	11.4	1 207	9.9	990	9.2	938	7.9	1 001	8	7.0 (0.0–44.6)	↓*
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	751	15.6	1 170	16.2	983	12.7	926	12.7	980	12.2	10.0 (0.0–47.5)	↓*
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	534	73	1 445	83	549	57.9	429	46.2	504	48.2	31.6 (0.0–94.1)	↓*
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	530	77	1 441	85.6	550	63.8	429	49	500	50.4	33.2 (0.0–95.2)	↓*
	Aminoglycoside (gentamicin/tobramycin) resistance	532	72.4	1 434	81.8	547	47.2	426	39.7	503	44.1	29.0 (1.8–89.9)	↓*
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	529	69.4	1 429	80.1	544	44.3	424	37.3	499	42.1	27.0 (0.0–89.5)	↓*
Staphylococcus aureus	MRSA[d]	1 513	21	2 359	19.3	2 072	20.9	2 028	20.7	2 204	17.3	14.2 (1.9–46.0)	↓
Streptococcus pneumoniae	Penicillin non-wild-type[e]	124	8.9	185	12.4	293	6.1	284	7	380	8.4	17.3 (0.0–36.6)	-
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	115	17.4	175	14.9	288	10.8	279	14.3	376	13.6	19.0 (4.0–44.2)	-
	Combined penicillin non-wild-type and resistance to macrolides[e]	115	8.7	174	6.3	288	4.5	279	6.1	374	4.8	11.1 (0.0–25.6)	-
Enterococcus faecalis	High-level gentamicin resistance	962	42.6	1 561	40.4	1 020	36	946	33.4	792	34	22.6 (4.8–49.2)	↓*
Enterococcus faecium	Vancomycin resistance	471	34.8	710	40.7	531	35.8	448	38.2	456	36	16.5 (0.0–61.7)	-

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; −indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Hungary, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	0	0	0	0	1	33.3	2	66.7	3	100
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	2	2.4	0	0	0	0	82	97.6	84	100
	Cefiderocol	8	9.5	0	0	18	21.4	58	69	84	100
	Ceftazidime-avibactam	10	11.9	0	0	53	63.1	21	25	84	100
	Imipenem-relebactam	0	0	0	0	3	3.6	81	96.4	84	100
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Peudomonas aeruginosa	Cefiderocol	19	6.1	0	0	0	0	293	93.9	312	100
	Ceftazidime-avibactam	134	42.9	0	0	56	17.9	122	39.1	312	100
	Ceftolozane-tazobactam	101	32.4	0	0	34	10.9	177	56.7	312	100
	Imipenem-relebactam	1	0.3	0	0	10	3.2	301	96.5	312	100
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acinetobacter spp.	Cefiderocol	21	8.6	0	0	3	1.2	219	90.1	243	100

ND: no data. For example if no carbapenem-resistant isolates were reported.

Iceland

Participating institutions
National University Hospital of Iceland, https://www.landspitali.is
Centre for Health Security and Infectious Disease Control, https://www.landlaeknir.is
Akureyri hospital, www.sak.is

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Iceland, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	100	100	100	100	100
Geographical representativeness	High	High	High	High	High
Hospital representativeness	High	High	High	High	High
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient days	61.3	64.4	69.8	72	72

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Iceland, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	100	50	50	100

NA: not applicable. In 2020 there was no EARS-Net EQA.
For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Iceland, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	2	245	2	2	278	1	2	235	2	2	258	3	2	290	1
Klebsiella pneumoniae	2	32	3	2	29	4[c]	2	32	0	2	44	5	2	41	5
Peudomonas aeruginosa	2	25	19[c]	2	32	7	2	35	6	2	27	8[c]	2	20	12[c]
***Acinetobacter* spp.**	1	3	NA	1	8	NA	1	2	NA	1	1	NA	2	3	NA
Staphylococcus aureus	2	116	6	2	96	4	2	144	7	2	129	4	2	143	4
Streptococcus pneumoniae	2	20	0[c]	2	16	NA	2	35	3	2	38	0	2	37	3
Enterococcus faecalis	2	30	7	2	37	6	2	29	7[c]	2	33	7	2	46	9
Enterococcus faecium	2	19	NA	2	18	NA	2	33	6	2	39	11	2	28	7[c]

Labs: laboratories.
NA: not applicable.
[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.
[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).
c A small number of isolates were tested (n < 30), and the percentage of isolates from ICUs should be interpreted with caution.

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Iceland

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	5.04	7.41	7.86	6.11	7.99	10.69	↑	+112.1	+5.65	+23	NA	NA	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	ND	0	0	0	0	0	NA	NA	NA	NA	NA	NA	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	1.96	1.65	0.27	1.06	2.06	2.09	-	+6.6	+0.13	+1	NA	NA	4.48 (0.55–13.63)

ND, no data available; NA, not applicable.

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Iceland

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	37.07	34.98	29.24	35.07	40.41	-	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	7.41	7.86	6.11	7.99	10.69	-	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0	0	0	0	0.26		0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	7.96	10.85	6.38	8.51	10.43	-	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	5.22	7.05	4.78	3.61	6.78	-	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2.2	2.17	2.39	2.06	3.13	-	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	0	0.27	0.27	0.77	0.52	-	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	0	0	0	0	0		3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	0	0	0.8	1.29	0	-	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	0	0	0	0.52	0	-	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	0	0	0	0	0		4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	ND	1.63	0.8	0.26	0.26	NA	1.81 (0.26–7.45)
	Ceftazidime resistance	0.55	0.81	0.53	0.52	0.78	-	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	0.82	0.81	1.06	0.26	0.26	-	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.27	0.54	1.06	0.52	0.52	-	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0	0	0	0	0		0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	ND	0.27	0.27	0.26	0.26	NA	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	0	0	0	0	0		2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0	0	0	0	0		2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	0	0	0	0	0		2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	0	0	0	0	0		2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	1.65	0.27	1.06	2.06	2.09	-	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	1.65	1.36	2.66	1.29	1.56	-	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	1.65	1.08	2.92	1.29	1.3	-	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	1.65	1.08	2.66	0.77	0.78	-	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	0.55	0.81	1.59	1.55	1.82	-	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	0	0	0	0	0		1.96 (0.00–9.97)

ND, no data available; NA, not applicable.

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Iceland, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	245	55.1	277	46.6	235	46.8	258	52.7	290	53.4	54.7 (34.4-71.1)	-
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	245	11	278	10.4	235	9.8	258	12	290	14.1	16.0 (6.8-38.7)	-
	Carbapenem (imipenem/meropenem) resistance	245	0	276	0	235	0	258	0	290	0.3	0.3 (0.0-2.5)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	245	11.8	277	14.4	235	10.2	258	12.8	290	13.8	22.5 (9.9-49.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	245	7.8	278	9.4	235	7.7	258	5.4	290	9	10.4 (4.5-29.6)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	245	3.3	277	2.9	235	3.8	258	3.1	290	4.1	5.5 (1.2-21.7)	-
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	32	0	29	3.4[f]	32	3.1	44	6.8	41	4.9	32.9 (4.9-84.3)	-
	Carbapenem (imipenem/meropenem) resistance	32	0	29	0.0[f]	32	0	44	0	41	0	11.3 (0.0-67.6)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	32	0	29	0.0[f]	32	9.4	44	11.4	41	0	31.4 (0.0-80.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	32	0	29	0.0[f]	32	0	44	4.5	41	0	21.5 (0.0-73.8)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	32	0	29	0.0[f]	32	0	44	0	41	0	18.8 (0.0-71.5)	-
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	ND	ND	31	19.4	35	8.6	27	3.7[f]	20	5.0[f]	16.4 (3.9-53.7)	NA
	Ceftazidime resistance	25	8.0[f]	32	9.4	35	5.7	27	7.4[f]	20	15.0[f]	13.8 (2.8-51.5)	-
	Carbapenem (imipenem/meropenem) resistance	25	12.0[f]	32	9.4	35	11.4	27	3.7[f]	20	5.0[f]	15.9 (1.5-53.4)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	25	4.0[f]	32	6.3	35	11.4	27	7.4[f]	20	10.0[f]	15.3 (4.9-51.9)	-
	Aminoglycoside (tobramycin) resistance	25	0.0[f]	32	0	35	0	27	0.0[f]	20	0.0[f]	7.0 (0.0-44.6)	-
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	ND	ND	31	3.2	35	2.9	27	3.7[f]	20	5.0[f]	10.0 (0.0-47.5)	NA
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	3	NA	8	NA	2	NA	1	NA	3	NA	31.6 (0.0-94.1)	NA
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	3	NA	8	NA	2	NA	1	NA	3	NA	33.2 (0.0-95.2)	NA
	Aminoglycoside (gentamicin/tobramycin) resistance	3	NA	8	NA	2	NA	1	NA	3	NA	29.0 (1.8-89.9)	NA
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	3	NA	8	NA	2	NA	1	NA	3	NA	27.0 (0.0-89.5)	NA
Staphylococcus aureus	MRSA[d]	116	5.2	95	1.1	144	2.8	129	6.2	143	5.6	14.2 (1.9-46.0)	-
Streptococcus pneumoniae	Penicillin non-wild-type[e]	20	30.0[f]	16	NA	35	28.6	38	13.2	37	16.2	17.3 (0.0-36.6)	NA
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	20	30.0[f]	16	NA	35	31.4	38	13.2	37	13.5	19.0 (4.0-44.2)	NA
	Combined penicillin non-wild-type and resistance to macrolides[e]	20	30.0[f]	16	NA	35	28.6	38	7.9	37	8.1	11.1 (0.0-25.6)	NA
Enterococcus faecalis	High-level gentamicin resistance	30	6.7	37	8.1	29	20.7[f]	33	18.2	46	15.2	22.6 (4.8-49.2)	-
Enterococcus faecium	Vancomycin resistance	19	NA	18	NA	33	0	39	0	28	0.0[f]	16.5 (0.0-61.7)	NA

ND, no data available; NA, not applicable.

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; −indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

[f] A small number of isolates were tested (n < 30), and the percentage resistance should be interpreted with caution.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Iceland, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	0	0	0	0	1	100	0	0	1	100
	Ceftazidime-avibactam	0	0	0	0	1	100	0	0	1	100
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	0	0	0	0	1	100	0	0	1	100
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Peudomonas aeruginosa	Cefiderocol	1	100	0	0	0	0	0	0	1	100
	Ceftazidime-avibactam	0	0	0	0	1	100	0	0	1	100
	Ceftolozane-tazobactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acinetobacter spp.	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: no data. For example if no carbapenem-resistant isolates were reported.

Ireland

Participating institutions

Health Protection Surveillance Centre, www.hpsc.ie

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Ireland, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	96	96	93	92	85
Geographical representativeness	High	High	High	High	High
Hospital representativeness	High	High	High	High	High
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient days	56.5	56.5	55.8	56.5	59.5

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Ireland, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	ND	85	90	91

ND: no data available.

NA: not applicable. In 2020 there was no EARS-Net EQA.

For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Ireland, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	33	2 851	NA	32	2 906	NA	32	3 008	NA	30	3 120	NA	31	2 885	3
Klebsiella pneumoniae	33	487	NA	31	502	NA	30	469	NA	28	571	NA	28	494	8
Peudomonas aeruginosa	26	264	NA	26	280	NA	27	303	NA	27	287	NA	29	264	9
***Acinetobacter* spp.**	17	54	NA	17	68	NA	17	78	NA	16	65	6	15	57	6
Staphylococcus aureus	31	1 024	NA	32	1 213	NA	31	1 178	NA	29	1 242	NA	29	1 060	6
Streptococcus pneumoniae	27	177	NA	24	168	NA	25	286	NA	24	341	NA	24	352	2
Enterococcus faecalis	31	312	NA	31	349	NA	30	357	NA	26	363	NA	30	288	9
Enterococcus faecium	26	472	NA	25	603	NA	25	610	NA	27	614	NA	25	512	16

Labs: laboratories.

NA: not applicable.

[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.

[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Ireland

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	8.28	7.07	6.01	6.18	6.7	7.54	-	-8.9	-0.74	-3	-10	7.45	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	0.11	0.04	0.06	0.06	0.04	0.02	-	-81.8*	-0.09*	-4*	-2	0.11	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	3.06	2.5	2.68	2.61	2.47	2.57	-	-16.0*	-0.49*	-12*	-6	2.88	4.48 (0.55–13.63)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

* Target reached.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Ireland

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	38.75	37.99	39.42	40.46	39.24	-	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	7.07	6.01	6.18	6.7	7.54	-	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0.04	0	0	0.04	0.04	-	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	11.27	9.63	9.95	10.08	9.5	↓	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	6.36	5.78	5.53	5.61	5.96	-	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2.79	2.39	2.25	2.04	2.42	-	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	1.91	1.62	1.25	1.88	1.63	-	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	0.04	0.06	0.06	0.04	0.02	-	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	1.74	1.69	0.98	1.79	1.03	-	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	1.18	1.1	0.79	1.03	0.64	↓	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	0.8	0.79	0.34	0.64	0.31	↓	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	0.65	0.83	0.51^	0.64	0.31	↓	1.81 (0.26–7.45)
	Ceftazidime resistance	0.52	0.65	0.57	0.39	0.24	↓	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	0.4	0.48	0.55	0.39	0.31	-	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.76	0.5	0.49	0.43	0.42	↓	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0.06^	0.17^	0.11^	0.04^	0.09^	-	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	0.04^	0.29^	0.23^	0.21^	0.09^	-	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	0	0.02	0.04	0	0	-	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.06^	0.04^	0.02^	0.02	0.07^	-	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	0.02^	0.04	0.02^	0.00^	0.02	-	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	0.00^	0.00^	0.00^	0.00^	0.00^		2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	2.5	2.68	2.61	2.47	2.57	-	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.59	0.69	1.49	1.18	1.63	↑	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.46	0.42	0.91	1.03	1.03	↑	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.36	0.25	0.7	0.62	0.77	↑	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	0.59^	0.94^	0.85^	0.95^	0.51^	-	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	3.53	3.45	3.68	2.66	2.37	↓	1.96 (0.00–9.97)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Ireland, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	2 841	65	2 898	63	3 003	61.8	3 115	63	2 800	63.7	54.7 (34.4–71.1)	-
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	2 850	11.8	2 903	10	3 007	9.7	3 118	10.4	2 879	11.9	16.0 (6.8–38.7)	-
	Carbapenem (imipenem/meropenem) resistance	2 820	0.1	2 891	0	2 996	0	3 069	0.1	2 883	0.1	0.3 (0.0–2.5)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	2 844	18.9	2 898	16	3 000	15.6	3 062	16	2 872	15	22.5 (9.9–49.3)	↓*
	Aminoglycoside (gentamicin/tobramycin) resistance	2 849	10.6	2 904	9.6	3 004	8.7	3 111	8.7	2 884	9.4	10.4 (4.5–29.6)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2 841	4.7	2 895	4	2 995	3.5	3 052	3.2	2 868	3.8	5.5 (1.2–21.7)	↓*
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	487	18.7	502	15.5	469	12.6	570	16	492	15	32.9 (4.9–84.3)	-
	Carbapenem (imipenem/meropenem) resistance	477	0.4	497	0.6	468	0.6	563	0.4	493	0.2	11.3 (0.0–67.6)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	486	17.1	500	16.2	466	9.9	561	15.5	485	9.7	31.4 (0.0–80.3)	↓*
	Aminoglycoside (gentamicin/tobramycin) resistance	485	11.5	502	10.6	469	7.9	571	8.8	493	5.9	21.5 (0.0–73.8)	↓*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	484	7.9	500	7.6	466	3.4	560	5.5	485	2.9	18.8 (0.0–71.5)	↓*
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	241	12.9	262	15.3	237	10.1	278	11.2	259	5.4	16.4 (3.9–53.7)	↓*
	Ceftazidime resistance	240	10.4	277	11.2	281	9.6	279	6.8	261	4.2	13.8 (2.8–51.5)	↓*
	Carbapenem (imipenem/meropenem) resistance	261	7.3	280	8.2	302	8.6	287	6.6	262	5.3	15.9 (1.5–53.4)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	262	13.7	277	8.7	299	7.7	277	7.6	263	7.2	15.3 (4.9–51.9)	↓*
	Aminoglycoside (tobramycin) resistance	161	1.9	244	3.3	267	1.9	240	0.8	232	1.7	7.0 (0.0–44.6)	-
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	138	1.4	225	6.2	199	5.5	230	4.3	227	1.8	10.0 (0.0–47.5)	-
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	52	0	66	1.5	78	2.6	64	0	56	0	31.6 (0.0–94.1)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	41	7.3	60	3.3	65	1.5	62	1.6	51	5.9	33.2 (0.0–95.2)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	48	2.1	64	3.1	67	1.5	58	0	57	1.8	29.0 (1.8–89.9)	-
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	35	0	56	0	56	0	56	0	51	0	27.0 (0.0–89.5)	-
Staphylococcus aureus	MRSA[d]	1 024	11.6	1 213	10.6	1 178	10.4	1 242	9.7	1 060	11	14.2 (1.9–46.0)	-
Streptococcus pneumoniae	Penicillin non-wild-type[e]	177	15.8	168	19.6	286	24.5	341	16.7	352	21	17.3 (0.0–36.6)	-
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	170	12.9	159	12.6	270	15.9	333	15	351	13.4	19.0 (4.0–44.2)	-
	Combined penicillin non-wild-type and resistance to macrolides[e]	170	10	159	7.5	270	12.2	333	9	351	10	11.1 (0.0–25.6)	-
Enterococcus faecalis	High-level gentamicin resistance	175	16	260	17.3	259	15.4	299	15.4	199	11.6	22.6 (4.8–49.2)	-
Enterococcus faecium	Vancomycin resistance	471	35.7	602	27.6	609	28.4	613	21	512	21.1	16.5 (0.0–61.7)	↓*

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; –indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Ireland, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	1	100	0	0	0	0	0	0	1	100
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Peudomonas aeruginosa	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	0	0	0	0	1	7.1	13	92.9	14	100
	Ceftolozane-tazobactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acinetobacter spp.	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: no data. For example if no carbapenem-resistant isolates were reported.

