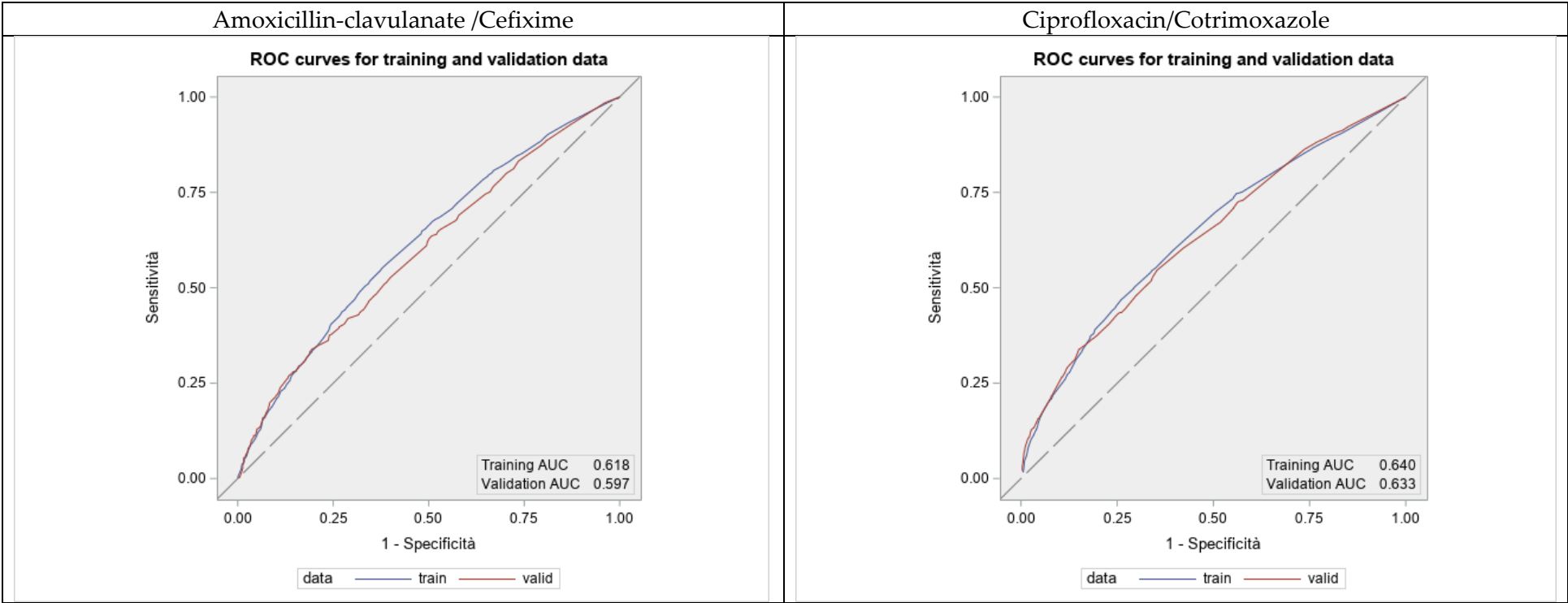
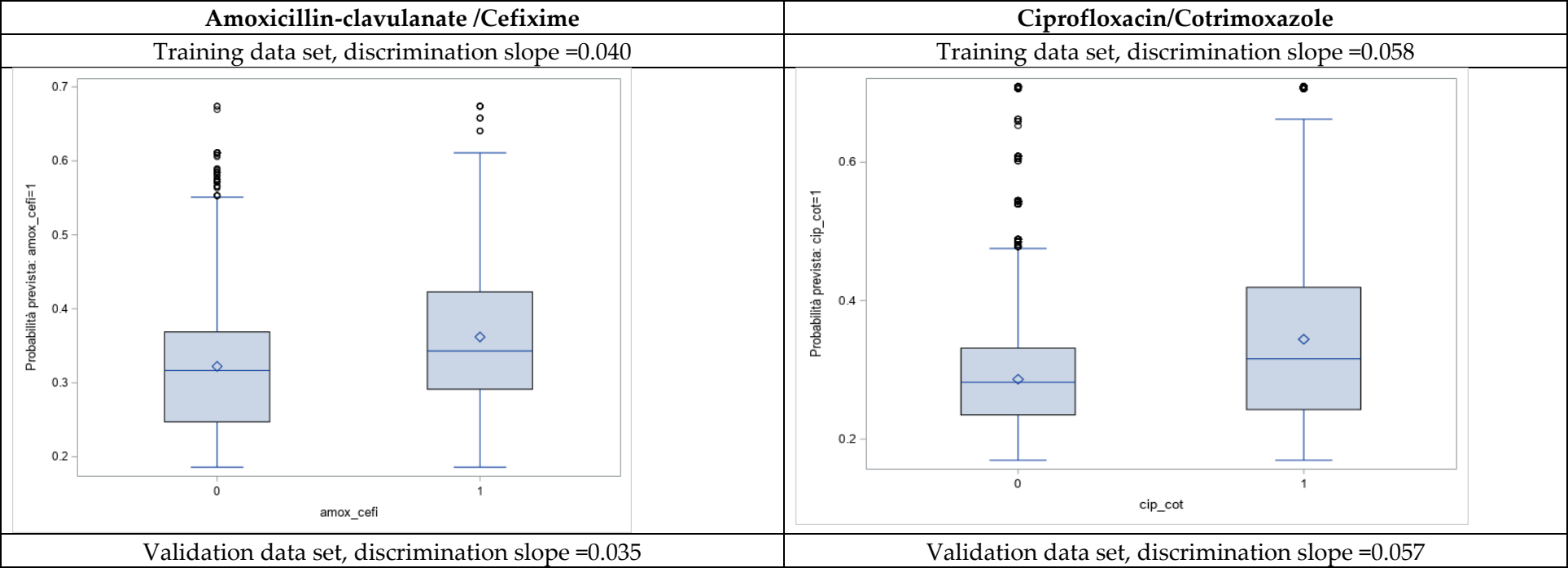
