

Table S1. Major features of strains included in this study

Isolate	Bacterium	Country	Year	Specimen	Host	Source	Accession number
1701091	<i>Providencia rettgeri</i>	China	2017	Intestinal contents	Chicken	This study	CP042860
1701092	<i>Proteus mirabilis</i>	China	2017	Intestinal contents	Chicken	This study	CP042857
QD23	<i>Klebsiella pneumoniae</i>	China	2015	Urine	Homo sapiens	This study	CP042858
51003	<i>Providencia rettgeri</i>	China	2017	Urine	Homo sapiens	This study	CP042861
DT104	<i>Salmonella enterica</i> Typhimurium	Canada	2001	—	—	GenBank	AF261825
BC22	<i>Proteus vulgaris</i>	China	2018	Anal swab	Swine	GenBank	MH160822
107	<i>Providencia rettgeri</i>	United Kingdom	2002	—	—	GenBank	AY090559
KP64	<i>K. pneumoniae</i>	Thailand	2015	—	Homo sapiens	GenBank	AP018750
3.5-R3	<i>Escherichia coli</i>	Australia	2016	Feces	Homo sapiens	GenBank	KX117211
2457T	<i>Shigella flexneri</i>	Japan	1954	Feces	Homo sapiens	GenBank	AE014073

Table S2. Sub-regions and resistance genes in the genetic elements characterized in this work

Group	Genetic element	Sub-region harbored	Resistance marker	Resistance phenotype	Nucleotide position
Novel IME	Tn6588	In1718	<i>aacA4cr</i>	Fluoroquinolone and aminoglycoside resistance	4053214..4053813
			<i>bla_{OXA-1}</i>	β-lactam resistance	4053944..4054774
			<i>catB3</i>	Phenicol resistance	4054912..4055544
			<i>arr-3</i>	Rifampicin resistance	4055629..4056081
			<i>qacED1</i>	Quaternary ammonium compound resistance	4056304..4056651
			<i>sulI</i>	Sulphonamide resistance	4056645..4057484
		IS26– <i>mphE</i> –IS26 unit	<i>mphE</i>	Macrolide resistance	4064893..4065777
			<i>msrE</i>	Macrolide, Lincosamide and Streptogramin B resistance	4065833..4067308
		In1247	<i>aadA2</i>	Aminoglycoside resistance	4108189..4108968
			<i>lnuF2</i>	Lincosamide	4107236..4108057
			<i>ble_{MBL}</i>	Bleomycin resistance	4077325..4077689 4083721..4084086 4090121..4090486 4096521..4096886 4102921..4103286
			<i>bla_{NDM-1}</i>	β-lactam resistance	4076509..4077321 4082905..4083717 4089305..4090117 4095705..4096517 4102105..4102917
			<i>arr-3</i>	Rifampicin resistance	4075316..4075768

					4081712..4082164 4088112..4088564 4094512..4094964 4100912..4101364
			<i>aphA6</i>	Aminoglycoside resistance	4070374..4071153
			<i>qacED1</i>	Quaternary ammonium compound resistance	4074746..4075093 4081143..4081489 4087542..4087889 4093942..4094289 4100342..4100689 4106741..4107088
			<i>sul1</i>	Sulphonamide resistance	4073913..4074752 4080312..4081149 4086709..4087548 4093109..4093948 4105908..4106747 4099509..4100348
		ISCR2- <i>floR</i> unit	<i>floR</i>	Phenicol resistance	4117563..4118777
		ISCR2- <i>sul2</i> unit	<i>sul2</i>	Sulphonamide resistance	4121280..4122095
		ISEc59- <i>aph(4)-Ia</i> - <i>aacC4</i> -IS26 unit	<i>aph(4)-Ia</i>	Aminoglycoside resistance	4126942..4127967
			<i>aacC4</i>	Aminoglycoside resistance	4128283..4129059
		Δ Tn4352	<i>aphA1</i>	Aminoglycoside resistance	4129980..4130795
		Tn6909-related region	<i>dfrA12</i>	Trimethoprim resistance	4135903..4136400
			<i>aadA2</i>	Aminoglycoside resistance	4134704..4135483
Tn6523-related IMEs	Tn6523	In127	<i>tetA(G)</i>	Tetracycline resistance	32536..33663
			<i>floR</i>	Phenicol resistance	30337..31551
			<i>aadA2</i>	Aminoglycoside resistance	27853..28644
			<i>qacED1</i>	Quaternary ammonium	28808..29155