Italy

Participating institutions
National Institute of Health, www.iss.it

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Italy, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	47	61	61	66	67
Geographical representativeness	High	High	High	High	High
Hospital representativeness	High	High	High	High	High
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient days	57	66.6	60.1	61.2	65.7

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Italy, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	98	85	91	92

NA: not applicable. In 2020 there was no EARS-Net EQA.
For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Italy, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	151	19 086	6	156	22 038	7	172	25 850	7	192	28 756	7	205	31 994	7
Klebsiella pneumoniae	147	8 597	24	154	9 724	24	172	11 762	19	196	13 968	18	207	15 613	18
Peudomonas aeruginosa	145	4 678	27	154	5 085	26	170	6 032	23	192	6 695	21	202	7 458	20
***Acinetobacter* spp.**	123	2 577	48	129	3 342	53	150	2 895	39	173	3 114	30	185	3 366	28
Staphylococcus aureus	149	11 164	14	154	12 680	14	170	14 863	12	194	15 425	11	207	16 640	11
Streptococcus pneumoniae	109	685	10	107	672	14	136	1 201	11	160	1 796	11	169	1 987	11
Enterococcus faecalis	149	6 354	28	150	7 686	27	166	8 261	20	191	8 174	18	201	8 823	17
Enterococcus faecium	138	4 243	26	150	5 358	26	164	6 070	20	183	6 109	17	201	6 425	17

Labs: laboratories.
[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.
[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Italy

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	22.96	17.67	14.77	17.29	19.56	22.19	-	-3.4	-0.77	-770	-12	20.2	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	8.43	8.73	6.99	7.77	9.29	9.29	-	+10.2	+0.86	+391	-5	8.01	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	13.42	13.07	10.28	11.7	10.18	10.54	↓	-21.5*	-2.88*	-1 889*	-18	11	4.48 (0.55–13.63)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

* Target reached.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Italy

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	9.70^	9.66^	12.99^	14.53^	21.42^	↑	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	17.67	14.77	17.29	19.56	22.19	↑	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0.3	0.24	0.18	0.31	0.36	-	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	25.26	19.98	22.26	24.55	27.31	-	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	9.59	7.98	10.04	11.76	13.26	↑	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	6.16	5	6.28	7.32	8.15	↑	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	16.28	14.27	17.24	19.58	20.6	↑	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	8.73	6.99	7.77	9.29	9.29	-	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	15.87	13.32	15.59	17.42	18.27	↑	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	9.11	7.96	10.17	11.56	12.1	↑	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	8.26	7.2	9.24	10.26	10.6	↑	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	3.92	3.27	3.95	3.68	3.71	-	1.81 (0.26–7.45)
	Ceftazidime resistance	3.09	2.73	3.11	2.98	3.04	-	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	2.63	2.4	2.72	2.72	2.57	-	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	3.22	2.66	3.07	2.74	2.61	↓	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	ND	ND	0.62^	0.77^	0.73^	NA	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	ND	ND	1.08^	1.26^	1.07^	NA	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	7.36	8.03	6.75	6.04	6.23	↓	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	7.51	8.12	6.97	6.01	6.16	↓	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	7.15	7.78	6.68	5.78	5.5	↓	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	6.88	7.62	6.19	5.55	5.25	↓	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	13.07	10.28	11.7	10.18	10.54	↓	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.25^	0.14^	0.28^	0.41^	0.48^	↑	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.55	0.43	0.79	1.15	1.32	↑	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.14^	0.09^	0.15^	0.21^	0.29^	↑	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	4.03^	3.23^	3.36^	3.07^	3.03^	↓	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	3.51	3.87	5.04	5.03	5.58	↑	1.96 (0.00–9.97)

ND, no data available; NA, not applicable.

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Italy, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	4 214	64.5	5 850	59.6	7 590	61.6	8 951	63.2	13 065	64.8	54.7 (34.4–71.1)	↑*
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	18 750	26.4	21 897	24.4	25 656	24.2	28 557	26.7	31 619	27.7	16.0 (6.8–38.7)	↑*
	Carbapenem (imipenem/meropenem) resistance	18 001	0.5	20 645	0.4	24 042	0.3	27 623	0.4	31 435	0.4	0.3 (0.0–2.5)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	18 840	37.6	21 642	33.4	25 320	31.6	27 993	34.1	31 286	34.5	22.5 (9.9–49.3)	↓*
	Aminoglycoside (gentamicin/tobramycin) resistance	17 994	14.9	21 358	13.5	25 448	14.2	28 594	16	31 282	16.8	10.4 (4.5–29.6)	↑*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	17 593	9.8	21 045	8.6	24 996	9	27 876	10.2	30 538	10.5	5.5 (1.2–21.7)	↑*
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	8 400	54.3	9 616	53.6	11 637	53.3	13 818	55.2	15 377	52.9	32.9 (4.9–84.3)	-
	Carbapenem (imipenem/meropenem) resistance	8 293	29.5	9 281	27.2	11 226	24.9	13 654	26.5	15 322	24	11.3 (0.0–67.6)	↓*
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	8 486	52.4	9 487	50.7	11 513	48.7	13 547	50.1	15 139	47.7	31.4 (0.0–80.3)	↓*
	Aminoglycoside (gentamicin/tobramycin) resistance	8 084	31.6	9 343	30.8	11 516	31.8	13 782	32.7	15 070	31.7	21.5 (0.0–73.8)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	7 842	29.5	9 171	28.4	11 299	29.4	13 397	29.8	14 624	28.6	18.8 (0.0–71.5)	-
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	4 537	24.2	4 853	24.4	5 894	24.1	6 497	22.1	7 193	20.4	16.4 (3.9–53.7)	↓*
	Ceftazidime resistance	4 473	19.3	4 886	20.2	5 894	19	6 525	17.8	7 236	16.6	13.8 (2.8–51.5)	↓*
	Carbapenem (imipenem/meropenem) resistance	4 615	15.9	5 034	17.2	5 963	16.4	6 636	16	7 371	13.8	15.9 (1.5–53.4)	↓*
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	4 599	19.6	4 989	19.3	5 962	18.5	6 660	16	7 266	14.2	15.3 (4.9–51.9)	↓*
	Aminoglycoside (tobramycin) resistance	ND	ND	ND	ND	3 248	6.9	4 318	7	4 602	6.2	7.0 (0.0–44.6)	NA
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	ND	ND	ND	ND	3 128	12.5	4 090	12	4 286	9.9	10.0 (0.0–47.5)	NA
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	2 552	80.8	3 291	88.1	2 742	88.5	3 098	75.9	3 317	74.3	31.6 (0.0–94.1)	↓*
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	2 522	83.4	3 286	89.3	2 811	89.1	3 043	76.9	3 238	75.1	33.2 (0.0–95.2)	↓*
	Aminoglycoside (gentamicin/tobramycin) resistance	2 496	80.2	3 253	86.4	2 827	85	3 061	73.6	3 142	69.2	29.0 (1.8–89.9)	↓*
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	2 451	78.7	3 205	86	2 648	84.1	2 998	72.1	3 048	68.1	27.0 (0.0–89.5)	↓*
Staphylococcus aureus	MRSA[d]	10 923	33.5	12 158	30.5	14 053	29.9	14 909	26.6	16 201	25.7	14.2 (1.9–46.0)	↓*
Streptococcus pneumoniae	Penicillin non-wild-type[e]	516	13.4	492	10	805	12.4	1 239	12.9	1 421	13.2	17.3 (0.0–36.6)	-
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	639	24.1	641	24.5	1 143	25	1 712	26.2	1 919	27.1	19.0 (4.0–44.2)	-
	Combined penicillin non-wild-type and resistance to macrolides[e]	491	7.7	474	6.5	773	7	1 175	6.8	1 382	8.4	11.1 (0.0–25.6)	-
Enterococcus faecalis	High-level gentamicin resistance	3 028	37.4	3 217	36.3	3 574	33.8	3 469	34.5	3 663	32.7	22.6 (4.8–49.2)	↓*
Enterococcus faecium	Vancomycin resistance	4 166	23.6	5 200	26.9	5 905	30.7	6 017	32.5	6 317	34.9	16.5 (0.0–61.7)	↑*

ND, no data available; NA, not applicable.

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; –indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Italy, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	48	34	0	0	58	41.1	35	24.8	141	100
	Imipenem-relebactam	13	9.2	0	0	16	11.3	112	79.4	141	100
	Meropenem-vaborbactam	47	33.3	0	0	31	22	63	44.7	141	100
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	226	6.2	0	0	82	2.2	3 363	91.6	3 671	100
	Ceftazidime-avibactam	2 051	55.9	1	0	991	27	628	17.1	3 671	100
	Imipenem-relebactam	786	21.4	1	0	401	10.9	2 483	67.6	3 671	100
	Meropenem-vaborbactam	1 494	40.7	0	0	522	14.2	1 655	45.1	3 671	100
Peudomonas aeruginosa	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	535	52.8	0	0	167	16.5	312	30.8	1 014	100
	Ceftolozane-tazobactam	611	60.3	1	0.1	185	18.2	217	21.4	1 014	100
	Imipenem-relebactam	123	12.1	1	0.1	88	8.7	802	79.1	1 014	100
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acinetobacter spp.	Cefiderocol	159	6.5	1	0	23	0.9	2 280	92.6	2 463	100

ND: no data. For example if no carbapenem-resistant isolates were reported.

Latvia

Participating institutions
Disease Prevention and Control Center of Latvia, www.spkc.gov.lv

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Latvia, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	90	90	90	90	90
Geographical representativeness	High	High	High	High	High
Hospital representativeness	Medium	Medium	Medium	High	High
Isolate representativeness	Medium	Medium	Medium	Medium	Medium
Blood culture sets/1 000 patient days	13.8	17	16.8	24.8	20.1

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Latvia, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	ND	93	86	86

ND: no data available.
NA: not applicable. In 2020 there was no EARS-Net EQA.
For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Latvia, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	10	379	21	11	394	20	11	484	19	13	465	8	10	642	18
Klebsiella pneumoniae	9	189	29	10	253	38	11	288	23	15	238	17	9	352	29
Peudomonas aeruginosa	9	43	31	9	78	51	9	72	35	11	44	12	8	65	29
***Acinetobacter* spp.**	7	52	54	8	82	67	8	73	41	9	77	44	7	61	47
Staphylococcus aureus	10	355	21	11	457	15	13	521	15	15	465	6	10	529	16
Streptococcus pneumoniae	5	42	38	7	56	22	8	106	25	11	70	6	5	68	34
Enterococcus faecalis	9	98	28	10	161	39	10	162	24	10	116	22	9	132	25
Enterococcus faecium	9	62	48	8	113	60	10	97	32	10	61	28	9	102	36

Labs: laboratories.
[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.
[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Latvia

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	5.03#	5.30#	4.23#	5.75#	6.96#	10.98#	↑	+118.3	+5.95	+109	0	5.03	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	0.00#	0.12#	0.23#	0.47#	0.89#	2.08#	↑	NA	+2.08	+39	0	0	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	1.91#	1.92#	1.41#	2.19#	1.48#	1.96^#	-	+2.6	+0.05	0	-6	1.8	4.48 (0.55–13.63)

NA, not applicable.

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

One or more of the three representativeness indicators (geographical, hospital and/or isolate representativeness) were not reported as 'High'. The results should be interpreted with caution.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Latvia

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	11.82#	9.98^#	13.27^#	6.20^#	20.66#	-	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	5.30#	4.23#	5.75#	6.96#	10.98#	↑	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0.00#	0.00#	0.00#	0.00#	0.24#		0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	6.06#	4.75#	6.22#	7.67#	11.40#	↑	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	2.50#	2.52#	3.38#	4.07#	8.25#	↑	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2.33#	1.94#	2.72#	3.48#	6.77#	↑	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	5.30#	5.34#	6.58#	5.84#	9.85#	↑	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	0.12#	0.23#	0.47#	0.89#	2.08#	↑	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	4.54#	4.58#	5.63#	5.07#	9.50#	↑	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	2.27#	3.29#	4.21#	3.60#	7.54#	↑	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2.10#	2.99#	3.67#	3.19#	6.89#	↑	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	0.23^#	1.23#	1.13#	0.53#	0.83^#	-	1.81 (0.26–7.45)
	Ceftazidime resistance	0.58#	1.17#	0.95^#	0.77#	1.25#	-	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	0.64#	1.35#	0.89#	0.59#	0.53#	-	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.70#	1.47#	1.42#	0.65#	1.13#	-	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0.00^#	0.23^#	0.77^#	0.06^#	0.24^#	-	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	0.06^#	0.18^#	0.53^#	0.12^#	0.30^#	-	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	2.50#	3.81#	3.08#	3.19#	2.37#	-	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	2.50#	3.05^#	2.78^#	2.42^#	2.55#	-	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	1.92#	3.29#	2.49#	2.30#	2.31#	-	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	1.86#	2.46^#	2.25^#	1.95^#	2.14#	-	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	1.92#	1.41#	2.19#	1.48#	1.96^#	-	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.41#	0.12#	0.18#	0.47#	0.00^#	-	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.17^#	0.00^#	0.30#	0.24#	0.12^#	-	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.06^#	0.00^#	0.06#	0.24#	0.00^#	-	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	1.98#	4.17#	9.42#	5.84^#	3.56#	-	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	1.05#	2.00#	1.54#	0.83#	1.25^#	-	1.96 (0.00–9.97)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

One or more of the three representativeness indicators (geographical, hospital and/or isolate representativeness) were not reported as 'High'. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Latvia, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	374	54.3	344	49.4	432	51.9	209	50.2	587	59.3	54.7 (34.4-71.1)	↑
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	378	24.1	393	18.3	484	20	462	25.5	641	28.9	16.0 (6.8-38.7)	↑
	Carbapenem (imipenem/meropenem) resistance	378	0	393	0	481	0	456	0	632	0.6	0.3 (0.0-2.5)	↑*
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	378	27.5	392	20.7	481	21.8	456	28.5	632	30.4	22.5 (9.9-49.3)	↑*
	Aminoglycoside (gentamicin/tobramycin) resistance	377	11.4	394	10.9	483	11.8	458	15.1	639	21.8	10.4 (4.5-29.6)	↑*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	376	10.6	391	8.4	481	9.6	449	13.1	628	18.2	5.5 (1.2-21.7)	↑*
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	188	48.4	253	36	287	38.7	238	41.6	351	47.3	32.9 (4.9-84.3)	-
	Carbapenem (imipenem/meropenem) resistance	189	1.1	253	1.6	288	2.8	237	6.3	352	9.9	11.3 (0.0-67.6)	↑*
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	188	41.5	252	31	287	33.1	235	36.6	351	45.6	31.4 (0.0-80.3)	↑
	Aminoglycoside (gentamicin/tobramycin) resistance	186	21	252	22.2	288	24.7	237	25.7	352	36.1	21.5 (0.0-73.8)	↑*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	185	19.5	251	20.3	286	21.7	234	23.1	350	33.1	18.8 (0.0-71.5)	↑*
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	14	NA	76	27.6	72	26.4	44	20.5	51	27.5	16.4 (3.9-53.7)	NA
	Ceftazidime resistance	42	23.8	77	26	52	30.8	41	31.7	63	33.3	13.8 (2.8-51.5)	-
	Carbapenem (imipenem/meropenem) resistance	43	25.6	78	29.5	72	20.8	44	22.7	65	13.8	15.9 (1.5-53.4)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	39	30.8	78	32.1	72	33.3	44	25	65	29.2	15.3 (4.9-51.9)	-
	Aminoglycoside (tobramycin) resistance	7	NA	23	17.4[f]	42	31	7	NA	36	11.1	7.0 (0.0-44.6)	NA
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	5	NA	23	13.0[f]	24	37.5[f]	7	NA	35	14.3	10.0 (0.0-47.5)	NA
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	52	82.7	82	79.3	73	71.2	77	70.1	59	67.8	31.6 (0.0-94.1)	↓*
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	50	86	60	86.7	60	78.3	49	83.7	61	70.5	33.2 (0.0-95.2)	↓*
	Aminoglycoside (gentamicin/tobramycin) resistance	52	63.5	82	68.3	73	57.5	77	50.6	60	65	29.0 (1.8-89.9)	-
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	50	64	60	70	60	63.3	49	67.3	58	62.1	27.0 (0.0-89.5)	-
Staphylococcus aureus	MRSA[d]	353	9.3	457	5.3	513	7.2	464	5.4	476	6.9	14.2 (1.9-46.0)	-
Streptococcus pneumoniae	Penicillin non-wild-type[e]	41	17.1	56	3.6	106	2.8	68	11.8	44	0	17.3 (0.0-36.6)	-
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	27	11.1[f]	34	0	103	4.9	67	6	44	4.5	19.0 (4.0-44.2)	-
	Combined penicillin non-wild-type and resistance to macrolides[e]	27	3.7[f]	34	0	103	1	65	6.2	44	0	11.1 (0.0-25.6)	-
Enterococcus faecalis	High-level gentamicin resistance	89	38.2	153	46.4	159	100	100	99	122	49.2	22.6 (4.8-49.2)	↑
Enterococcus faecium	Vancomycin resistance	62	29	113	30.1	96	27.1	61	23	88	23.9	16.5 (0.0-61.7)	-

NA, not applicable.

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; −indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

[f] A small number of isolates were tested (n < 30), and the percentage resistance should be interpreted with caution.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Latvia, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	13	37.1	0	0	8	22.9	14	40	35	100
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Peudomonas aeruginosa	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	2	22.2	0	0	0	0	7	77.8	9	100
	Ceftolozane-tazobactam	0	0	0	0	2	22.2	7	77.8	9	100
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acinetobacter spp.	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: no data. For example if no carbapenem-resistant isolates were reported.

Liechtenstein

Participating institutions

Liechtensteinisches Landesspital

Laboratory Dr Risch[a]

The Swiss Center for Antibiotic Resistance (ANRESIS)[b]

[a] Liechtenstein uses Laboratory Dr Risch as a participating institution at national level.

[b] Liechtenstein uses the Swiss Center for Antibiotic Resistance as a participating institution at national level.

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Liechtenstein, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	ND	ND	40	40	40
Geographical representativeness	ND	ND	Medium	Medium	Medium
Hospital representativeness	ND	ND	Medium	Medium	Medium
Isolate representativeness	ND	ND	Medium	Medium	Medium
Blood culture sets/1 000 patient days	ND	ND	2.7	2.1	1.5

ND: no data available.

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Liechtenstein, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	ND	ND	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	ND	100	100	100

ND: no data available.

NA: not applicable. In 2020 there was no EARS-Net EQA.

For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Liechtenstein, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	ND	ND	ND	ND	ND	ND	1	13	NA	1	8	NA	1	12	NA
Klebsiella pneumoniae	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	2	NA	1	4	NA
Peudomonas aeruginosa	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	2	NA	ND	ND	ND
***Acinetobacter* spp.**	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Staphylococcus aureus	ND	ND	ND	ND	ND	ND	1	5	NA	1	2	NA	2	5	NA
Streptococcus pneumoniae	ND	ND	ND	ND	ND	ND	1	3	NA	1	1	NA	2	2	NA
Enterococcus faecalis	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	2	NA	1	1	NA
Enterococcus faecium	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	1	1	NA

Labs: laboratories.