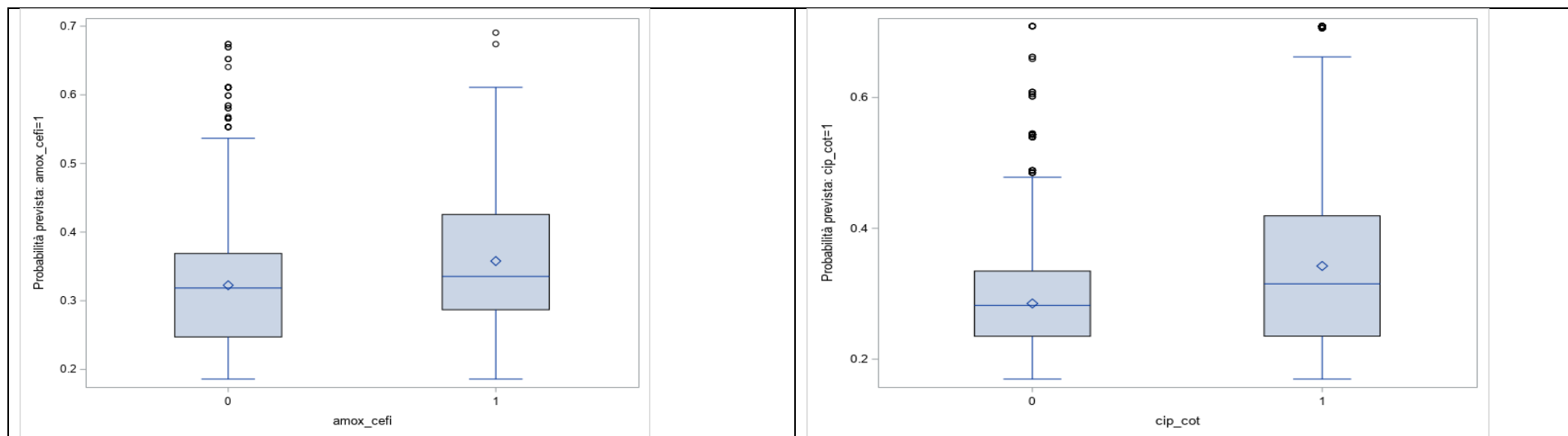