Tn6589				compound resistance	38268..38615
			<i>bla</i> _{CARB-2}	β-lactam resistance	37185..38051
			<i>sulI</i>	Sulphonamide resistance	38609..39448
	In27		<i>dfrA12</i>	Trimethoprim resistance	4098798..4099295
			<i>aadA2</i>	Aminoglycoside resistance	4097599..4098378
			<i>qacED1</i>	Quaternary ammonium compound resistance	4078911..4079258 4090680..4091033 4097088..4097435
			<i>sulI</i>	Sulphonamide resistance	4078078..4078917 4084488..4085328 4089846..4090686 4096255..4097094
			<i>ble</i> _{MBL}	Bleomycin resistance	4081494..4081860 4093267..4093632
			<i>bla</i> _{NDM-1}	β-lactam resistance	4080674..4081490 4092451..4093263
			<i>arr-3</i>	Macrolide resistance	4079481..4079933 4091256..4091708
			<i>qnrA1</i>	Quinolone resistance	4075212..4075868 4086980..4087636
		ISCR3– <i>tetA</i> (G)– <i>floR</i> unit	<i>floR</i>	Phenicol resistance	4071158..4072372
			<i>tetA</i> (G)	Tetracycline resistance	4069046..4070221
		Tn2– <i>rmtB</i> region	<i>bla</i> _{TEM-1}	β-lactam resistance	4063556..4064416
			<i>rmtB</i>	Aminoglycoside resistance	4064586..4065341
		ISCR2– <i>floR</i> unit	<i>floR</i>	Phenicol resistance	4057365..4058579
		ISPa13– <i>erm42</i> –IS26 unit	<i>erm42</i>	Macrolide resistance	4050878..4051789
	<i>aacC2</i> – <i>tmrB</i> region	<i>aacC2</i>	Aminoglycoside resistance	4041098..4041958	
		<i>tmrB</i>	Tunicamycin resistance	4041971..4042513	

		In363	<i>bla</i> _{TEM-1}	β-lactam resistance	4046930..4047790
			<i>dfrA1</i>	Trimethoprim resistance	4038243..4038716
			<i>qacED1</i>	Quaternary ammonium compound resistance	4037191..4037539
			<i>sul1</i>	Sulphonamide resistance	4036356..4037197
Tn6512-related ICEs	Tn6512	Tn6578	<i>aphA1</i>	Aminoglycoside resistance	12894..13709
		<i>mer</i> region	<i>mer</i> locus	Mercuric resistance	80391..83682
	Tn6575	Truncated ISEc59- <i>aph(4)-Ia</i> - <i>aacC4</i> -IS26 unit	<i>aph(4)-Ia</i>	Aminoglycoside resistance	12989..14014 44227..45252
			<i>aacC4</i>	Aminoglycoside resistance	14243..15019 43222..43998
		Unnamable In element	<i>aacA4cr</i>	Fluoroquinolone and aminoglycoside resistance	33722..34321 30630..31229
			<i>bla</i> _{OXA-1}	β-lactam resistance	32761..33591
			<i>catB3</i>	Phenicol resistance	31991..32623
			<i>arr-3</i>	Rifampicin resistance	30081..30533 31454..31906
			<i>ampC</i>	β-lactam resistance	24780..25919
			<i>qacED1</i>	Quaternary ammonium compound resistance	29511..29858
			<i>sul1</i>	Sulphonamide resistance	22364..23203 28678..29517
		Tn4352	<i>aphA1</i>	Aminoglycoside resistance	35254..36069
		IS26- <i>cfr</i> -IS26 unit	<i>cfr</i>	Phenicol resistance	37586..38635
		Tn6581a	<i>bleO</i>	Bleomycin resistance	41824..42210
		In525	<i>aadA2</i>	Aminoglycoside resistance	54081..54554
			<i>ereA</i>	Macrolide resistance	54747..55967
			<i>dfrA32</i>	Trimethoprim resistance	54081..54554