ND: no data available.

NA: not applicable.

[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.

[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Liechtenstein

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	ND	ND	ND	6.36#	0.00#	0.00#	NA	NA	NA	NA	NA	NA	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	ND	ND	ND	ND	0.00#	0.00#	NA	NA	NA	NA	NA	NA	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	ND	ND	ND	6.36#	0.00#	6.25#	NA	NA	NA	NA	NA	NA	4.48 (0.55–13.63)

ND, no data available; NA, not applicable.

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

One or more of the three representativeness indicators (geographical, hospital and/or isolate representativeness) were not reported as 'High'. The results should be interpreted with caution.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Liechtenstein

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	ND	ND	19.08#	18.90#	18.74#	NA	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	ND	ND	6.36#	0.00#	0.00#	NA	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	ND	ND	0.00#	0.00#	0.00#	NA	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	ND	ND	12.72#	12.60#	6.25#	NA	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	ND	ND	0.00#	0.00#	0.00#	NA	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	ND	ND	0.00#	0.00#	0.00#	NA	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	ND	ND	ND	0.00#	0.00#	NA	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	ND	ND	ND	0.00#	0.00#	NA	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	ND	ND	ND	0.00#	0.00#	NA	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	ND	ND	ND	0.00#	0.00#	NA	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	ND	ND	ND	0.00#	0.00#	NA	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	ND	ND	ND	0.00#	ND	NA	1.81 (0.26–7.45)
	Ceftazidime resistance	ND	ND	ND	0.00#	ND	NA	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	ND	ND	ND	0.00#	ND	NA	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	ND	ND	ND	0.00#	ND	NA	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	ND	ND	ND	0.00^#	ND	NA	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	ND	ND	ND	0.00^#	ND	NA	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	ND	ND	ND	ND	ND	NA	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	ND	ND	ND	ND	ND	NA	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	ND	ND	ND	ND	ND	NA	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	ND	ND	ND	ND	ND	NA	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	ND	ND	6.36#	0.00#	6.25#	NA	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	ND	ND	0.00^#	0.00#	0.00#	NA	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	ND	ND	0.00#	0.00#	6.25#	NA	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	ND	ND	0.00^#	0.00#	0.00#	NA	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	ND	ND	ND	0.00#	6.25#	NA	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	ND	ND	ND	ND	0.00#	NA	1.96 (0.00–9.97)

ND, no data available; NA, not applicable.

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

One or more of the three representativeness indicators (geographical, hospital and/or isolate representativeness) were not reported as 'High'. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Liechtenstein, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	ND	ND	ND	ND	13	NA	8	NA	12	NA	54.7 (34.4–71.1)	NA
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	ND	ND	ND	ND	13	NA	8	NA	12	NA	16.0 (6.8–38.7)	NA
	Carbapenem (imipenem/meropenem) resistance	ND	ND	ND	ND	13	NA	8	NA	12	NA	0.3 (0.0–2.5)	NA
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	ND	ND	ND	ND	13	NA	8	NA	12	NA	22.5 (9.9–49.3)	NA
	Aminoglycoside (gentamicin/tobramycin) resistance	ND	ND	ND	ND	13	NA	8	NA	12	NA	10.4 (4.5–29.6)	NA
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	ND	ND	ND	ND	13	NA	8	NA	12	NA	5.5 (1.2–21.7)	NA
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	ND	ND	ND	ND	ND	ND	2	NA	4	NA	32.9 (4.9–84.3)	NA
	Carbapenem (imipenem/meropenem) resistance	ND	ND	ND	ND	ND	ND	2	NA	4	NA	11.3 (0.0–67.6)	NA
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	ND	ND	ND	ND	ND	ND	2	NA	4	NA	31.4 (0.0–80.3)	NA
	Aminoglycoside (gentamicin/tobramycin) resistance	ND	ND	ND	ND	ND	ND	2	NA	4	NA	21.5 (0.0–73.8)	NA
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	ND	ND	ND	ND	ND	ND	2	NA	4	NA	18.8 (0.0–71.5)	NA
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	ND	ND	ND	ND	ND	ND	2	NA	ND	ND	16.4 (3.9–53.7)	NA
	Ceftazidime resistance	ND	ND	ND	ND	ND	ND	2	NA	ND	ND	13.8 (2.8–51.5)	NA
	Carbapenem (imipenem/meropenem) resistance	ND	ND	ND	ND	ND	ND	2	NA	ND	ND	15.9 (1.5–53.4)	NA
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	ND	ND	ND	ND	ND	ND	2	NA	ND	ND	15.3 (4.9–51.9)	NA
	Aminoglycoside (tobramycin) resistance	ND	ND	ND	ND	ND	ND	1	NA	ND	ND	7.0 (0.0–44.6)	NA
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	ND	ND	ND	ND	ND	ND	1	NA	ND	ND	10.0 (0.0–47.5)	NA
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	31.6 (0.0–94.1)	NA
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	33.2 (0.0–95.2)	NA
	Aminoglycoside (gentamicin/tobramycin) resistance	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	29.0 (1.8–89.9)	NA
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	27.0 (0.0–89.5)	NA
Staphylococcus aureus	MRSA[d]	ND	ND	ND	ND	5	NA	2	NA	5	NA	14.2 (1.9–46.0)	NA
Streptococcus pneumoniae	Penicillin non-wild-type[e]	ND	ND	ND	ND	2	NA	1	NA	2	NA	17.3 (0.0–36.6)	NA
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	ND	ND	ND	ND	3	NA	1	NA	2	NA	19.0 (4.0–44.2)	NA
	Combined penicillin non-wild-type and resistance to macrolides[e]	ND	ND	ND	ND	2	NA	1	NA	2	NA	11.1 (0.0–25.6)	NA
Enterococcus faecalis	High-level gentamicin resistance	ND	ND	ND	ND	ND	ND	2	NA	1	NA	22.6 (4.8–49.2)	NA
Enterococcus faecium	Vancomycin resistance	ND	ND	ND	ND	ND	ND	ND	ND	1	NA	16.5 (0.0–61.7)	NA

ND, no data available; NA, not applicable.

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; −indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

[f] A small number of isolates were tested (n < 30), and the percentage resistance should be interpreted with caution.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Liechtenstein, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Peudomonas aeruginosa	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftolozane-tazobactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acinetobacter spp.	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: no data. For example if no carbapenem-resistant isolates were reported.

Lithuania

Participating institutions
National Public Health Surveillance Laboratory, www.nvspl.lt
Institute of Hygiene, www.hi.lt

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Lithuania, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	100	100	100	100	100
Geographical representativeness	High	High	High	High	High
Hospital representativeness	High	High	High	High	High
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient days	8.1	9.8	7.9	8.8	14.6

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Lithuania, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	100	93	93	93

NA: not applicable. In 2020 there was no EARS-Net EQA.
For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Lithuania, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	17	1 142	18	17	1 154	16	16	1 309	15	15	1 481	15	15	1 738	18
Klebsiella pneumoniae	16	413	25	14	512	29	14	517	29	15	541	28	16	725	26
Peudomonas aeruginosa	15	121	26	12	162	35	13	170	29	11	142	31	12	173	32
***Acinetobacter* spp.**	12	157	71	13	361	78	12	141	62	12	122	45	11	145	67
Staphylococcus aureus	17	704	22	16	746	21	15	828	18	15	813	19	15	929	19
Streptococcus pneumoniae	14	96	22	15	109	25	15	172	16	14	178	21	14	210	20
Enterococcus faecalis	14	140	28	14	183	41	13	167	29	14	162	17	14	200	26
Enterococcus faecium	15	145	43	13	211	44	13	164	42	11	156	31	12	196	33

Labs: laboratories.
[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.
[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Lithuania

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	5.62	6.51	5.62	7.2	8.78	9.53	↑	+69.6	+3.91	+118	0	5.62	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	0.54	0.43	0.18	0.11	0.73	2.39	-	+342.6	+1.85	+54	-4	0.52	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	2.18	2.47	2.4	2.78	2.45	3.22	↑	+47.7	+1.04	+32	-6	2.05	4.48 (0.55–13.63)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Lithuania

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	23.19	23.43	27.33	31.71	34.79	↑	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	6.51	5.62	7.2	8.78	9.53	↑	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0	0.11	0.11	0.03	0.24	↑	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	7.62	7.19	8.77	10.46	11.95	↑	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	4.19	3.4	3.88	5.84	5.75	↑	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2.61	2	2.57	3.46	3.95	↑	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	6.3	7.87	7.34	8.22	11.99	↑	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	0.43	0.18	0.11	0.73	2.39	↑	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	6.69	6.98	7.31	7.84	11.09	↑	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	4.97	5.29	4.99	5.53	8.91	↑	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	4.19	4.54	3.96	4.55	6.27	↑	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	1	0.82	1.1	0.63	1.04	-	1.81 (0.26–7.45)
	Ceftazidime resistance	0.72	0.75	0.93	0.49	0.97	-	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	1.11	1.47	1.46	0.7	1.52	-	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.79	0.93	1.07	0.49	1.04	-	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	ND	ND	ND	ND	ND	NA	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	ND	ND	ND	ND	ND	NA	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	5.12	12.38	4.45	3.95	4.19	-	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	5.12	12.48	4.42	3.85	4.02	-	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	4.72	11.73	3.99	3.46	3.81	-	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	4.65	11.63	3.88	3.43	3.74	-	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	2.47	2.4	2.78	2.45	3.22	-	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.47	0.32	0.39	0.59	0.76	↑	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.5	0.72	0.89	1.12	1.07	↑	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.32	0.18	0.18	0.38	0.45	-	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	0.32^	0.61^	0.82^	1.01^	0.69^	↑	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	2.93	5.01	3.96	3.32	4.19	-	1.96 (0.00–9.97)

ND, no data available; NA, not applicable.

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Lithuania, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	1 138	56.9	1 147	57.1	1 303	58.9	1 477	61.3	1 733	57.9	54.7 (34.4–71.1)	-
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	1 142	15.9	1 153	13.6	1 309	15.4	1 480	17	1 738	15.8	16.0 (6.8–38.7)	-
	Carbapenem (imipenem/meropenem) resistance	1 142	0	1 149	0.3	1 309	0.2	1 478	0.1	1 736	0.4	0.3 (0.0–2.5)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	1 136	18.8	1 139	17.6	1 293	19	1 455	20.5	1 721	20	22.5 (9.9–49.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	1 141	10.3	1 141	8.3	1 308	8.3	1 473	11.3	1 733	9.6	10.4 (4.5–29.6)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1 135	6.4	1 126	5	1 293	5.6	1 446	6.8	1 717	6.6	5.5 (1.2–21.7)	-
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	413	42.6	512	43	517	39.8	541	43.4	725	47.7	32.9 (4.9–84.3)	-
	Carbapenem (imipenem/meropenem) resistance	413	2.9	511	1	517	0.6	541	3.9	725	9.5	11.3 (0.0–67.6)	↑*
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	413	45.3	510	38.2	514	39.9	532	42.1	721	44.4	31.4 (0.0–80.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	410	33.9	511	29	516	27.1	540	29.3	722	35.6	21.5 (0.0–73.8)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	410	28.5	509	25	514	21.6	531	24.5	718	25.2	18.8 (0.0–71.5)	-
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	121	23.1	162	14.2	170	18.2	142	12.7	173	17.3	16.4 (3.9–53.7)	-
	Ceftazidime resistance	119	16.8	160	13.1	170	15.3	142	9.9	172	16.3	13.8 (2.8–51.5)	-
	Carbapenem (imipenem/meropenem) resistance	121	25.6	161	25.5	169	24.3	142	14.1	173	25.4	15.9 (1.5–53.4)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	120	18.3	158	16.5	170	17.6	140	10	172	17.4	15.3 (4.9–51.9)	-
	Aminoglycoside (tobramycin) resistance	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	7.0 (0.0–44.6)	NA
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	10.0 (0.0–47.5)	NA
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	157	91.1	360	96.1	141	88.7	122	92.6	145	83.4	31.6 (0.0–94.1)	↓*
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	154	92.9	361	96.7	139	89.2	119	92.4	144	80.6	33.2 (0.0–95.2)	↓*
	Aminoglycoside (gentamicin/tobramycin) resistance	153	86.3	351	93.4	133	84.2	120	82.5	144	76.4	29.0 (1.8–89.9)	↓*
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	150	86.7	350	92.9	131	83.2	118	83.1	143	75.5	27.0 (0.0–89.5)	↓*
Staphylococcus aureus	MRSA[d]	704	9.8	746	9	828	9.4	813	8.6	929	10	14.2 (1.9–46.0)	-
Streptococcus pneumoniae	Penicillin non-wild-type[e]	96	13.5	109	8.3	172	6.4	178	9.6	210	10.5	17.3 (0.0–36.6)	-
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	96	14.6	109	18.3	172	14.5	176	18.2	208	14.9	19.0 (4.0–44.2)	-
	Combined penicillin non-wild-type and resistance to macrolides[e]	96	9.4	109	4.6	172	2.9	176	6.3	208	6.3	11.1 (0.0–25.6)	-
Enterococcus faecalis	High-level gentamicin resistance	68	13.2	94	18.1	101	22.8	99	29.3	101	19.8	22.6 (4.8–49.2)	-
Enterococcus faecium	Vancomycin resistance	145	56.6	211	66.4	164	67.7	156	60.9	196	61.7	16.5 (0.0–61.7)	-

ND, no data available; NA, not applicable.

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; −indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Lithuania, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Peudomonas aeruginosa	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftolozane-tazobactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acinetobacter spp.	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: no data. For example if no carbapenem-resistant isolates were reported.

Luxembourg

Participating institutions
National Health Laboratory, https://lns.lu/
Microbiology Laboratory, Centre Hospitalier de Luxembourg, https://www.chl.lu/fr/service/laboratoire-de-bacteriologie-microbiologie

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Luxembourg, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	99	100	99	100	99
Geographical representativeness	High	High	High	High	High
Hospital representativeness	High	High	High	High	High
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient days	38.9	42.1	43.9	42.5	44.1

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Luxembourg, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	100	80	100	100

NA: not applicable. In 2020 there was no EARS-Net EQA.
For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Luxembourg, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	4	428	8	4	354	10	4	469	4	4	461	7	4	524	9
Klebsiella pneumoniae	4	87	23	4	101	20	4	117	17	4	85	18	4	136	13
Peudomonas aeruginosa	3	51	14	3	37	27	4	47	30	4	47	17	4	58	22
***Acinetobacter* spp.**	2	7	NA	2	8	NA	2	13	NA	2	7	NA	3	12	NA
Staphylococcus aureus	4	195	18	4	199	20	4	235	13	4	190	14	4	195	17
Streptococcus pneumoniae	3	24	13[c]	4	21	5[c]	4	44	14	4	63	13	4	33	9
Enterococcus faecalis	4	95	37	4	84	37	4	86	19	4	81	14	4	77	13
Enterococcus faecium	3	42	20	4	58	38	4	69	37	4	74	24	4	58	21

Labs: laboratories.
NA: not applicable.
[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.
[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).
[c] A small number of isolates were tested (n < 30), and the percentage of isolates from ICUs should be interpreted with caution.

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Luxembourg

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	10.2	7.91	6.3	7.67	8.17	10.22	-	+0.2	+0.02	+6	-12	8.98	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	0.16	0.16	0.16	0.31	0.3	0.15	-	-6.3*	-0.01*	0*	-2	0.16	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	2.14	0.97	1.73	1.72	1.66	1.5	-	-29.9*	-0.64*	-3*	-6	2.01	4.48 (0.55–13.63)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

* Target reached.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Luxembourg

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	36.14	29.62	36.47	36.02	42.84	↑	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	7.91	6.3	7.67	8.17	10.22	-	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0	0	0	0.15	0	-	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	15	11.66	12.36	10.9	14.73	-	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	6.13	4.88	5.32	6.96	5.11	-	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2.74	2.36	1.88	2.42	2.1	-	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	3.71	4.1	3.44	2.72	4.06	-	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	0.16	0.16	0.31	0.3	0.15	-	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	4.36	3.78	3.91	2.42	3.16	-	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	2.9	2.36	1.72	1.36	1.2	↓	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2.9	2.05	0.94	1.06	0.9	↓	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	0.48	0	0.47	1.36	1.35	↑	1.81 (0.26–7.45)
	Ceftazidime resistance	0.32	0.47	0.47	1.21	1.5	↑	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	0.65	0.47	0.47	0.91	1.35	-	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	1.77	1.42	0.94	0.61	1.5	-	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0.16^	0.16	0.00^	0.15	0	-	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	0.32^	0	0.00^	0.76	0.9	↑	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	0	0	0.16	0.00^	0	-	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0	0.16	0	0.15	0	-	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	0	0	0	0.15	0	-	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	0	0	0	0.00^	0		2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	0.97	1.73	1.72	1.66	1.5	-	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.65	0.47	0.94	1.21	0.45	-	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.48	0.95	1.1	1.06	0.45	-	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0	0.32	0.78	0.61	0.3	-	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	1.61	1.58	1.41	1.36^	0.75	-	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	0.81	0	0.63	0.76	0	-	1.96 (0.00–9.97)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Luxembourg, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	427	52.5	352	53.4	469	49.7	461	51.6	524	54.4	54.7 (34.4–71.1)	-
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	428	11.4	354	11.3	469	10.4	461	11.7	524	13	16.0 (6.8–38.7)	-
	Carbapenem (imipenem/meropenem) resistance	428	0	354	0	469	0	461	0.2	524	0	0.3 (0.0–2.5)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	428	21.7	354	20.9	469	16.8	461	15.6	524	18.7	22.5 (9.9–49.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	428	8.9	354	8.8	469	7.2	461	10	524	6.5	10.4 (4.5–29.6)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	428	4	354	4.2	469	2.6	461	3.5	524	2.7	5.5 (1.2–21.7)	-
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	87	26.4	101	25.7	117	18.8	85	21.2	135	20	32.9 (4.9–84.3)	-
	Carbapenem (imipenem/meropenem) resistance	87	1.1	101	1	117	1.7	84	2.4	136	0.7	11.3 (0.0–67.6)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	87	31	101	23.8	117	21.4	85	18.8	135	15.6	31.4 (0.0–80.3)	↓*
	Aminoglycoside (gentamicin/tobramycin) resistance	87	20.7	101	14.9	117	9.4	85	10.6	135	5.9	21.5 (0.0–73.8)	↓*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	87	20.7	101	12.9	117	5.1	85	8.2	135	4.4	18.8 (0.0–71.5)	↓*
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	51	5.9	35	0	47	6.4	47	19.1	57	15.8	16.4 (3.9–53.7)	↑*
	Ceftazidime resistance	50	4	37	8.1	47	6.4	47	17	57	17.5	13.8 (2.8–51.5)	↑*
	Carbapenem (imipenem/meropenem) resistance	47	8.5	37	8.1	45	6.7	47	12.8	57	15.8	15.9 (1.5–53.4)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	50	22	37	24.3	47	12.8	47	8.5	57	17.5	15.3 (4.9–51.9)	-
	Aminoglycoside (tobramycin) resistance	40	2.5	37	2.7	31	0	45	2.2	55	0	7.0 (0.0–44.6)	-
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	40	5	35	0	29	0.0[f]	45	11.1	55	10.9	10.0 (0.0–47.5)	↑*
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	7	NA	8	NA	13	NA	5	NA	12	NA	31.6 (0.0–94.1)	NA
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	7	NA	8	NA	13	NA	7	NA	12	NA	33.2 (0.0–95.2)	NA
	Aminoglycoside (gentamicin/tobramycin) resistance	7	NA	8	NA	13	NA	7	NA	12	NA	29.0 (1.8–89.9)	NA
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	7	NA	8	NA	13	NA	5	NA	12	NA	27.0 (0.0–89.5)	NA
Staphylococcus aureus	MRSA[d]	195	3.1	199	5.5	235	4.7	190	5.8	195	5.1	14.2 (1.9–46.0)	-
Streptococcus pneumoniae	Penicillin non-wild-type[e]	24	16.7[f]	21	14.3[f]	44	13.6	63	12.7	33	9.1	17.3 (0.0–36.6)	-
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	24	12.5[f]	21	28.6[f]	44	15.9	63	11.1	33	9.1	19.0 (4.0–44.2)	-
	Combined penicillin non-wild-type and resistance to macrolides[e]	24	0.0[f]	21	9.5[f]	44	11.4	63	6.3	33	6.1	11.1 (0.0–25.6)	-
Enterococcus faecalis	High-level gentamicin resistance	95	10.5	84	11.9	86	10.5	65	13.8	77	6.5	22.6 (4.8–49.2)	-
Enterococcus faecium	Vancomycin resistance	42	11.9	58	0	69	5.8	74	6.8	58	0	16.5 (0.0–61.7)	-

NA, not applicable.