Supplementary Figure S1. ROC curve and AUC of training and validation data sets

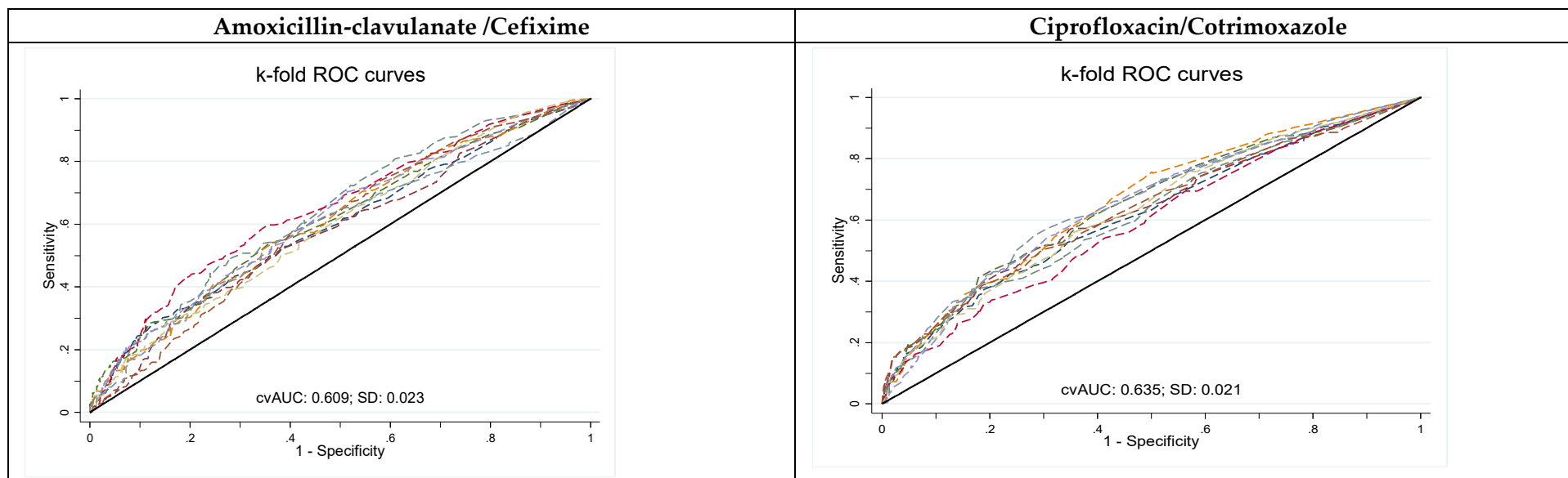


Supplementary Figure S2. Box plots of predicted probabilities and discrimination slope in the training and validation data sets





Supplementary Figure S3. ROC curve and AUC of 10-fold cross validations-internal validations



Supplementary Table S1. Distribution of 9449 bacterial pathogens isolated

Escherichia coli: n=4902 (51.9%), other *Enterobacteriales*: n=2694 (28.5%), other non-fermenting Gram-negatives: n=61 (0.6%), *Pseudomonas aeruginosa*: n=566 (6.0%), *Enterococcus* spp.: 995 (10.5%) and other Gram-positives: n=231 (2.4%)

Pathogens	n (%)	Group of pathogens
<i>Escherichia coli</i>	4902 (51.9)	<i>Escherichia coli</i>
<i>Pseudomonas aeruginosa</i>	566 (6.0)	<i>Pseudomonas aeruginosa</i>
Other <i>Enterobacteriales</i>	2694 (28.5)	Other <i>Enterobacteriales</i>
<i>Citrobacter braakii</i>	8	
<i>Citrobacter farmeri</i>	3	
<i>Citrobacter freundii</i>	69	
<i>Citrobacter koseri</i>	78	
<i>Citrobacter species</i>	3	
<i>Citrobacter</i> spp.	12	
<i>Citrobacter youngae</i>	3	
<i>Enterobacter aerogenes</i>	95	
<i>Enterobacter asburiae</i>	1	
<i>Enterobacter cloacae</i>	191	
<i>Enterobacter hormaechei</i>	3	
<i>Enterobacter</i> spp.	16	
<i>Escherichia hermannii</i>	1	
<i>Klebsiella oxytoca</i>	307	
<i>Klebsiella ozonae</i>	1	
<i>Klebsiella</i> spp	14	
<i>Morganella morganii</i>	109	
<i>Proteus mirabilis</i>	988	
<i>Proteus</i> spp.	44	
<i>Proteus vulgaris/penneri</i>	59	
<i>Providencia rettgeri</i>	3	
<i>Providencia stuartii</i>	2	
<i>Raoultella ornithinolytica</i>	1	
<i>Salmonella</i> spp.	3	
<i>Serratia liquefaciens</i>	2	
<i>Serratia marcescens</i>	39	
<i>Serratia plymuthica</i>	1	
<i>Serratia</i> spp.	5	
<i>Klebsiella pneumoniae</i>	633	
Other non-fermenting Gram-negatives	61 (0.6)	Other non-fermenting Gram-negatives
<i>Achromobacter</i> spp.	1	
<i>Acinetobacter baumannii/calcoaceticus complex</i>	9	
<i>Acinetobacter junii</i>	2	