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; −indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

[f] A small number of isolates were tested (n < 30), and the percentage resistance should be interpreted with caution.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Luxembourg, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	0	0	0	0	1	100	0	0	1	100
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Peudomonas aeruginosa	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	2	22.2	0	0	0	0	7	77.8	9	100
	Ceftolozane-tazobactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acinetobacter spp.	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: no data. For example if no carbapenem-resistant isolates were reported.

Malta

Participating institutions

Malta Mater Dei Hospital, Msida, https://healthservices.gov.mt/en/MDH/Pages/Home.aspx

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Malta, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	95	95	95	95	95
Geographical representativeness	High	High	High	High	High
Hospital representativeness	High	High	High	High	High
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient days	35.2	37.7	34.9	32.8	35

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Malta, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	100	100	100	100

NA: not applicable. In 2020 there was no EARS-Net EQA.

For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Malta, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	1	277	2	1	299	4	1	326	3	1	416	4	1	493	2
Klebsiella pneumoniae	1	132	6	1	135	14	1	120	14	1	147	9	1	176	7
Peudomonas aeruginosa	1	49	13	1	35	29	1	47	13	1	40	8	1	51	6
***Acinetobacter* spp.**	1	7	NA	1	16	NA	1	14	NA	1	21	21[c]	1	12	NA
Staphylococcus aureus	1	92	6	1	103	8	1	116	8	1	110	5	1	105	8
Streptococcus pneumoniae	1	16	NA	1	6	NA	1	14	NA	1	26	4[c]	1	26	4[c]
Enterococcus faecalis	1	28	20[c]	1	39	16	1	33	16	1	30	7	1	30	23
Enterococcus faecium	1	23	24[c]	1	38	42	1	32	20	1	25	21[c]	1	39	23

Labs: laboratories.

NA: not applicable.

[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.

[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

[c] A small number of isolates were tested (n < 30), and the percentage of isolates from ICUs should be interpreted with caution.

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Malta

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	12.37	6.96	8.36	7.48	9.13	22.79	-	+84.2	+10.42	+67	-12	10.89	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	2.13	2.05	1.84	1.21	0.97	0.93	↓	-56.3*	-1.20*	-5*	-4	2.04	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	3.84	3.68	4.28	4.45	3.11	2.99	-	-22.1*	-0.85*	-2*	-10	3.46	4.48 (0.55–13.63)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

* Target reached.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Malta

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	33.14	39.36	41.42	50.49	64.08	↑	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	6.96	8.36	7.48	9.13	22.79	↑	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0	0	0	0	0		0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	20.05	18.76	17.38	22.53	39.61	↑	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	7.16	7.75	7.88	8.35	27.28	↑	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	4.71	4.9	3.03	4.47	19.99	↑	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	10.43	7.95	6.67	7.19	9.15	-	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	2.05	1.84	1.21	0.97	0.93	-	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	10.02	9.59	7.68	8.35	10.28	-	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	6.34	5.51	1.41	3.11	3.18	-	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	5.11	4.49	1.21	2.33	2.62	↓	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	1.84	2.04	0.81	0.97	1.31	-	1.81 (0.26–7.45)
	Ceftazidime resistance	1.23	1.02	0.2	0.78	0.93	-	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	0.82	0.82	1.01	0.39	0.75	-	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	1.64	0.61	0.4	0.58	0.93	-	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0.2	0.2	0	0.19	0.19	-	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	1.02	0.61	0.4	0.39	0.75	-	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	0.2	0	0.4	0	0.19	-	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.2	0	0.4	0.19	0	-	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	0.2	0	0.2	0	0	-	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	0.2	0	0.2	0	0	-	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	3.68	4.28	4.45	3.11	2.99	-	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	1.84	0.61	0.61	1.36	1.31	-	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	1.43	0.61	1.01	2.72	1.87	-	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	1.23	0.41	0.4	1.36	1.12	-	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	1.43	1.22	1.41	0.39	0.93	-	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	1.02	4.28	2.42	1.75	2.24	-	1.96 (0.00–9.97)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Malta, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	277	58.5	299	64.5	326	62.9	416	62.5	493	69.6	54.7 (34.4-71.1)	↑*
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	277	12.3	299	13.7	326	11.3	416	11.3	493	24.7	16.0 (6.8-38.7)	↑*
	Carbapenem (imipenem/meropenem) resistance	277	0	299	0	326	0	416	0	493	0	0.3 (0.0-2.5)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	277	35.4	299	30.8	326	26.4	416	27.9	493	43	22.5 (9.9-49.3)	↑*
	Aminoglycoside (gentamicin/tobramycin) resistance	277	12.6	299	12.7	326	12	416	10.3	493	29.6	10.4 (4.5-29.6)	↑*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	277	8.3	299	8	326	4.6	416	5.5	493	21.7	5.5 (1.2-21.7)	↑*
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	132	38.6	135	28.9	120	27.5	147	25.2	176	27.8	32.9 (4.9-84.3)	↓*
	Carbapenem (imipenem/meropenem) resistance	132	7.6	135	6.7	120	5	147	3.4	176	2.8	11.3 (0.0-67.6)	↓*
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	132	37.1	135	34.8	120	31.7	147	29.3	176	31.3	31.4 (0.0-80.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	132	23.5	135	20	120	5.8	147	10.9	176	9.7	21.5 (0.0-73.8)	↓*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	132	18.9	135	16.3	120	5	147	8.2	176	8	18.8 (0.0-71.5)	↓*
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	49	18.4	35	28.6	47	8.5	40	12.5	51	13.7	16.4 (3.9-53.7)	-
	Ceftazidime resistance	49	12.2	35	14.3	47	2.1	40	10	50	10	13.8 (2.8-51.5)	-
	Carbapenem (imipenem/meropenem) resistance	49	8.2	35	11.4	47	10.6	40	5	51	7.8	15.9 (1.5-53.4)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	49	16.3	35	8.6	47	4.3	40	7.5	51	9.8	15.3 (4.9-51.9)	-
	Aminoglycoside (tobramycin) resistance	49	2	35	2.9	47	0	40	2.5	51	2	7.0 (0.0-44.6)	-
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	49	10.2	35	8.6	47	4.3	40	5	50	8	10.0 (0.0-47.5)	-
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	7	NA	16	NA	14	NA	21	0.0[f]	12	NA	31.6 (0.0-94.1)	NA
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	7	NA	16	NA	14	NA	21	4.8[f]	12	NA	33.2 (0.0-95.2)	NA
	Aminoglycoside (gentamicin/tobramycin) resistance	7	NA	16	NA	14	NA	21	0.0[f]	12	NA	29.0 (1.8-89.9)	NA
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	7	NA	16	NA	14	NA	21	0.0[f]	12	NA	27.0 (0.0-89.5)	NA
Staphylococcus aureus	MRSA[d]	92	19.6	103	20.4	116	19	110	14.5	105	15.2	14.2 (1.9-46.0)	-
Streptococcus pneumoniae	Penicillin non-wild-type[e]	16	NA	6	NA	14	NA	26	26.9[f]	26	26.9[f]	17.3 (0.0-36.6)	NA
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	16	NA	6	NA	14	NA	26	53.8[f]	26	38.5[f]	19.0 (4.0-44.2)	NA
	Combined penicillin non-wild-type and resistance to macrolides[e]	16	NA	6	NA	14	NA	26	26.9[f]	26	23.1[f]	11.1 (0.0-25.6)	NA
Enterococcus faecalis	High-level gentamicin resistance	28	25.0[f]	38	15.8	33	21.2	29	6.9[f]	30	16.7	22.6 (4.8-49.2)	-
Enterococcus faecium	Vancomycin resistance	23	21.7[f]	38	55.3	32	37.5	25	36.0[f]	39	30.8	16.5 (0.0-61.7)	-

NA, not applicable.

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; −indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

[f] A small number of isolates were tested (n < 30), and the percentage resistance should be interpreted with caution.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Malta, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Peudomonas aeruginosa	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftolozane-tazobactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
***Acinetobacter* spp.**	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: no data. For example if no carbapenem-resistant isolates were reported.

Netherlands

Participating institutions

National Institute for Public Health and the Environment, www.rivm.nl

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Netherlands, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	72	72	74	76	78
Geographical representativeness	High	High	High	High	High
Hospital representativeness	High	High	High	High	High
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient days	ND	ND	ND	ND	ND

ND: no data available.

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Netherlands, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	100	79	91	88

ND: no data available.

NA: not applicable. In 2020 there was no EARS-Net EQA.

For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Netherlands, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	38	7 498	4	35	6 576	3	36	7 217	3	38	7 843	3	45	9 014	3
Klebsiella pneumoniae	38	1 397	6	35	1 270	5	36	1 385	5	38	1 504	4	45	1 798	3
Peudomonas aeruginosa	37	749	11	35	730	13	36	756	9	38	775	10	45	906	8
***Acinetobacter* spp.**	34	153	11	33	192	13	35	201	8	36	214	9	42	216	6
Staphylococcus aureus	38	3 294	8	35	3 235	9	36	3 609	7	38	3 740	6	45	4 271	6
Streptococcus pneumoniae	38	997	6	35	839	6	36	1 538	4	38	1 695	4	45	1 908	4
Enterococcus faecalis	38	1 211	24	35	1 302	29	36	1 172	14	38	1 221	11	45	1 278	9
Enterococcus faecium	37	1 312	53	35	1 272	54	36	1 081	38	37	990	35	45	1 149	34

Labs: laboratories.

[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.

[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Netherlands

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	4.54	3.97	3.47	4.29	4.62	5.84	-	+28.6	+1.3	+263	0	4.54	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	0.02	0.01	0.02	0.05	0.04	0.09	↑	+350	+0.07	+12	0	0.02	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	0.4	0.39	0.39	0.52	0.49	0.59	↑	+47.5	+0.19	+37	-3	0.39	4.48 (0.55–13.63)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Netherlands

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	25.52	21.63	22.67	23.72	28.12	-	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	3.97	3.47	4.29	4.62	5.84	↑	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0.02	0.02	0.02	0.05	0.06	↑	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	7.97	6.96	7.28	7.5	8.81	-	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	3.84	3.13	3.42	3.01	3.82	-	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1.12	1.05	1.14	1.24	1.51	↑	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	1.24	1.02	1.04	1.13	1.65	-	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	0.01	0.02	0.05	0.04	0.09	↑	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	1.46	1.03	1.34	1.26	1.86	-	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	0.81	0.56	0.67	0.69	1.06	-	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	0.48	0.43	0.44	0.5	0.87	↑	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	0.34	0.3	0.52	0.33	0.45	-	1.81 (0.26–7.45)
	Ceftazidime resistance	0.18	0.16	0.28	0.16	0.28	-	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	0.22	0.3	0.35	0.38	0.33	-	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.54	0.46	0.42	0.51	0.49	-	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0.06	0.02	0.02	0.04	0.07	-	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	0.1	0.05	0.13	0.1	0.16	-	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	0.01	0.01	0.02	0.02	0.02	-	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.05	0.06	0.05	0.08	0.07	-	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	0.02	0.06	0.03	0.07	0.08	↑	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	0	0	0.01	0.02	0.01	-	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	0.39	0.39	0.52	0.49	0.59	↑	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.30^	0.32^	0.57^	0.66^	0.81^	↑	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.26	0.2	0.37	0.54	0.52	↑	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.05^	0.04^	0.12^	0.11^	0.13^	↑	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	1.28^	1.88^	0.83^	0.61^	0.56^	↓	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	0.05	0.03	0.07	0.04	0.06	-	1.96 (0.00–9.97)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Netherlands, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	7 494	42.7	6 571	41.4	7 210	40.9	7 834	41	9 003	43.7	54.7 (34.4–71.1)	-
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	7 494	6.6	6 575	6.6	7 215	7.7	7 840	8	8 981	9.1	16.0 (6.8–38.7)	↑*
	Carbapenem (imipenem/meropenem) resistance	7 487	0	6 569	0	7 210	0	7 780	0.1	9 005	0.1	0.3 (0.0–2.5)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	7 490	13.3	6 575	13.3	7 213	13.1	7 840	12.9	9 011	13.7	22.5 (9.9–49.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	7 495	6.4	6 576	6	7 216	6.2	7 841	5.2	9 013	5.9	10.4 (4.5–29.6)	↓
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	7 486	1.9	6 574	2	7 210	2.1	7 836	2.1	8 980	2.4	5.5 (1.2–21.7)	↑
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	1 397	11.2	1 270	10.1	1 385	9.8	1 504	10.2	1 788	12.9	32.9 (4.9–84.3)	-
	Carbapenem (imipenem/meropenem) resistance	1 396	0.1	1 270	0.2	1 384	0.4	1 483	0.4	1 685	0.8	11.3 (0.0–67.6)	↑
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	1 395	13.1	1 270	10.2	1 385	12.6	1 504	11.3	1 798	14.5	31.4 (0.0–80.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	1 397	7.3	1 270	5.6	1 385	6.3	1 504	6.3	1 798	8.3	21.5 (0.0–73.8)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1 395	4.3	1 270	4.3	1 385	4.1	1 504	4.5	1 788	6.8	18.8 (0.0–71.5)	↑*
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	701	6.1	699	5.4	720	9.4	738	6.1	873	7.2	16.4 (3.9–53.7)	-
	Ceftazidime resistance	748	2.9	728	2.7	756	4.8	773	2.8	905	4.3	13.8 (2.8–51.5)	-
	Carbapenem (imipenem/meropenem) resistance	746	3.6	730	5.2	756	6	773	6.6	906	5.1	15.9 (1.5–53.4)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	749	9.1	730	7.9	756	7.3	775	8.9	905	7.6	15.3 (4.9–51.9)	-
	Aminoglycoside (tobramycin) resistance	748	1.1	728	0.4	756	0.4	775	0.6	905	1.1	7.0 (0.0–44.6)	-
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	697	1.9	696	0.9	720	2.4	735	1.8	872	2.5	10.0 (0.0–47.5)	-
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	148	0.7	185	0.5	198	1	210	1.4	208	1.4	31.6 (0.0–94.1)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	147	4.1	186	3.8	198	3	211	5.2	215	4.7	33.2 (0.0–95.2)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	149	1.3	191	4.2	199	2	212	4.7	212	5.2	29.0 (1.8–89.9)	-
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	139	0	179	0	195	0.5	206	1.5	204	1	27.0 (0.0–89.5)	-
Staphylococcus aureus	MRSA[d]	3 293	1.5	3 231	1.5	3 609	1.9	3 739	1.8	4 055	2	14.2 (1.9–46.0)	-
Streptococcus pneumoniae	Penicillin non-wild-type[e]	799	4.8	648	6.2	1 157	6.4	1 156	7.8	1 404	8.1	17.3 (0.0–36.6)	↑*
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	919	3.5	766	3.3	1 419	3.4	1 578	4.6	1 813	4	19.0 (4.0–44.2)	-
	Combined penicillin non-wild-type and resistance to macrolides[e]	722	0.8	575	0.9	1 039	1.4	1 039	1.4	1 312	1.4	11.1 (0.0–25.6)	-
Enterococcus faecalis	High-level gentamicin resistance	544	29.6	641	36.8	559	19.3	576	14.4	455	17.4	22.6 (4.8–49.2)	↓*
Enterococcus faecium	Vancomycin resistance	1 310	0.5	1 272	0.3	1 081	0.8	987	0.5	1 149	0.8	16.5 (0.0–61.7)	-

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; –indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Netherlands, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Peudomonas aeruginosa	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftolozane-tazobactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
***Acinetobacter* spp.**	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: no data. For example if no carbapenem-resistant isolates were reported.

Norway

Participating institutions

University Hospital of North Norway, https://www.unn.no/fag-og-forskning/norm-norsk-overvakingssystem-for-antibiotikaresistens-hos-mikrober

Norwegian Institute of Public Health, https://www.fhi.no/

St Olav University Hospital, Trondheim, https://www.stolav.no/

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Norway, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	94	94	94	94	94
Geographical representativeness	High	High	High	High	High
Hospital representativeness	High	High	High	High	High
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient days	91.9	87.4	97.3	80.9	91.7

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Norway, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	93	100	94	94

NA: not applicable. In 2020 there was no EARS-Net EQA.

For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Norway, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	18	3 764	4	18	3 840	3	18	3 835	3	18	3 984	3	18	3 976	11
Klebsiella pneumoniae	18	703	5	18	787	3	17	783	3	18	787	3	18	905	13
Peudomonas aeruginosa	18	283	5	18	309	3	18	362	6	18	294	4	18	295	11
***Acinetobacter* spp.**	10	31	0	14	42	5	15	35	3	14	41	0	14	61	7
Staphylococcus aureus	18	1 605	6	18	1 728	6	18	1 864	6	18	1 829	5	18	1 878	11
Streptococcus pneumoniae	18	243	3	18	263	3	18	454	4	18	493	3	18	510	16
Enterococcus faecalis	18	546	6	18	608	6	18	655	4	18	608	6	18	610	15
Enterococcus faecium	17	183	6	18	218	11	18	244	9	18	254	13	18	240	11

Labs: laboratories.

[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.

[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Norway

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	5.03	4.32	4.16	4.27	4.34	5.18	-	+3	+0.15	+19	NA	NA	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	0.04	0.02	0.04	0.04	0.08	0.13	↑	+225	+0.09	+5	NA	NA	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	0.34	0.5	0.3	0.39	0.64	0.69	↑	+102.9	+0.35	+20	NA	NA	4.48 (0.55–13.63)

NA, not applicable.

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Norway

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	29.63	26.8	27.69	28.45	29.1	-	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	4.32	4.16	4.27	4.34	5.18	↑	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0.02	0	0.02	0.04	0.02	-	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	7.37	7.46	7.69	7.79	7.59	-	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	4.22	4.08	4.06	4.26	4.45	-	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1.15	1.2	1.14	1.03	1.15	-	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	1.41	1.14	1	0.89	1.21	-	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	0.02	0.04	0.04	0.08	0.13	↑	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	1.55	1.82	1.51	1.78	1.96	-	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	1.01	0.79	0.61	0.64	0.88	-	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	0.65	0.45	0.45	0.41	0.52	-	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	0.30^	0.32^	0.61^	0.43^	0.31^	-	1.81 (0.26–7.45)
	Ceftazidime resistance	0.3	0.37	0.51	0.37	0.38	-	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	0.36	0.41	0.43	0.41	0.29	-	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.48	0.26	0.53	0.47	0.36	-	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0.02	0	0.04	0.02	0.06	-	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	0.14^	0.14^	0.20^	0.08^	0.12^	-	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	0	0	0.02	0	0.02	-	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0	0.04	0	0	0.02	-	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	0	0.02	0.02	0.02	0.02	-	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	0	0	0	0	0.02		2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	0.5	0.3	0.39	0.64	0.69	↑	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.36	0.32	0.65	0.68	0.5	-	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.22^	0.26	0.31	0.64	0.61	↑	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.12^	0.16	0.18	0.37	0.21	-	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	0.40^	0.30^	0.25^	0.12^	0.17^	↓	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	0.02	0.02	0.06	0.04	0.06	-	1.96 (0.00–9.97)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Norway, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	3 758	39.8	3 837	35.4	3 737	37.8	3 983	36.9	3 974	38.2	54.7 (34.4–71.1)	-
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	3 762	5.8	3 839	5.5	3 739	5.8	3 984	5.6	3 976	6.8	16.0 (6.8–38.7)	-
	Carbapenem (imipenem/meropenem) resistance	3 646	0	3 820	0	3 738	0	3 984	0.1	3 973	0	0.3 (0.0–2.5)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	3 735	10	3 827	9.9	3 726	10.5	3 971	10.1	3 962	10	22.5 (9.9–49.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	3 763	5.7	3 839	5.4	3 831	5.4	3 983	5.5	3 976	5.8	10.4 (4.5–29.6)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	3 734	1.6	3 826	1.6	3 726	1.6	3 970	1.3	3 962	1.5	5.5 (1.2–21.7)	-
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	702	10.1	787	7.4	769	6.6	787	5.8	904	7	32.9 (4.9–84.3)	↓*
	Carbapenem (imipenem/meropenem) resistance	687	0.1	783	0.3	769	0.3	787	0.5	902	0.8	11.3 (0.0–67.6)	↑*
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	696	11.2	782	11.8	765	10.1	783	11.7	900	11.3	31.4 (0.0–80.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	702	7.3	786	5.1	782	4	787	4.2	904	5.1	21.5 (0.0–73.8)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	696	4.7	782	2.9	764	3	783	2.7	900	3	18.8 (0.0–71.5)	-
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	254	5.9	278	5.8	316	9.8	261	8.4	256	6.3	16.4 (3.9–53.7)	-
	Ceftazidime resistance	277	5.4	295	6.4	354	7.3	285	6.7	286	7	13.8 (2.8–51.5)	-
	Carbapenem (imipenem/meropenem) resistance	282	6.4	309	6.8	362	6.1	294	7.1	295	5.1	15.9 (1.5–53.4)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	282	8.5	309	4.2	361	7.5	293	8.2	295	6.4	15.3 (4.9–51.9)	-
	Aminoglycoside (tobramycin) resistance	281	0.4	308	0	362	0.6	294	0.3	294	1	7.0 (0.0–44.6)	-
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	246	2.8	263	2.7	307	3.3	251	1.6	246	2.4	10.0 (0.0–47.5)	-
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	31	0	42	0	34	2.9	41	0	61	1.6	31.6 (0.0–94.1)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	31	0	42	4.8	34	0	41	0	61	1.6	33.2 (0.0–95.2)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	30	0	42	2.4	35	2.9	40	2.5	57	1.8	29.0 (1.8–89.9)	-
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	30	0	42	0	34	0	40	0	57	1.8	27.0 (0.0–89.5)	-
Staphylococcus aureus	MRSA[d]	1 552	1.6	1 638	0.9	1 796	1.1	1 714	1.9	1 748	2.1	14.2 (1.9–46.0)	↑*
Streptococcus pneumoniae	Penicillin non-wild-type[e]	242	7.4	262	6.1	453	7.3	491	7.1	509	5.1	17.3 (0.0–36.6)	-
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	215	5.1	242	5.4	418	3.8	487	6.8	501	6.4	19.0 (4.0–44.2)	-
	Combined penicillin non-wild-type and resistance to macrolides[e]	214	2.8	241	3.3	417	2.2	485	3.9	500	2.2	11.1 (0.0–25.6)	-
Enterococcus faecalis	High-level gentamicin resistance	161	12.4	159	9.4	155	8.4	138	4.3	156	5.8	22.6 (4.8–49.2)	↓*
Enterococcus faecium	Vancomycin resistance	180	0.6	216	0.5	243	1.2	253	0.8	229	1.3	16.5 (0.0–61.7)	-

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; −indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Norway, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	0	0	0	0	1	14.3	6	85.7	7	100
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Peudomonas aeruginosa	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	2	13.3	0	0	0	0	13	86.7	15	100
	Ceftolozane-tazobactam	3	20	0	0	0	0	12	80	15	100
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acinetobacter spp.	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: no data. For example if no carbapenem-resistant isolates were reported.

Poland

Participating institutions
National Medicines Institute, Department of Epidemiology and Clinical Microbiology, https://www.nil.gov.pl
National Reference Centre for Susceptibility Testing, https://korld.nil.gov.pl

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Poland, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	16	20	18	21	20
Geographical representativeness	Medium	Medium	Medium	Medium	Medium
Hospital representativeness	Medium	Medium	Medium	Medium	Medium
Isolate representativeness	Medium	High	High	High	High
Blood culture sets/1 000 patient days	45.6	54.7	51.2	55.1	57.7

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Poland, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	98	88	97	99

NA: not applicable. In 2020 there was no EARS-Net EQA.
For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Poland, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	49	2 179	25	52	2 376	28	52	2 538	25	52	3 072	24	54	3 696	20
Klebsiella pneumoniae	49	1 091	35	52	1 447	47	52	1 357	39	52	1 583	38	54	2 066	30
Peudomonas aeruginosa	48	317	38	49	445	49	52	476	39	49	480	39	53	655	31
***Acinetobacter* spp.**	44	373	55	50	832	69	49	469	51	48	454	56	48	478	40
Staphylococcus aureus	50	1 676	29	52	1 975	32	52	2 073	27	52	2 145	29	54	2 542	23
Streptococcus pneumoniae	40	165	33	47	260	35	49	456	33	50	518	27	53	628	23
Enterococcus faecalis	49	790	36	51	1 252	50	51	972	41	52	1 005	43	54	1 089	32
Enterococcus faecium	48	529	38	52	908	52	51	681	40	51	731	41	54	871	30

Labs: laboratories.
[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.
[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Poland

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	7.44#	6.24#	5.87#	6.98#	7.77#	9.43#	↑	+26.7	+1.99	+631	-10	6.7	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	1.38#	1.45#	3.69#	3.30#	3.69#	5.15#	↑	+273.2	+3.77	+1 361	-4	1.32	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	4.26#	3.08^#	3.74^#	3.91#	3.52#	3.43#	-	-19.5*	-0.83*	-363*	-10	3.83	4.48 (0.55–13.63)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

One or more of the three representativeness indicators (geographical, hospital and/or isolate representativeness) were not reported as 'High'. The results should be interpreted with caution.

* Target reached.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Poland

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	4.64^#	6.47^#	7.23^#	8.12^#	8.33^#	↑	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	6.24#	5.87#	6.98#	7.77#	9.43#	↑	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0.02#	0.04#	0.03#	0.08#	0.07#	-	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	11.67#	9.92#	10.87#	12.68#	14.16#	↑	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	4.86#	3.96#	4.18#	5.09#	6.17#	↑	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	3.08#	2.80^#	2.55^#	3.29^#	4.03^#	↑	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	11.28#	13.24#	12.29#	13.11#	16.90#	↑	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	1.45#	3.69#	3.30#	3.69#	5.15#	↑	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	11.64#	13.28#	11.98#	12.93#	15.82#	↑	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	8.38#	9.92#	8.69#	9.32#	11.84#	↑	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	7.90#	9.42#	7.98^#	8.75^#	10.81^#	↑	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	1.42^#	1.59#	1.59#	1.63#	1.84#	-	1.81 (0.26–7.45)
	Ceftazidime resistance	1.12#	1.19#	1.18#	1.32#	1.56#	↑	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	1.48#	1.63#	1.70#	1.58#	1.90#	-	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	1.45^#	1.89#	1.65#	1.54#	1.79#	-	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0.77^#	0.52^#	0.65^#	0.74^#	0.68^#	-	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	0.91^#	0.98^#	0.94^#	0.93^#	0.89^#	-	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	4.79#	9.02#	5.25#	4.65#	4.94#	-	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	5.32#	9.99#	5.62#	4.90#	5.12#	-	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	4.23#	7.95#	4.07#	3.82#	3.48#	-	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	3.75#	7.00#	3.63#	3.60#	3.33#	-	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	3.08^#	3.74^#	3.91#	3.52#	3.43#	-	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.28#	0.63#	0.78#	0.65#	1.27#	↑	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.46^#	0.82^#	1.28^#	1.27^#	1.32^#	↑	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.18^#	0.41^#	0.46^#	0.44^#	0.68^#	↑	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	5.98^#	8.42#	6.15#	5.58#	6.29#	-	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	3.34#	4.08#	4.07#	3.90#	4.31#	↑	1.96 (0.00–9.97)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

One or more of the three representativeness indicators (geographical, hospital and/or isolate representativeness) were not reported as 'High'. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Poland, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	502	56.2	809	60.6	857	57.2	956	65.6	1 085	56.2	54.7 (34.4–71.1)	-
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	2 172	17.4	2 371	18.7	2 531	18.7	3 067	19.6	3 673	18.8	16.0 (6.8–38.7)	-
	Carbapenem (imipenem/meropenem) resistance	2 080	0	2 290	0.1	2 451	0.1	2 966	0.2	3 520	0.1	0.3 (0.0–2.5)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	2 149	33	2 268	33.1	2 392	30.8	3 040	32.2	3 614	28.7	22.5 (9.9–49.3)	↓*
	Aminoglycoside (gentamicin/tobramycin) resistance	2 033	14.5	2 186	13.7	2 296	12.3	2 780	14.1	3 395	13.3	10.4 (4.5–29.6)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1 998	9.4	2 077	10.2	2 149	8.1	2 748	9.2	3 302	8.9	5.5 (1.2–21.7)	-
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	1 088	63	1 432	70	1 345	61.9	1 573	64.3	2 042	60.6	32.9 (4.9–84.3)	↓*
	Carbapenem (imipenem/meropenem) resistance	1 074	8.2	1 429	19.5	1 332	16.8	1 572	18.1	2 000	18.9	11.3 (0.0–67.6)	↑*
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	1 085	65.2	1 428	70.4	1 341	60.6	1 568	63.6	2 020	57.4	31.4 (0.0–80.3)	↓*
	Aminoglycoside (gentamicin/tobramycin) resistance	1 019	50	1 364	55.1	1 242	47.4	1 442	49.9	1 904	45.5	21.5 (0.0–73.8)	↓*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1 012	47.4	1 333	53.5	1 221	44.3	1 424	47.4	1 849	42.8	18.8 (0.0–71.5)	↓*
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	266	32.3	440	27.3	463	23.3	467	27	635	21.3	16.4 (3.9–53.7)	↓*
	Ceftazidime resistance	312	21.8	442	20.4	471	17	478	21.3	618	18.4	13.8 (2.8–51.5)	-
	Carbapenem (imipenem/meropenem) resistance	316	28.5	440	28	468	24.6	476	25.6	646	21.5	15.9 (1.5–53.4)	↓*
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	270	32.6	443	32.3	459	24.4	477	24.9	645	20.3	15.3 (4.9–51.9)	↓*
	Aminoglycoside (tobramycin) resistance	239	19.7	323	12.1	334	13.2	322	17.7	446	11.2	7.0 (0.0–44.6)	-
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	178	30.9	318	23.3	323	19.8	312	23.1	411	15.8	10.0 (0.0–47.5)	↓*
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	372	78.2	826	82.7	466	76.4	450	79.8	476	76.1	31.6 (0.0–94.1)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	366	88.3	816	92.6	452	84.3	441	85.7	465	80.6	33.2 (0.0–95.2)	↓*
	Aminoglycoside (gentamicin/tobramycin) resistance	363	70.8	812	74.1	450	61.3	433	68.1	454	56.2	29.0 (1.8–89.9)	↓*
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	355	64.2	791	67	432	56.9	421	66	439	55.6	27.0 (0.0–89.5)	↓*
Staphylococcus aureus	MRSA[d]	1 351	13.8	1 718	16.5	2 000	13.3	1 953	13.9	2 334	10.8	14.2 (1.9–46.0)	↓*
Streptococcus pneumoniae	Penicillin non-wild-type[e]	158	10.8	255	18.8	445	11.9	504	9.9	597	15.6	17.3 (0.0–36.6)	-
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	123	22.8	213	29.1	352	24.7	392	25	448	21.7	19.0 (4.0–44.2)	-
	Combined penicillin non-wild-type and resistance to macrolides[e]	116	9.5	208	14.9	342	9.1	381	8.9	427	11.7	11.1 (0.0–25.6)	-
Enterococcus faecalis	High-level gentamicin resistance	703	51.6	1 153	55.2	878	47.5	914	47.2	1 004	45.9	22.6 (4.8–49.2)	↓*
Enterococcus faecium	Vancomycin resistance	527	38.5	900	34.3	680	40.6	728	41.3	867	36.4	16.5 (0.0–61.7)	-

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; −indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Poland, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	0	0	0	0	2	40	3	60	5	100
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	1	20	0	0	0	0	4	80	5	100
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	14	3.7	0	0	17	4.5	346	91.8	377	100
	Ceftazidime-avibactam	80	21.2	0	0	82	21.8	215	57	377	100
	Imipenem-relebactam	19	5	0	0	29	7.7	329	87.3	377	100
	Meropenem-vaborbactam	42	11.1	0	0	25	6.6	310	82.2	377	100
Peudomonas aeruginosa	Cefiderocol	4	2.9	0	0	1	0.7	134	96.4	139	100
	Ceftazidime-avibactam	14	10.1	0	0	12	8.6	113	81.3	139	100
	Ceftolozane-tazobactam	8	5.8	0	0	10	7.2	121	87.1	139	100
	Imipenem-relebactam	5	3.6	0	0	5	3.6	129	92.8	139	100
	Meropenem-vaborbactam	4	2.9	0	0	5	3.6	130	93.5	139	100
Acinetobacter spp.	Cefiderocol	11	3	0	0	1	0.3	350	96.7	362	100

ND: no data. For example if no carbapenem-resistant isolates were reported.