Pathogens	n (%)	Group of pathogens
<i>Acinetobacter lwoffii</i>	1	
<i>Acinetobacter</i> spp.	3	
<i>Pseudomonas fluorescens</i>	2	
<i>Pseudomonas pseudoalcaligenes</i>	3	
<i>Pseudomonas putida</i>	7	
<i>Pseudomonas</i> spp.	29	
<i>Stenotrophomonas maltophilia</i>	4	
Other Gram-positives	231 (2.4)	Other Gram-positives
<i>Staphylococcus aureus</i>	61	
<i>Staphylococcus saprophyticus</i>	1	
<i>Streptococcus agalactiae</i>	169	
Enterococci	995 (10.5)	<i>Enterococcus</i> spp
<i>Enterococcus casseliflavus</i>	1	
<i>Enterococcus faecalis</i>	850	
<i>Enterococcus faecium</i>	99	
<i>Enterococcus gallinarum</i>	3	
<i>Enterococcus</i> spp.	42	

Supplementary Table S2. Characteristics of study population and culture reports of positive samples

Total patients, n(%)	6207 (100.0)
Sex, F	3136 (50.5)
Age at the 1 st sample, median (IQR), min-max values, years	1.8 (0.4-6.8), 0-19
≤6 months	1685 (27.2)
>6 months	4522 (72.8)
Total numbers of bacterial pathogens isolated for patient, median (IQR), min-max values	1 (1-1), 1-55
1	4775 (76.9)
2	812 (13.1)
>2	620 (10.0)
Total isolated pathogens¹	9449 (100.0)
Age at sample, median (IQR), min-max values, years	2.5 (0.6-8.3), 0-19
Department of admission	
Emergency	4679 (49.5)
Surgery/Orthopedics/Neurosurgery	1280 (13.5)
Nephrology	1044 (11.0)
Infectious Diseases	414 (4.4)
Neonatal or Pediatric ICU	383 (4.1)
Hematology/Oncology	353 (3.7)
Others	1296 (13.7)
Days from previous pathogens isolated, median (IQR), min-max values	94 (29-316) 0-4194
Patients aged ≤6 months at the 1st sample	1685 (100.0)
Sex, F	602 (35.7)
Total numbers of pathogens isolated for patient, median (IQR), min-max values	1 (1-2) 1-23
1	1238 (73.5)
2	239 (14.2)
>2	208 (12.3)
Department of admission	
Emergency	954 (56.6)
Hematology/Oncology/ Neonatal or Pediatric ICU /Others	389 (23.1)
Infectious Diseases	186 (11.0)
Surgery/Orthopedics/Neurosurgery	88 (5.2)
Nephrology	68 (4.0)

¹9449 pathogen isolated in 9356 samples, 0.9% of samples had more than one isolate

Supplementary Table S3. Distribution of isolated pathogens resistant to different antibiotics.
Proportions are number of resistant over number of tested strains

	Resistant, n	Susceptible, n	% Resistant/Tested, (95% CI)
<i>Escherichia coli</i>, n=4902			
Amikacin	2	3000	0.07 (0-0.3)
Amoxicillin-clavulanate	1428	3350	29.9 (28.4-31.4)
Ampicillin	2685	1882	58.8 (57.1-60.5)
Cefixime	202	1689	10.7 (9.1-12.5)
Cefuroxime	336	3071	9.9 (8.7-11.2)
Cefotaxime	297	3442	7.9 (6.9-9.1)
Ceftazidime	273	4617	5.6 (4.9-6.4)
Ciprofloxacin	503	4391	10.3 (9.1-11.5)
Fosfomycin	43	4113	1.0 (0.6-1.6)
Gentamicin	344	4548	7.0 (6.2-8.0)
Meropenem	1	4891	0 (0-0.1)
Nitrofurantoin	22	4702	0.5 (0.3-0.7)
Cotrimoxazole	1518	3375	31.0 (29.4-32.7)
Piperacillin-tazobactam	468	4421	9.6 (8.6-10.6)
Other <i>Enterobacteriales</i>, n=2694			
Amikacin	22	1567	1.4 (0.8-2.3)
Amoxicillin-clavulanate	981	1579	38.3 (36.1-40.6)
Ampicillin	1864	518	78.2 (76.3-80.1)
Cefixime	205	881	18.9 (16.3-21.7)
Cefuroxime	398	1264	23.9 (21.8-26.3)
Cefotaxime	257	1829	12.3 (10.7-14.1)
Ceftazidime	295	2386	11.0 (9.7-12.5)
Ciprofloxacin	222	2454	8.3 (7.0-9.8)
Fosfomycin	423	1743	19.5 (17.7-21.5)
Gentamicin	419	2251	15.7 (14.1-17.4)
Meropenem	22	2658	0.8 (0.5-1.4)
Nitrofurantoin	973	449	68.4 (65.6-71.1)
Cotrimoxazole	605	2076	22.6 (20.6-24.6)
Piperacillin-tazobactam	373	2287	14.0 (12.6-15.6)
<i>Pseudomonas aeruginosa</i>, n=566			
Amikacin	13	345	3.6 (2.1-6.3)
Ceftazidime	41	520	7.3 (4.6-11.5)
Ciprofloxacin	24	533	4.3 (2.5-7.2)
Fosfomycin	20	9	70.0 (46.4-85.1)
Meropenem	30	529	5.4 (3.6-7.8)
Piperacillin-tazobactam	46	509	8.3 (5.1-13.1)
Enterococci, n=995			
Ampicillin	79	867	8.3 (6.7-10.4)
Teicoplanin	6	951	0.6 (0.3-1.4)
Vancomycin	11	980	1.1 (0.6-2.0)
Other Gram-positives, n=231			
Ampicillin	23	0	100.0
Amoxicillin-clavulanate	2	10	16.7 (3.3-54.3)
Other non-fermenting Gram-negatives, n=61			