Portugal

Participating institutions
National Institute of Health Doutor Ricardo Jorge, https://www.insa.min-saude.pt/
Directorate-General of Health, https://www.dgs.pt/

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Portugal, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	97	97	97	98	98
Geographical representativeness	High	High	High	High	High
Hospital representativeness	High	High	High	High	High
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient days	244.2	256	363.7	323.6	205.1

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Portugal, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	81	91	83	93

NA: not applicable. In 2020 there was no EARS-Net EQA.
For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Portugal, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	63	5 858	4	57	5 633	4	63	5 558	4	69	6 414	4	66	7 324	4
Klebsiella pneumoniae	60	2 790	9	56	2 602	14	58	3 035	10	62	3 424	10	65	3 732	9
Peudomonas aeruginosa	57	1 061	9	53	1 016	14	56	1 131	10	58	1 187	11	59	1 274	11
***Acinetobacter* spp.**	31	104	9	26	67	17	33	125	17	33	156	22	30	157	17
Staphylococcus aureus	65	3 319	6	59	2 948	10	65	3 602	8	66	3 291	7	64	3 725	7
Streptococcus pneumoniae	48	588	NA	41	427	NA	50	706	2	57	957	3	55	1 069	4
Enterococcus faecalis	58	990	10	52	999	13	55	1 123	10	59	1 045	9	60	1 217	10
Enterococcus faecium	43	406	12	43	416	17	44	520	19	53	524	14	50	598	13

Labs: laboratories.
NA: not applicable.
[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.
[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Portugal

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	10.32	8.38	7.36	7.76	10.73	13.08	-	+26.7	+2.76	+331	-12	9.08	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	2.93	3.22	2.92	3.01	4.19	4.22	↑	+44	+1.29	+148	-5	2.78	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	11.39	9.8	7.23	8.81	7.39	8.22	↓	-27.8*	-3.17*	-296*	-18	9.34	4.48 (0.55–13.63)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

* Target reached.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Portugal

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	31.83	27.26	28.51	31.39	37.64	-	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	8.38	7.36	7.76	10.73	13.08	↑	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0.09	0.18	0.17	0.32	0.33	↑	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	14.01	12.65	11.81	15.18	16.52	-	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	6.77	5.96	6.46	8.23	9.49	↑	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	3.48	2.84	3.28	3.96	4.69	↑	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	13.16	11.63	13.56	16.82	16.54	↑	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	3.22	2.92	3.01	4.19	4.22	↑	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	11.88	10.81	12.28	14.71	14.02	↑	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	7.8	6.48	6.98	7.92	7.11	-	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	6.53	5.31	5.9	6.84	6.31	-	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	1.86	1.62	1.69	1.76	1.87	-	1.81 (0.26–7.45)
	Ceftazidime resistance	1.41	1.54	1.45	1.55	1.53	-	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	1.42	1.43	1.32	1.17	1.28	-	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	1.96	1.83	1.59	1.73	1.6	↓	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0.47^	0.55^	0.40^	0.38^	0.31^	↓	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	0.78^	1.11^	0.77^	0.78^	0.83^	-	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	0.16	0.07	0.38	0.65	0.38	↑	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.18	0.11	0.4	0.7	0.37	↑	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	0.13	0.08	0.25	0.42	0.33	↑	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	0.09	0.05^	0.22	0.41	0.26	↑	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	9.8	7.23	8.81	7.39	8.22	-	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.71^	0.53^	0.52^	0.90^	1.26	↑	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.88	0.77	1.02	1.36	1.6	↑	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.42^	0.34^	0.32^	0.45^	0.68	↑	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	1.71^	1.46^	1.71^	1.48^	1.69^	-	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	0.31	0.35	0.57	0.53	0.66	↑	1.96 (0.00–9.97)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Portugal, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	5 849	54.4	5 164	52.7	5 486	52.2	5 923	54.4	7 127	55.1	54.7 (34.4–71.1)	-
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	5 793	14.4	5 615	13.1	5 526	14.1	6 403	17.2	7 290	18.7	16.0 (6.8–38.7)	↑*
	Carbapenem (imipenem/meropenem) resistance	5 833	0.2	5 466	0.3	5 362	0.3	6 183	0.5	6 932	0.5	0.3 (0.0–2.5)	↑*
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	5 845	23.9	5 618	22.5	5 530	21.4	6 399	24.3	7 265	23.7	22.5 (9.9–49.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	5 788	11.7	5 605	10.6	5 544	11.7	6 407	13.2	7 247	13.6	10.4 (4.5–29.6)	↑*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	5 716	6.1	5 591	5.1	5 496	6	6 385	6.4	7 200	6.8	5.5 (1.2–21.7)	↑*
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	2 762	47.6	2 581	45	3 013	45.2	3 403	50.7	3 727	46.3	32.9 (4.9–84.3)	-
	Carbapenem (imipenem/meropenem) resistance	2 780	11.6	2 520	11.6	2 935	10.3	3 280	13.1	3 513	12.5	11.3 (0.0–67.6)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	2 779	42.7	2 596	41.6	3 030	40.7	3 415	44.2	3 695	39.6	31.4 (0.0–80.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	2 759	28.2	2 592	25	3 031	23.1	3 418	23.8	3 680	20.1	21.5 (0.0–73.8)	↓*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2 734	23.8	2 571	20.6	3 005	19.7	3 394	20.7	3 666	17.9	18.8 (0.0–71.5)	↓*
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	1 060	17.5	985	16.4	1 125	15.1	1 172	15.4	1 272	15.3	16.4 (3.9–53.7)	-
	Ceftazidime resistance	977	14.4	1 013	15.2	1 120	13	1 181	13.5	1 270	12.6	13.8 (2.8–51.5)	-
	Carbapenem (imipenem/meropenem) resistance	1 057	13.4	1 015	14.1	1 129	11.8	1 181	10.2	1 274	10.4	15.9 (1.5–53.4)	↓*
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	1 059	18.5	1 012	18.1	1 120	14.3	1 186	14.9	1 273	13.1	15.3 (4.9–51.9)	↓*
	Aminoglycoside (tobramycin) resistance	877	5.4	875	6.3	991	4	1 047	3.7	1 127	2.8	7.0 (0.0–44.6)	↓*
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	794	9.8	872	12.7	980	7.9	1 034	7.7	1 126	7.7	10.0 (0.0–47.5)	↓*
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	104	15.4	67	10.4	122	31.1	155	43.2	156	25.6	31.6 (0.0–94.1)	↑*
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	101	17.8	62	17.7	123	32.5	156	46.2	157	24.8	33.2 (0.0–95.2)	↑*
	Aminoglycoside (gentamicin/tobramycin) resistance	104	12.5	64	12.5	118	21.2	152	28.3	150	22.7	29.0 (1.8–89.9)	↑*
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	101	8.9	59	8.5	114	19.3	151	27.8	149	18.1	27.0 (0.0–89.5)	↑*
Staphylococcus aureus	MRSA[d]	3 299	29.7	2 873	25.1	3 544	25	3 284	23.1	3 600	23.8	14.2 (1.9–46.0)	↓*
Streptococcus pneumoniae	Penicillin non-wild-type[e]	513	13.8	369	14.4	583	8.9	818	11.2	987	13.3	17.3 (0.0–36.6)	-
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	565	15.6	404	19.1	684	14.9	928	15	1 048	15.9	19.0 (4.0–44.2)	-
	Combined penicillin non-wild-type and resistance to macrolides[e]	492	8.5	348	9.8	566	5.7	795	5.8	969	7.3	11.1 (0.0–25.6)	-
Enterococcus faecalis	High-level gentamicin resistance	862	19.8	802	18.2	873	19.7	826	18.4	1 001	17.6	22.6 (4.8–49.2)	-
Enterococcus faecium	Vancomycin resistance	399	7.8	409	8.6	513	11.1	522	10.3	598	11.5	16.5 (0.0–61.7)	↑

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; –indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Portugal, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	19	55.9	0	0	2	5.9	13	38.2	34	100
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	259	58.9	0	0	30	6.8	151	34.3	440	100
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	1	0.2	0	0	0	0	439	99.8	440	100
Peudomonas aeruginosa	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	38	28.6	5	3.8	4	3	86	64.7	133	100
	Ceftolozane-tazobactam	94	70.7	4	3	9	6.8	26	19.5	133	100
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acinetobacter spp.	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: no data. For example if no carbapenem-resistant isolates were reported.

Romania

Participating institutions

National Institute of Public Health, www.insp.gov.ro

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Romania, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	11	11	13	13	15
Geographical representativeness	Low	Low	Low	Low	Low
Hospital representativeness	Low	Low	Low	Low	Low
Isolate representativeness	Low	Low	Low	Low	Low
Blood culture sets/1 000 patient days	26.4	26.4	32.5	39.7	32.9

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Romania, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	100	94	100	91

NA: not applicable. In 2020 there was no EARS-Net EQA.

For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Romania, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	15	455	17	16	499	18	17	702	15	18	993	12	22	1 340	14
Klebsiella pneumoniae	16	478	54	16	538	52	17	628	48	19	944	39	22	1 167	39
Peudomonas aeruginosa	15	148	53	16	208	51	16	230	50	19	264	46	22	258	43
***Acinetobacter* spp.**	15	298	72	16	386	73	15	319	69	18	337	62	21	441	63
Staphylococcus aureus	16	418	30	16	469	27	17	597	22	18	782	22	22	1 028	19
Streptococcus pneumoniae	11	42	20	10	28	23[c]	11	43	7	14	81	17	16	123	17
Enterococcus faecalis	15	167	58	16	227	47	17	246	36	19	314	39	22	379	37
Enterococcus faecium	16	122	53	14	194	53	16	185	45	17	179	39	22	210	36

Labs: laboratories.

[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.

[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

[c] A small number of isolates were tested (n < 30), and the percentage of isolates from ICUs should be interpreted with caution.

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Romania

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	6.32#	4.19#	4.40#	4.97#	7.63#	9.68#	↑	+53.2	+3.36	+619	-5	6	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	7.12#	10.77#	13.87#	12.12#	20.02#	20.31#	↑	+185.3	+13.19	+2 492	-5	6.76	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	13.72#	9.03#	8.95#	9.37#	11.99#	13.15#	-	-4.2	-0.57	-157	-18	11.25	4.48 (0.55–13.63)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

One or more of the three representativeness indicators (geographical, hospital and/or isolate representativeness) were not reported as 'High'. The results should be interpreted with caution.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Romania

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	9.31^#	10.70^#	13.66^#	18.93^#	21.33^#	↑	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	4.19#	4.40#	4.97#	7.63#	9.68#	↑	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0.14#	0.09#	0.16#	0.73#	0.42#	↑	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	5.50#	5.82#	6.63#	10.05#	11.75#	↑	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	1.88^#	2.04^#	2.91^#	4.44^#	5.03^#	↑	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	0.99^#	0.95^#	1.45^#	2.06^#	2.90^#	↑	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	15.24#	17.90#	15.76#	26.24#	27.34#	↑	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	10.77#	13.87#	12.12#	20.02#	20.31#	↑	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	14.77#	17.04#	15.07#	24.14#	26.19#	↑	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	9.31^#	10.75^#	10.83^#	18.45^#	18.81^#	↑	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	8.94^#	9.94^#	10.06^#	17.32^#	17.52^#	↑	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	2.40^#	4.36#	4.24#	5.01#	2.90#	-	1.81 (0.26–7.45)
	Ceftazidime resistance	2.77#	4.40#	4.20#	5.01#	2.76#	-	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	3.06#	4.50#	5.01#	5.57#	3.08#	-	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	3.06#	4.36#	4.53#	5.17#	2.97#	-	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	2.16^#	3.31^#	3.07^#	3.51^#	1.71^#	-	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	1.88^#	3.17^#	3.39^#	3.79^#	1.89^#	-	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	13.03#	17.09#	11.47#	11.79#	14.20#	-	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	13.31#	17.23#	11.60#	11.83#	14.27#	-	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	10.72^#	14.49^#	9.58^#	9.49^#	12.10^#	-	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	10.49^#	14.25^#	9.33^#	9.29^#	11.89^#	-	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	9.03#	8.95#	9.37#	11.99#	13.15#	↑	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.71#	0.47#	0.61#	1.01#	1.47#	↑	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.47^#	0.43^#	0.53^#	0.97#	1.26#	↑	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.38^#	0.33^#	0.48^#	0.81#	1.05#	↑	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	3.01^#	3.74#	3.80^#	5.29^#	3.39^#	-	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	2.07#	4.02#	2.75#	2.95#	2.73#	-	1.96 (0.00–9.97)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

One or more of the three representativeness indicators (geographical, hospital and/or isolate representativeness) were not reported as 'High'. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Romania, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	316	62.7	352	64.2	542	62.4	760	61.7	974	62.6	54.7 (34.4-71.1)	-
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	452	19.7	495	18.8	690	17.8	990	19.1	1 340	20.7	16.0 (6.8-38.7)	-
	Carbapenem (imipenem/meropenem) resistance	454	0.7	498	0.4	697	0.6	985	1.8	1 305	0.9	0.3 (0.0-2.5)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	450	26	498	24.7	690	23.8	980	25.4	1 334	25.2	22.5 (9.9-49.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	367	10.9	406	10.6	602	12	865	12.7	1 172	12.3	10.4 (4.5-29.6)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	360	5.8	401	5	582	6.2	849	6	1 166	7.1	5.5 (1.2-21.7)	-
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	477	67.9	534	70.8	614	63.5	936	69.4	1 167	67	32.9 (4.9-84.3)	-
	Carbapenem (imipenem/meropenem) resistance	474	48.3	538	54.5	627	47.8	940	52.8	1 156	50.3	11.3 (0.0-67.6)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	474	66.2	536	67.2	618	60.4	935	64	1 161	64.5	31.4 (0.0-80.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	399	49.6	440	51.6	508	52.8	801	57.1	1 000	53.8	21.5 (0.0-73.8)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	397	47.9	434	48.4	487	51.1	789	54.4	995	50.4	18.8 (0.0-71.5)	-
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	121	42.1	195	47.2	216	48.6	248	50	250	33.2	16.4 (3.9-53.7)	-
	Ceftazidime resistance	144	41	202	46	218	47.7	255	48.6	252	31.3	13.8 (2.8-51.5)	↓*
	Carbapenem (imipenem/meropenem) resistance	148	43.9	207	45.9	230	53.9	262	52.7	258	34.1	15.9 (1.5-53.4)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	140	46.4	204	45.1	229	48.9	260	49.2	255	33.3	15.3 (4.9-51.9)	↓*
	Aminoglycoside (tobramycin) resistance	124	37.1	168	41.7	180	42.2	197	44.2	170	28.8	7.0 (0.0-44.6)	-
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	96	41.7	159	42.1	176	47.7	190	49.5	167	32.3	10.0 (0.0-47.5)	-
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	297	93.3	386	93.5	318	89.3	336	86.9	438	92.7	31.6 (0.0-94.1)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	297	95.3	385	94.5	315	91.1	334	87.7	436	93.6	33.2 (0.0-95.2)	↓
	Aminoglycoside (gentamicin/tobramycin) resistance	253	90.1	336	91.1	267	88.8	285	82.5	385	89.9	29.0 (1.8-89.9)	-
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	251	88.8	335	89.9	264	87.5	282	81.6	380	89.5	27.0 (0.0-89.5)	-
Staphylococcus aureus	MRSA[d]	406	47.3	461	41	596	38.9	754	39.4	1 021	36.8	14.2 (1.9-46.0)	↓*
Streptococcus pneumoniae	Penicillin non-wild-type[e]	39	38.5	28	35.7[f]	42	35.7	77	32.5	123	34.1	17.3 (0.0-36.6)	-
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	37	27	25	36.0[f]	36	36.1	80	30	122	29.5	19.0 (4.0-44.2)	-
	Combined penicillin non-wild-type and resistance to macrolides[e]	34	23.5	25	28.0[f]	36	33.3	76	26.3	122	24.6	11.1 (0.0-25.6)	-
Enterococcus faecalis	High-level gentamicin resistance	148	43.2	212	37.3	218	43.1	280	46.8	326	29.8	22.6 (4.8-49.2)	↓*
Enterococcus faecium	Vancomycin resistance	112	39.3	191	44.5	184	37	177	41.2	209	37.3	16.5 (0.0-61.7)	-

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; −indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

[f] A small number of isolates were tested (n < 30), and the percentage resistance should be interpreted with caution.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Romania, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	1	8.3	0	0	0	0	11	91.7	12	100
	Ceftazidime-avibactam	1	8.3	0	0	0	0	11	91.7	12	100
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	41	7.1	0	0	34	5.9	506	87.1	581	100
	Ceftazidime-avibactam	31	5.3	0	0	136	23.4	414	71.3	581	100
	Imipenem-relebactam	19	3.3	0	0	100	17.2	462	79.5	581	100
	Meropenem-vaborbactam	5	0.9	0	0	69	11.9	507	87.3	581	100
Peudomonas aeruginosa	Cefiderocol	4	4.5	0	0	0	0	84	95.5	88	100
	Ceftazidime-avibactam	4	4.5	0	0	8	9.1	76	86.4	88	100
	Ceftolozane-tazobactam	4	4.5	0	0	7	8	77	87.5	88	100
	Imipenem-relebactam	2	2.3	0	0	7	8	79	89.8	88	100
	Meropenem-vaborbactam	2	2.3	0	0	4	4.5	82	93.2	88	100
Acinetobacter spp.	Cefiderocol	2	0.5	0	0	2	0.5	402	99	406	100

ND: no data. For example if no carbapenem-resistant isolates were reported.

Slovakia

Participating institutions
National Reference Centre for Antimicrobial Resistance, https://www.uvzsr.sk
Public Health Authority of the Slovak Republic, https://www.uvzsr.sk
Regional Public Health Authority Banska Bystrica, https://www.uvzsr.sk

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Slovakia, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	56	56	56	54	53
Geographical representativeness	High	High	High	High	High
Hospital representativeness	High	High	High	High	High
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient days	27	32.1	29.5	30.6	31.6

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Slovakia, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	100	100	100	86

NA: not applicable. In 2020 there was no EARS-Net EQA.
For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Slovakia, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	11	732	17	13	663	16	13	784	17	11	697	9	12	777	12
Klebsiella pneumoniae	11	405	35	13	551	41	13	409	30	11	310	18	11	381	25
Peudomonas aeruginosa	11	246	35	13	275	42	13	238	30	11	228	27	11	202	23
***Acinetobacter* spp.**	11	95	37	12	148	57	12	155	42	8	76	28	8	94	21
Staphylococcus aureus	11	540	22	13	583	20	13	578	21	11	416	12	12	490	16
Streptococcus pneumoniae	5	15	NA	6	22	18[c]	10	34	26	8	34	15	8	59	25
Enterococcus faecalis	11	199	30	12	335	42	12	275	31	11	214	19	10	208	21
Enterococcus faecium	10	121	31	12	224	52	13	155	36	10	142	17	11	138	20

Labs: laboratories.
NA: not applicable.
[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.
[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).
[c] A small number of isolates were tested (n < 30), and the percentage of isolates from ICUs should be interpreted with caution.