	Resistant, n	Susceptible, n	% Resistant/Tested, (95% CI)
Amikacin	2	39	4.9 (1.1-18.5)
Cefotaxime	11	2	84.6 (52.0-96.5)
Ceftazidime	7	40	14.9 (6.4-30.9)
Ciprofloxacin	10	49	16.9 (7.6-33.7)
Gentamicin	12	46	20.7 (10.0-37.9)
Meropenem	13	44	22.8 (11.6-40.0)
Cotrimoxazole	25	32	43.8 (30.1-58.6)
Piperacillin-tazobactam	6	41	12.8 (5.0-28.8)

Supplementary Table S4. Characteristics of patients with isolation of *Enterobacteriales* from urine samples

Total patients, n (%)	5190 (100.0)
Sex, F	2637 (50.8)
Age at the 1 st sample, median (IQR), min-max values, years	1.6 (0.4-6.1), 0-19
≤6 months	1631 (31.4)
>6 months	3559 (68.6)
Total numbers of pathogens isolated for patient, median (IQR), min-max values	1 (1-2), 1-40
1	4065 (78.3)
2	657 (12.7)
>2	468 (9.0)
Total strains	7596 (100.0)
Age at sample, median (IQR), min-max values, years	2.3 (0.5-7.9), 0-19
0-6 months	1945 (25.6)
7 months-2 years	2255 (29.7)
3 -7 years	1498 (19.7)
>7 years	1898 (25.0)
Department of admission	
Emergency	4114 (54.2)
Surgery/Orthopedics/Neurosurgery	980 (12.9)
Nephrology	697 (9.2)
Infectious Diseases	319 (4.2)
Hematology/Oncology	283 (3.7)
Neonatal or Pediatric ICU	238 (3.1)
Others	965 (12.7)
Days from previous pathogens isolate, median (IQR), min-max values	106 (34-348), 0-4194

Supplementary Table S5. Distribution of 4902 *Escherichia coli* and 2694 other *Enterobacteriales* resistant to different antibiotics by age at sampling

	Age at sampling								
	0-6 months			>6 months			Total		
Antibiotics	R % (R/tested)	S	N	R % (R/tested)	S	N	R % (R/tested)	S	N
Amoxicillin-clavulanate	661 (34.8)	1239	45	1748 (32.1)	3690	213	2409 (32.8)	4929	258
Ciprofloxacin	94 (4.9)	1842	9	631 (11.2)	5003	17	725 (9.6)	6845	26
Cotrimoxazole	352 (18.2)	1585	8	1771 (31.4)	3866	14	2123 (28.0)	5451	22
Cefixime	118 (15.7)	635	1192	289 (13.0)	1935	3427	407 (13.7)	2570	4619
Ceftazidime	159 (8.2)	1780	6	409 (7.3)	5223	19	568 (7.5)	7003	25
Piperacillin-tazobactam	244 (12.6)	1686	15	597 (10.6)	5022	32	841 (11.1)	6708	47
Ceftazidime+Gentamicin, n=6648	65 (3.7)	1708	5	137 (2.8)	4720	13	202 (3.0)	6428	18
Piperacillin taz.+Gentamicin, n=6301	50 (3.0)	1600	6	126 (2.7)	4506	13	176 (2.8)	6106	19

R=resistant; S=susceptible