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Slovakia

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	6.39	6.45	4.91	5.98	5.12	6.64	-	+3.9	+0.25	+12	-5	6.07	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	0.52	1.05	1.96	1.87	1.33	1.74	↑	+234.6	+1.22	+66	-4	0.5	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	5.01	4.38	4.25	3.42	2.05	3.27	↓	-34.7*	-1.74*	-96*	-10	4.51	4.48 (0.55–13.63)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

* Target reached.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Slovakia

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	13.61	11.77	13.67	13.64	15.06	-	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	6.45	4.91	5.98	5.12	6.64	-	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0.03	0	0	0.03	0.07	-	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	8.15	6.44	8.31	7.37	8.1	-	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	4.42	3.07	3.55	3.27	3.65	-	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	3.53	2.19	2.73	2.46	2.5	-	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	7.1	12.2	7.36	5.56	7.41	-	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	1.05	1.96	1.87	1.33	1.74	-	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	7.1	11.68	6.44	4.81	6.61	-	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	6.48	10.76	5.85	4.26	5.57	-	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	5.79	9.22	4.9	3.75	4.77	-	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	2.32^	2.62	1.74^	2.15	1.77	-	1.81 (0.26–7.45)
	Ceftazidime resistance	2.29^	2.68	1.77^	2.39	1.74	-	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	3.7	3.73	2.2	3.38	2.78	-	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	3.99	4.28	3.38	3.17	2.68	↓	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	2.62	2.91	2.07	2.49	2.05	-	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	2.45^	2.71^	1.91^	2.29	1.95	-	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	0.92	2.68	3.02	1.23	1.25	-	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	1.21	3.3	3.32	1.26	1.29	-	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	0.88	2.98	3.25	1.23	1.22	-	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	0.72	2.35	2.92	1.13	1.15	-	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	4.38	4.25	3.42	2.05	3.27	↓	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.07	0.07	0.1	0.1	0.35	↑	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.1	0.1	0.23	0.17^	0.42	↑	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.03	0.03	0.03	0.00^	0.24	-	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	2.29	5.59	3.02	0.99	1.01	↓	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	1.57	2.49	2.1	1.09	1.25	-	1.96 (0.00–9.97)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Slovakia, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	728	57.1	660	54.5	767	54.2	684	58.5	761	56.9	54.7 (34.4–71.1)	-
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	727	27.1	649	23.1	768	23.7	696	21.6	777	24.6	16.0 (6.8–38.7)	-
	Carbapenem (imipenem/meropenem) resistance	705	0.1	625	0	738	0	696	0.1	777	0.3	0.3 (0.0–2.5)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	729	34.2	662	29.8	782	32.4	693	31.2	775	30.1	22.5 (9.9–49.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	731	18.5	663	14.2	783	13.8	695	13.8	777	13.5	10.4 (4.5–29.6)	↓*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	724	14.9	648	10.3	767	10.8	692	10.4	775	9.3	5.5 (1.2–21.7)	↓*
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	399	54.4	545	68.4	399	56.1	310	52.6	381	55.9	32.9 (4.9–84.3)	-
	Carbapenem (imipenem/meropenem) resistance	392	8.2	515	11.7	379	15	310	12.6	381	13.1	11.3 (0.0–67.6)	↑
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	403	53.8	550	64.9	409	47.9	310	45.5	379	50.1	31.4 (0.0–80.3)	↓*
	Aminoglycoside (gentamicin/tobramycin) resistance	405	48.9	551	59.7	408	43.6	310	40.3	380	42.1	21.5 (0.0–73.8)	↓*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	399	44.4	544	51.8	399	37.3	310	35.5	378	36.2	18.8 (0.0–71.5)	↓*
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	213	33.3	254	31.5	213	24.9	226	27.9	201	25.4	16.4 (3.9–53.7)	↓*
	Ceftazidime resistance	214	32.7	253	32.4	213	25.4	228	30.7	201	24.9	13.8 (2.8–51.5)	-
	Carbapenem (imipenem/meropenem) resistance	231	48.9	258	44.2	218	30.7	228	43.4	201	39.8	15.9 (1.5–53.4)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	246	49.6	273	48	237	43.5	228	40.8	202	38.1	15.3 (4.9–51.9)	↓*
	Aminoglycoside (tobramycin) resistance	242	33.1	265	33.6	236	26.7	216	33.8	194	30.4	7.0 (0.0–44.6)	-
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	210	35.7	244	34	213	27.2	215	31.2	192	29.2	10.0 (0.0–47.5)	-
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	91	30.8	134	61.2	150	61.3	76	47.4	94	38.3	31.6 (0.0–94.1)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	95	38.9	148	68.2	155	65.2	76	48.7	94	39.4	33.2 (0.0–95.2)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	95	28.4	147	61.9	154	64.3	76	47.4	94	37.2	29.0 (1.8–89.9)	-
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	91	24.2	134	53.7	149	59.7	76	43.4	94	35.1	27.0 (0.0–89.5)	-
Staphylococcus aureus	MRSA[d]	540	24.8	582	22.3	578	18	416	14.4	488	19.3	14.2 (1.9–46.0)	↓*
Streptococcus pneumoniae	Penicillin non-wild-type[e]	14	NA	22	9.1[f]	33	9.1	32	9.4	59	16.9	17.3 (0.0–36.6)	NA
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	15	NA	21	14.3[f]	32	21.9	28	17.9[f]	58	20.7	19.0 (4.0–44.2)	NA
	Combined penicillin non-wild-type and resistance to macrolides[e]	14	NA	21	4.8[f]	31	3.2	26	0.0[f]	58	12.1	11.1 (0.0–25.6)	NA
Enterococcus faecalis	High-level gentamicin resistance	195	35.9	325	52.6	265	34.7	208	13.9	202	14.4	22.6 (4.8–49.2)	↓*
Enterococcus faecium	Vancomycin resistance	120	40	219	34.7	153	41.8	141	22.7	137	26.3	16.5 (0.0–61.7)	↓*

NA, not applicable.

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; −indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

[f] A small number of isolates were tested (n < 30), and the percentage resistance should be interpreted with caution.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Slovakia, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Peudomonas aeruginosa	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftolozane-tazobactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acinetobacter spp.	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: no data. For example if no carbapenem-resistant isolates were reported.

Slovenia

Participating institutions

National Institute of Public Health, www.nijz.si

Medical Faculty, University of Ljubljana, https://imi.si/

National Laboratory of Health, Environment and Food, https://www.nlzoh.si/

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Slovenia, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	99	99	99	99	99
Geographical representativeness	High	High	High	High	High
Hospital representativeness	High	High	High	High	High
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient days	47.1	56.1	56.4	44.7	66.8

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Slovenia, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	100	100	100	100

NA: not applicable. In 2020 there was no EARS-Net EQA.

For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Slovenia, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	10	1 617	6	10	1 681	5	10	1 660	5	10	1 639	5	10	1 709	7
Klebsiella pneumoniae	10	291	17	10	351	14	10	372	10	10	339	11	10	352	11
Peudomonas aeruginosa	10	186	35	9	257	20	9	220	24	10	234	21	10	186	20
***Acinetobacter* spp.**	7	36	39	9	124	56	8	60	37	7	52	15	4	20	25[c]
Staphylococcus aureus	10	711	14	10	768	12	10	644	8	10	673	8	10	679	8
Streptococcus pneumoniae	10	172	9	10	187	8	10	225	5	10	232	8	10	263	6
Enterococcus faecalis	9	182	15	9	205	20	10	194	11	9	177	11	10	178	14
Enterococcus faecium	9	177	32	10	219	34	8	158	30	9	171	25	9	150	29

Labs: laboratories.

[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.

[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

[c] A small number of isolates were tested (n < 30), and the percentage of isolates from ICUs should be interpreted with caution.

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Slovenia

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	7.67	8.24	7.47	7.43	6.78	7.37	-	-3.9	-0.3	-3	-10	6.9	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	0.05	0	0.14	0.34	0.62	0.62	↑	+1 140	+0.57	+12	-2	0.05	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	2.38	3.37	2.87	2.68	3.24	2.81	-	+18.1	+0.43	+10	-6	2.24	4.48 (0.55–13.63)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Slovenia

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	39.95	40.9	38.97	38.31	40.61	-	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	8.24	7.47	7.43	6.78	7.37	-	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0	0	0	0.05	0	-	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	14.12	13.41	13.18	12.45	12.94	-	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	5.3	5.32	6.33	5.44	6.18	-	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2.8	2.25	2.92	2.34	2.62	-	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	2.22	3.64	3.69	3.72	3.28	-	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	0	0.14	0.34	0.62	0.62	↑	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	3.47	4.07	3.93	4.39	3.47	-	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	1.4	2.3	2.21	2.77	1.76	-	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1.06	2.06	1.97	2.24	1.28	-	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	1.3	1.82	1.39	1.19	1.19	-	1.81 (0.26–7.45)
	Ceftazidime resistance	1.2	1.77	1.39	1.24	1.19	-	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	1.2	1.63	1.53	1.34	1.19	-	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	1.4	2.06	1.1	1.05	1.33	-	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0.10^	0.29^	0.24	0.19	0.38	-	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	0.19^	0.86^	0.81	0.72	0.67	-	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	0.34	3.98	1.25	0.57	0.1	-	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.48	4.36	1.34	0.62	0.1	-	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	0.43	4.07	1.25	0.62	0.05	-	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	0.29	3.98	1.2	0.57	0.05	-	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	3.37	2.87	2.68	3.24	2.81	-	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	1.11	0.57	0.77	1.29	2.14	↑	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	1.2	0.62	0.86	0.67	0.71	-	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.63	0.19	0.29	0.43	0.38	-	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	1.59	1.82	1.63	0.91	0.81	↓	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	0.1	0.38	0.1	0.38	0.19	-	1.96 (0.00–9.97)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Slovenia, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	1 617	51.3	1 681	50.8	1 659	49	1 639	49	1 709	50	54.7 (34.4–71.1)	-
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	1 617	10.6	1 681	9.3	1 660	9.3	1 639	8.7	1 709	9.1	16.0 (6.8–38.7)	-
	Carbapenem (imipenem/meropenem) resistance	1 617	0	1 681	0	1 660	0	1 639	0.1	1 709	0	0.3 (0.0–2.5)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	1 617	18.1	1 681	16.7	1 660	16.6	1 639	15.9	1 709	15.9	22.5 (9.9–49.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	1 616	6.8	1 681	6.6	1 660	8	1 639	7	1 709	7.6	10.4 (4.5–29.6)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1 616	3.6	1 681	2.8	1 660	3.7	1 639	3	1 709	3.2	5.5 (1.2–21.7)	-
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	291	15.8	351	21.7	372	20.7	339	23	352	19.6	32.9 (4.9–84.3)	-
	Carbapenem (imipenem/meropenem) resistance	291	0	351	0.9	372	1.9	339	3.8	352	3.7	11.3 (0.0–67.6)	↑*
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	291	24.7	351	24.2	372	22	339	27.1	352	20.7	31.4 (0.0–80.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	290	10	351	13.7	372	12.4	339	17.1	352	10.5	21.5 (0.0–73.8)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	290	7.6	351	12.3	372	11	339	13.9	352	7.7	18.8 (0.0–71.5)	-
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	186	14.5	257	14.8	220	13.2	234	10.7	186	13.4	16.4 (3.9–53.7)	-
	Ceftazidime resistance	186	13.4	257	14.4	220	13.2	234	11.1	186	13.4	13.8 (2.8–51.5)	-
	Carbapenem (imipenem/meropenem) resistance	186	13.4	257	13.2	220	14.5	234	12	186	13.4	15.9 (1.5–53.4)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	186	15.6	257	16.7	220	10.5	234	9.4	186	15.1	15.3 (4.9–51.9)	-
	Aminoglycoside (tobramycin) resistance	56	3.6	174	3.4	204	2.5	230	1.7	183	4.4	7.0 (0.0–44.6)	-
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	56	7.1	174	10.3	204	8.3	230	6.5	183	7.7	10.0 (0.0–47.5)	-
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	36	19.4	124	66.9	60	43.3	52	23.1	20	10.0[f]	31.6 (0.0–94.1)	↓*
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	36	27.8	124	73.4	60	46.7	52	25	20	10.0[f]	33.2 (0.0–95.2)	↓*
	Aminoglycoside (gentamicin/tobramycin) resistance	36	25	124	68.5	60	43.3	52	25	20	5.0[f]	29.0 (1.8–89.9)	↓*
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	36	16.7	124	66.9	60	41.7	52	23.1	20	5.0[f]	27.0 (0.0–89.5)	↓*
Staphylococcus aureus	MRSA[d]	711	9.8	768	7.8	644	8.7	673	10.1	678	8.7	14.2 (1.9–46.0)	-
Streptococcus pneumoniae	Penicillin non-wild-type[e]	172	13.4	187	6.4	225	7.1	232	11.6	263	17.1	17.3 (0.0–36.6)	↑*
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	172	14.5	187	7	225	8	232	6	263	5.7	19.0 (4.0–44.2)	↓*
	Combined penicillin non-wild-type and resistance to macrolides[e]	172	7.6	187	2.1	225	2.7	232	3.9	263	3	11.1 (0.0–25.6)	-
Enterococcus faecalis	High-level gentamicin resistance	179	18.4	196	19.4	190	17.9	174	10.9	174	9.8	22.6 (4.8–49.2)	↓*
Enterococcus faecium	Vancomycin resistance	177	1.1	219	3.7	158	1.3	171	4.7	150	2.7	16.5 (0.0–61.7)	-

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; −indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

[f] A small number of isolates were tested (n < 30), and the percentage resistance should be interpreted with caution.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Slovenia, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	1	7.7	0	0	6	46.2	6	46.2	13	100
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Peudomonas aeruginosa	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	4	16	0	0	5	20	16	64	25	100
	Ceftolozane-tazobactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acinetobacter spp.	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: no data. For example if no carbapenem-resistant isolates were reported.

Spain

Participating institutions
Health Institute Carlos lll, www.isciii.es
National Centre for Microbiology
CIBERinfect

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Spain, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	36	31	30	28	29
Geographical representativeness	Medium	Medium	Medium	Medium	Medium
Hospital representativeness	High	High	High	High	High
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient days	109.5	165.4	705.3	606.6	588.1

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Spain, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	91	91	88	93

NA: not applicable. In 2020 there was no EARS-Net EQA.
For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories,[a] number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Spain, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	43	7 939	NA	39	7 583	NA	41	9 717	NA	40	9 635	NA	41	10 646	NA
Klebsiella pneumoniae	42	2 244	NA	39	2 174	NA	41	2 973	NA	40	3 138	NA	41	3 397	NA
Peudomonas aeruginosa	41	1 228	NA	39	1 185	NA	41	1 403	NA	40	1 430	NA	41	1 408	NA
***Acinetobacter* spp.**	21	92	NA	24	95	NA	24	92	NA	26	79	NA	24	84	NA
Staphylococcus aureus	42	2 542	NA	40	2 594	NA	41	3 108	NA	40	2 973	NA	41	3 259	NA
Streptococcus pneumoniae	41	614	NA	37	391	NA	41	842	NA	40	1 203	NA	41	1 461	NA
Enterococcus faecalis	41	1 531	NA	40	1 542	NA	39	1 594	NA	40	1 567	NA	40	1 626	NA
Enterococcus faecium	42	1 104	NA	39	997	NA	39	1 095	NA	39	1 103	NA	41	1 337	NA

Labs: laboratories.
NA: not applicable.
[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.
[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Spain

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	7.84#	6.40#	6.65#	10.02#	11.16#	12.45#	↑	+58.8	+4.61	+2 370	-10	7.06	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	0.76#	0.60#	0.72^#	1.08#	0.96#	1.20#	↑	+57.9	+0.44	+227	-4	0.73	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	4.21#	3.13#	3.53^#	4.54^#	4.29^#	3.90^#	-	-7.4	-0.31	-78	-10	3.79	4.48 (0.55–13.63)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

One or more of the three representativeness indicators (geographical, hospital and/or isolate representativeness) were not reported as 'High'. The results should be interpreted with caution.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Spain

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	24.40#	27.07#	34.39^#	37.50#	40.01#	↑	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	6.40#	6.65#	10.02#	11.16#	12.45#	↑	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0.17#	0.06^#	0.38#	0.04#	0.22#	-	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	13.09#	13.71#	18.78#	19.68#	21.60#	↑	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	6.26#	6.38#	8.22#	8.78#	9.51#	↑	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2.77#	2.71#	3.96#	4.18#	4.21#	↑	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	3.42#	3.99#	5.51#	5.69#	5.51#	↑	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	0.60#	0.72^#	1.08#	0.96#	1.20#	↑	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	3.35#	4.09#	5.71#	6.03#	6.55#	↑	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	2.63#	3.04#	3.91#	3.90#	3.66#	↑	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2.07#	2.59#	3.18#	3.13#	2.87#	↑	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	0.77#	1.06#	1.50#	0.97#	0.87#	-	1.81 (0.26–7.45)
	Ceftazidime resistance	0.66#	0.83^#	1.48#	0.76#	0.89#	-	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	1.21#	1.36#	2.21#	1.54#	1.62#	-	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	1.30#	1.60#	2.22#	2.01#	1.86#	↑	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0.62#	0.85#	0.67#	0.66#	0.48^#	-	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	0.63#	0.74^#	1.19^#	0.70^#	0.54^#	-	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	0.33#	0.36#	0.23#	0.21^#	0.15#	↓	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.33#	0.37#	0.25#	0.25#	0.12^#	↓	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	0.29#	0.37#	0.21#	0.19#	0.12#	↓	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	0.28#	0.33#	0.19#	0.16^#	0.09^#	↓	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	3.13#	3.53^#	4.54^#	4.29^#	3.90^#	-	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.66^#	0.48^#	1.08^#	1.31^#	1.89^#	↑	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.76#	0.69#	1.15#	1.69^#	2.20^#	↑	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.36^#	0.27^#	0.56^#	0.79^#	1.09^#	↑	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	2.66^#	2.91^#	2.45^#	2.24^#	1.84^#	↓	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	0.08#	0.07#	0.22#	0.33#	0.23#	↑	1.96 (0.00–9.97)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

One or more of the three representativeness indicators (geographical, hospital and/or isolate representativeness) were not reported as 'High'. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Spain, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	7 214	57.6	7 075	56.2	8 550	57.2	8 793	57.4	9 779	57.7	54.7 (34.4–71.1)	-
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	7 744	14.1	7 425	13.2	9 585	14.9	9 269	16.2	10 427	16.8	16.0 (6.8–38.7)	↑*
	Carbapenem (imipenem/meropenem) resistance	7 848	0.4	6 227	0.1	9 549	0.6	9 173	0.1	10 060	0.3	0.3 (0.0–2.5)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	7 799	28.6	7 571	26.6	9 343	28.6	9 617	27.6	10 157	30	22.5 (9.9–49.3)	↑*
	Aminoglycoside (gentamicin/tobramycin) resistance	7 829	13.6	7 567	12.4	9 367	12.5	9 609	12.3	10 469	12.8	10.4 (4.5–29.6)	-
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	7 512	6.3	7 408	5.4	8 863	6.4	9 232	6.1	9 774	6.1	5.5 (1.2–21.7)	-
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	2 185	26.6	2 127	27.6	2 938	26.7	3 033	25.3	3 306	23.5	32.9 (4.9–84.3)	↓*
	Carbapenem (imipenem/meropenem) resistance	2 228	4.6	1 847	5.7	2 917	5.2	3 003	4.3	3 163	5.3	11.3 (0.0–67.6)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	2 222	25.7	2 168	27.7	2 816	28.8	3 133	25.9	3 267	28.3	31.4 (0.0–80.3)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	2 229	20.1	2 169	20.6	2 899	19.2	3 126	16.8	3 241	15.9	21.5 (0.0–73.8)	↓*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2 149	16.4	2 121	18	2 709	16.7	3 019	13.9	3 080	13.1	18.8 (0.0–71.5)	↓*
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	1 173	11.3	1 124	13.9	1 306	16.3	1 303	10.1	1 292	9.4	16.4 (3.9–53.7)	↓*
	Ceftazidime resistance	1 167	9.7	1 036	11.8	1 373	15.3	1 378	7.4	1 302	9.7	13.8 (2.8–51.5)	-
	Carbapenem (imipenem/meropenem) resistance	1 226	16.8	1 175	17	1 392	22.6	1 371	15.1	1 355	16.9	15.9 (1.5–53.4)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	1 211	18.2	1 157	20.3	1 353	23.4	1 430	19	1 359	19.3	15.3 (4.9–51.9)	-
	Aminoglycoside (tobramycin) resistance	1 197	8.8	1 143	10.9	1 327	7.2	1 313	6.8	1 237	5.4	7.0 (0.0–44.6)	↓*
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	1 119	9.6	980	11.1	1 218	13.9	1 199	7.8	1 113	6.8	10.0 (0.0–47.5)	↓*
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	92	60.9	93	57	92	35.9	71	39.4	83	25.3	31.6 (0.0–94.1)	↓*
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	92	62	93	58.1	92	39.1	79	43	70	24.3	33.2 (0.0–95.2)	↓*
	Aminoglycoside (gentamicin/tobramycin) resistance	92	53.3	93	58.1	91	33	76	32.9	80	21.3	29.0 (1.8–89.9)	↓*
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	92	51.1	92	53.3	91	29.7	69	30.4	67	17.9	27.0 (0.0–89.5)	↓*
Staphylococcus aureus	MRSA[d]	2 313	23.1	1 896	27.4	2 513	25.7	2 233	25.9	2 322	23.7	14.2 (1.9–46.0)	-
Streptococcus pneumoniae	Penicillin non-wild-type[e]	543	20.8	329	21.3	703	21.8	947	18.7	1 196	22.3	17.3 (0.0–36.6)	-
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	589	22.1	373	27.1	788	20.8	1 074	21.1	1 310	23.7	19.0 (4.0–44.2)	-
	Combined penicillin non-wild-type and resistance to macrolides[e]	527	11.8	318	12.6	663	11.9	898	11.9	1 096	14.1	11.1 (0.0–25.6)	-
Enterococcus faecalis	High-level gentamicin resistance	1 329	34.1	1 362	31.4	1 400	24.9	1 215	24.8	1 165	22.3	22.6 (4.8–49.2)	↓*
Enterococcus faecium	Vancomycin resistance	1 079	1.2	996	1	1 080	2.9	1 092	4	1 220	2.6	16.5 (0.0–61.7)	↑*

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; −indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Spain, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Peudomonas aeruginosa	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftolozane-tazobactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
***Acinetobacter* spp.**	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: no data. For example if no carbapenem-resistant isolates were reported.

Sweden

Participating institutions

The Public Health Agency of Sweden, www.folkhalsomyndigheten.se

Population and hospitals contributing data: coverage, representativeness and blood culture rate, Sweden, 2020–2024

Parameter	2020	2021	2022	2023	2024
Estimated national population coverage (%)	86	89	89	89	89
Geographical representativeness	High	High	High	High	High
Hospital representativeness	High	High	High	High	High
Isolate representativeness	High	High	High	High	High
Blood culture sets/1 000 patient days	105.6	ND	ND	112.4	112.4

ND: no data available.

For data reported in 2020, 'Isolate representativeness' refers to patient and isolate representativeness as defined in the report 'Antimicrobial resistance surveillance in Europe 2022 – 2020 data'.

Laboratories contributing data: use of clinical breakpoint guidelines and participation in EARS-Net EQA, Sweden, 2020–2024

Parameter	2020	2021	2022	2023	2024
Percentage of laboratories using EUCAST or EUCAST-harmonised guidelines	100	100	100	100	100
Percentage of laboratories participating in EARS-Net EQA	NA	100	100	94	95

NA: not applicable. In 2020 there was no EARS-Net EQA.

For more information about the EARS-Net EQA, the report 'External quality assessment (EQA) of the performance of laboratories participating in the European Antimicrobial Resistance Surveillance Network (EARS-Net), 2024'.

Annual number of reporting laboratories[a], number of reported isolates and percentage[b] of isolates reported from patients in ICUs, Sweden, 2020–2024

Bacterial species	2020			2021			2022			2023			2024		
	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)	Labs (n)	Isolates (n)	Isolates from ICU (%)
Escherichia coli	20	9 852	NA	21	10 634	NA	21	10 563	NA	21	10 726	NA	20	10 504	NA
Klebsiella pneumoniae	20	1 843	NA	21	2 001	NA	21	2 164	NA	21	2 165	NA	21	2 484	NA
Peudomonas aeruginosa	20	735	NA	21	803	NA	21	853	NA	21	858	NA	21	849	NA
***Acinetobacter* spp.**	1	126	NA	1	138	NA	1	149	NA	1	156	NA	1	175	NA
Staphylococcus aureus	20	6 891	NA	21	7 736	NA	21	7 940	NA	21	7 916	NA	20	7 466	NA
Streptococcus pneumoniae	20	551	NA	21	672	NA	21	1 102	NA	21	1 324	NA	21	1 286	NA
Enterococcus faecalis	20	1 443	NA	21	1 635	NA	21	1 581	NA	21	1 614	NA	21	1 533	NA
Enterococcus faecium	20	789	NA	21	1 006	NA	21	1 022	NA	21	1 002	NA	21	962	NA

Labs: laboratories.

NA: not applicable.

[a] Number of laboratories reporting at least one isolate during the specific year. The total number of participating laboratories might be higher.

[b] Isolates with missing information on hospital department are excluded from the calculation, and the percentage of isolates from ICUs is presented only if there are ≥20 isolates of which ≥ 70% have data on hospital department. If not, the percentage is presented as not applicable (NA).

MRSA, third-generation cephalosporin-resistant *Escherichia coli*, and carbapenem-resistant *Klebsiella pneumoniae* 2019–2024: estimated incidence, trend, change in proportion, estimated incidence and estimated number of cases, and the target as percentage reduction and estimated incidence in 2030, as well as the 2024 EU estimated incidence and country range, by bacterial species and antimicrobial group/agent, Sweden

Bacterial species	Antimicrobial group/agents	Estimated incidence[a] of isolates from bloodstream infections with resistance phenotype (n per 100 000 population)							Progress towards target			Target[b]		2024 EU Estimated incidence and country range (n per 100 000 population)
		2019	2020	2021	2022	2023	2024	Trend 2019–2024[c]	Change in estimated incidence (%) 2019–2024[b]	Change in estimated incidence (n per 100 000 population) 2019–2024	Change in estimated number of cases 2019–2024	Recommended change (%) 2019–2030	Target 2030 (n per 100 000 population)	
Escherichia coli	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	9.24	8.73	8.19	8.52	9.08	10.55	-	+14.2	+1.31	+169	-10	8.32	11.03 (3.75–22.79)
Klebsiella pneumoniae	Carbapenem (imipenem/meropenem) resistance	0.03	0.06	0.03	0.04	0.12	0.14	↑	+366.7	+0.11	+12	0	0.03	3.51 (0.02–20.31)
Staphylococcus aureus	MRSA[d]	1.34	1.8	1.65	1.58	1.79	2.07	↑	+54.5	+0.73	+81	-3	1.3	4.48 (0.55–13.63)

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] The 'Council recommendation on stepping up EU actions to combat antimicrobial resistance in a One Health Approach' (2023/C220/01) includes 2030 EU targets, with 2019 as the baseline year: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=oj:JOC_2023_220_R_0001

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

Estimated total incidence of bloodstream infections with resistance phenotype (number per 100 000 population) and trend, 2020–2024, as well as the 2024 EU/EEA estimated incidence and country range, by bacterial species and antimicrobial group/agent, Sweden

Bacterial species	Antimicrobial group/agent	Estimated incidence[a] of isolates from bloodstream infections with resistance						
		2020	2021	2022	2023	2024	Trend 2020–2024[b]	2024 EU/EEA Estimated incidence and country range (n per 100 000 population)
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	ND	ND	ND	ND	ND	NA	31.68 (6.43–64.29)
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	8.73	8.19	8.52	9.08	10.55	↑	10.96 (0.00–22.79)
	Carbapenem (imipenem/meropenem) resistance	0.01	0.06	0.04	0.04	0.09	-	0.15 (0.00–1.26)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	15.54	15.63	15.62	16.81	17.3	↑	15.71 (3.07–39.61)
	Aminoglycoside (gentamicin/tobramycin) resistance	6.52	6.67	6.42	7.05	7.15	-	6.68 (0.00–27.28)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	2.35	2.07	2.39	2.47	2.6	-	3.31 (0.00–19.99)
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	1.68	1.5	1.82	2.3	2.54	↑	9.03 (0.00–28.02)
	Carbapenem (imipenem/meropenem) resistance	0.06	0.03	0.04	0.12	0.14	↑	3.46 (0.00–20.31)
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	2.09	2.38	2.85	2.92	3.57	↑	8.53 (0.00–28.77)
	Aminoglycoside (gentamicin/tobramycin) resistance	0.74	0.82	0.78	1.04	1.13	↑	5.58 (0.00–18.81)
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	0.5	0.48	0.46	0.69	0.69	↑	4.84 (0.00–17.52)
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	0.45	0.76	0.64	0.69	0.86	↑	1.81 (0.26–7.45)
	Ceftazidime resistance	0.42	0.57	0.47	0.49	0.61	-	1.52 (0.22–7.61)
	Carbapenem (imipenem/meropenem) resistance	0.35	1.03	1.01	0.89	0.89	-	1.74 (0.12–8.34)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.61	0.93	0.84	0.84	0.66	-	1.65 (0.36–8.05)
	Aminoglycoside (tobramycin) resistance	0.03^	0.04^	0.01^	0.01^	0.04^	-	0.58 (0.00–5.06)
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	0.10^	0.21^	0.24^	0.21^	0.21^	-	0.79 (0.00–4.91)
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	0.1	0.01	0.04	0.03	0.03	-	2.49 (0.00–14.59)
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	0.1	0.02	0.03	0.04	0.04	-	2.50 (0.00–14.27)
	Aminoglycoside (gentamicin/tobramycin) resistance	0.11	0.08	0.02	0.02	0.05^	↓	2.13 (0.00–12.50)
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	0.1	0	0.02	0.02	0.01^	-	2.03 (0.00–12.29)
Staphylococcus aureus	MRSA[c]	1.8	1.65	1.58	1.79	2.07	-	4.43 (0.55–13.63)
Streptococcus pneumoniae	Penicillin non-wild-type[d]	0.52	0.54	1.04	0.97	1.25	↑	0.99 (0.00–2.85)
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	0.41	0.35	0.64	0.76	0.76	↑	1.12 (0.12–6.25)
	Combined penicillin non-wild-type and resistance to macrolides[d]	0.17	0.18	0.34	0.4	0.43	↑	0.55 (0.00–1.76)
Enterococcus faecalis	High-level gentamicin resistance	1.41^	0.78^	0.88^	0.65^	0.51^	↓	2.20 (0.02–6.29)
Enterococcus faecium	Vancomycin resistance	0.01^	0.03	0.03	0.07	0.11	↑	1.96 (0.00–9.97)

ND, no data available; NA, not applicable.

[a] Incidence was estimated using the EARS-Net data reported to EpiPulse Cases. Each de-duplicated isolate from a blood sample (> 99% data) or cerebrospinal fluid sample (< 1% data) was considered a proxy for a bloodstream infection.

[b] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively; – indicates no statistically significant trend.

[c] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene by PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[d] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

^ The antimicrobial group/agent was tested for <90% of isolates. The results should be interpreted with caution.

Total number of invasive isolates tested (n) and percentage of isolates with resistance phenotype (%)[a], by bacterial species and antimicrobial group/agent, 2024 EU/EEA range, population-weighted mean and trend, Sweden, 2020–2024

Bacterial species	Antimicrobial group/agent	2020		2021		2022		2023		2024		2024 EU/EEA range and population-weighted mean[b]	Trend 2020–2024[c]
		n	%	n	%	n	%	n	%	n	%		
Escherichia coli	Aminopenicillin (amoxicillin/ampicillin) resistance	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	54.7 (34.4–71.1)	NA
	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	9 852	7.9	10 633	7.1	10 563	7.5	10 725	7.9	10 503	9.4	16.0 (6.8–38.7)	↑*
	Carbapenem (imipenem/meropenem) resistance	9 846	0	10 626	0.1	10 558	0	10 714	0	10 497	0.1	0.3 (0.0–2.5)	-
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	9 798	14.1	10 570	13.7	10 513	13.8	10 674	14.7	10 438	15.6	22.5 (9.9–49.3)	↑*
	Aminoglycoside (gentamicin/tobramycin) resistance	9 840	5.9	10 299	6	10 549	5.7	10 714	6.2	9 655	6.9	10.4 (4.5–29.6)	↑*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	9 792	2.1	10 247	1.9	10 502	2.1	10 665	2.2	9 611	2.5	5.5 (1.2–21.7)	↑*
Klebsiella pneumoniae	Third-generation cephalosporin (cefotaxime/ceftriaxone/ceftazidime) resistance	1 842	8.1	2 000	7	2 161	7.8	2 165	9.9	2 483	9.6	32.9 (4.9–84.3)	↑*
	Carbapenem (imipenem/meropenem) resistance	1 843	0.3	1 997	0.2	2 162	0.2	2 164	0.5	2 483	0.5	11.3 (0.0–67.6)	↑*
	Fluoroquinolone (ciprofloxacin/levofloxacin/ofloxacin) resistance	1 830	10.2	1 989	11.1	2 147	12.3	2 155	12.7	2 472	13.6	31.4 (0.0–80.3)	↑*
	Aminoglycoside (gentamicin/tobramycin) resistance	1 839	3.6	1 939	3.9	2 160	3.4	2 164	4.5	2 283	4.6	21.5 (0.0–73.8)	↑*
	Combined resistance to third-generation cephalosporins, fluoroquinolones, and aminoglycosides	1 827	2.4	1 927	2.3	2 142	2	2 155	3	2 273	2.9	18.8 (0.0–71.5)	-
Pseudomonas aeruginosa	Piperacillin-tazobactam resistance	735	5.4	803	8.7	851	7.1	857	7.6	845	9.6	16.4 (3.9–53.7)	↑*
	Ceftazidime resistance	735	5	803	6.6	851	5.2	857	5.4	848	6.7	13.8 (2.8–51.5)	-
	Carbapenem (imipenem/meropenem) resistance	733	4.2	803	11.8	853	11	857	9.7	848	9.9	15.9 (1.5–53.4)	↑*
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	733	7.4	803	10.7	851	9.2	857	9.2	848	7.3	15.3 (4.9–51.9)	-
	Aminoglycoside (tobramycin) resistance	464	0.6	562	0.7	603	0.2	590	0.2	527	0.8	7.0 (0.0–44.6)	-
	Combined resistance to ≥3 antimicrobial groups (among piperacillin-tazobactam, ceftazidime, carbapenems, fluoroquinolones and aminoglycosides)	464	1.9	562	3.4	598	3.7	590	3.4	527	3.8	10.0 (0.0–47.5)	-
***Acinetobacter* species**	Carbapenem (imipenem/meropenem) resistance	126	7.1	138	0.7	149	2.7	156	1.9	175	1.7	31.6 (0.0–94.1)	↓*
	Fluoroquinolone (ciprofloxacin/levofloxacin) resistance	126	7.1	137	1.5	149	2	156	2.6	175	2.3	33.2 (0.0–95.2)	-
	Aminoglycoside (gentamicin/tobramycin) resistance	125	8	138	5.1	147	1.4	153	1.3	152	3.3	29.0 (1.8–89.9)	↓*
	Combined resistance to carbapenems, fluoroquinolones and aminoglycosides	125	7.2	137	0	147	1.4	153	1.3	152	0.7	27.0 (0.0–89.5)	↓*
Staphylococcus aureus	MRSA[d]	6 871	2.3	7 733	2	7 936	1.9	7 915	2.1	7 465	2.6	14.2 (1.9–46.0)	-
Streptococcus pneumoniae	Penicillin non-wild-type[e]	544	8.5	668	7.5	1 096	8.9	1 323	6.9	1 282	9.1	17.3 (0.0–36.6)	-
	Macrolide (azithromycin/clarithromycin/erythromycin) resistance	549	6.6	669	4.8	1 100	5.5	1 321	5.4	1 284	5.5	19.0 (4.0–44.2)	-
	Combined penicillin non-wild-type and resistance to macrolides[e]	542	2.8	665	2.6	1 095	2.9	1 320	2.8	1 280	3.1	11.1 (0.0–25.6)	-
Enterococcus faecalis	High-level gentamicin resistance	1 238	10.1	1 078	6.7	999	8.2	914	6.7	997	4.8	22.6 (4.8–49.2)	↓*
Enterococcus faecium	Vancomycin resistance	600	0.2	984	0.3	1 021	0.3	1 000	0.7	959	1	16.5 (0.0–61.7)	↑*

ND, no data available; NA, not applicable.

[a] Percentages of isolates with resistance phenotype are presented only if data are available for ≥20 isolates. If not, the percentage is presented as not applicable (NA).

[b] Lowest and highest national resistance percentage among reporting EU/EEA countries (n = 30).

[c] ↑ and ↓ indicate statistically significant increasing and decreasing trends, respectively, in the overall data; * indicates confirmation by a significant trend in the data that only includes laboratories reporting continuously for all five years; –indicates no statistically significant trend. NA: not applicable indicates that data were not reported for all years, a significant change in data source occurred during the period, or the number of isolates was < 20 in any year during the period.

[d] MRSA is based on AST results for cefoxitin or, if unavailable, oxacillin. AST results reported for cloxacillin, dicloxacillin, flucloxacillin or meticillin are accepted as a marker for oxacillin resistance if oxacillin is not reported. If no phenotypic results are available, data from molecular confirmation tests (detection of *mecA* gene PCR or a positive PBP2A-agglutination test) are accepted as a marker for MRSA.

[e] Penicillin results are based on penicillin or, if unavailable, oxacillin. For *S. pneumoniae*, the term penicillin non-wild-type is used in this report, referring to *S. pneumoniae* isolates reported by the local laboratories as susceptible, increased exposure (I) or resistant (R) to penicillin, assuming MIC to benzylpenicillin above those of wild-type isolates (> 0.06 mg/L). The qualitative susceptibility categories (S/I/R) as reported by the laboratory are used, since quantitative susceptibility information is missing for a large part of the data.

Number of susceptible (S), susceptible increased exposure (I), resistant (R) and total invasive carbapenem-resistant isolates, by bacterial species and antimicrobial agent, Sweden, 2024

Bacterial species	Antimicrobial group/agent	S		I		R		Missing SIR data		Total	
		n	%	n	%	n	%	n	%	n	%
Escherichia coli	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Klebsiella pneumoniae	Aztreonam-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Peudomonas aeruginosa	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftazidime-avibactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Ceftolozane-tazobactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Imipenem-relebactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
	Meropenem-vaborbactam	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Acinetobacter **spp.**	Cefiderocol	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

ND: no data. For example if no carbapenem-resistant isolates were reported.