		Δ Tn6309	<i>tetA(C)</i>	Tetracycline resistance	61430..62620
		Δ Tn125-2	<i>bla_{NDM-1}</i>	β -lactam resistance	65690..66502
			<i>ble_{MBL}</i>	Bleomycin resistance	66506..66871
		Tn6911-related region	<i>qacED1</i>	Quaternary ammonium compound resistance	75746..76093
			<i>sul1</i>	Sulphonamide resistance	74913..75752
		Truncated ISCR2- <i>floR</i> unit	<i>floR</i>	Phenicol resistance	84749..85963
		Truncated ISCR2- <i>sul2</i> unit	<i>sul2</i>	Sulphonamide resistance	88619..89434
	Δ Tn5393c	<i>strA</i>	Aminoglycoside resistance	87755..88558	
		<i>strB</i>	Aminoglycoside resistance	86919..87755	
	Tn6576	In525	<i>aadA2</i>	Aminoglycoside resistance	4512080..4512859
			<i>ereA</i>	Macrolide resistance	4512956..4514176
			<i>dfrA32</i>	Trimethoprim resistance	4514369..4514842
		Truncated <i>chrA-orf98</i> unit	<i>chrA</i>	Chromate resistance	4516708..4517913
		Tn6581b	<i>bleO</i>	Bleomycin resistance	4519258..4519644 4625360..4625746
		Unnamable In37-like element	<i>aacA4cr</i>	Fluoroquinolone and aminoglycoside resistance	4521355..4521954 4625746..4628056
			<i>bla_{OXA-1}</i>	β -lactam resistance	4522085..4522915 4628187..4629017
			<i>catB3</i>	Phenicol resistance	4523053..4523685; 4629155..4629787
			<i>arr-3</i>	Rifampicin resistance	4523770..4524222 4629872..4630324
<i>qacED1</i>			Quaternary ammonium compound resistance	4524445..4524792 4630547..4630894	
<i>sul1</i>			Sulphonamide resistance	4524786..4525625 4630888..4631727	

		ISEc59– <i>aph(4)-Ia</i> – <i>aacC4</i> –IS26 unit	<i>aph(4)-Ia</i>	Aminoglycoside resistance	4526607..4527383
			<i>aacC4</i>	Aminoglycoside resistance	4527612..4528637
		ISCR2– <i>sul2</i> unit	<i>sul2</i>	Sulphonamide resistance	4533484..4534299
		Truncated ISCR2– <i>floR</i> unit	<i>floR</i>	Phenicol resistance	4536802..4538016
		Δ Tn6503a	<i>bla</i> _{CTX-M-14}	β -lactam resistance	4547007..4547882
		IS26– <i>fosA3</i> –IS26 unit	<i>fosA3</i>	Fosfomycin resistance	4551726..4552142
		Tn4352	<i>aphA1</i>	Aminoglycoside resistance	4554787..4555602
					4616494..4617309 4634951..4635766
		Δ Tn6309	<i>tetA(C)</i>	Tetracycline resistance	4558081..4559271
		Δ Tn6029	<i>sul2</i>	Sulphonamide resistance	4610858..4611673
			<i>strA</i>	Aminoglycoside resistance	4611734..4612537
			<i>strB</i>	Aminoglycoside resistance	4612537..4613373
		Truncated <i>aacC2</i> – <i>tmrB</i> region	<i>aacC2</i>	Aminoglycoside resistance	4614371..4615231 4632828..4633688 4859983..4860855 4881427..4882287
		IS26– <i>mph(A)</i> –IS6100 unit	<i>mph(A)</i>	Macrolide resistance	4618286..4619191 4636743..4637648 4840469..4841374 4861920..4862830
		<i>chrA</i> – <i>orf98</i> unit	<i>chrA</i>	Chromate resistance	4622810..4624015 4641267..4642472 4844992..4846197 4866450..4867655
		In27	<i>dfrA12</i>	Trimethoprim resistance	4645502..4645999
			<i>aadA2</i>	Aminoglycoside resistance	4644303..4645082
<i>qacED1</i>	Quaternary ammonium		4643792..4644139		

			compound resistance	
		<i>sul1</i>	Sulphonamide resistance	4642959..4643798
	<i>sil-cop</i> region	<i>sil</i> locus	Silver resistance	4696846..4709292
		<i>cop</i> locus	Copper resistance	4710590..4718123
	Δ Tn21	<i>mer</i> locus	Mercuric resistance	4828474..4832436
	<i>aacC2-tmrB</i> region	<i>aacC2</i>	Aminoglycoside resistance	4838550..4839410
		<i>tmrB</i>	Tunicamycin resistance	4837995..4838537
		<i>bla</i> _{TEM-1}	β -lactam resistance	4832718..4833578
	In1021	<i>aacA4cr</i>	Fluoroquinolone and aminoglycoside resistance	4856564..4857164 4878020..4878619
		<i>dfrA27</i>	Trimethoprim resistance	4855407..4855880 4876865..4877338
		<i>aadA16</i>	Aminoglycoside resistance	4854381..4855226 4875839..4876684
		<i>ble</i> _{MBL}	Bleomycin resistance	4850096..4850461 4871554..4871919
		<i>bla</i> _{NDM-3}	β -lactam resistance	4849280..4850092 4870738..4871550
		<i>arr-3</i>	Rifampicin resistance	4848087..4848539 4856014..4856467 4869545..4869997 4877471..4877923
		<i>qacED1</i>	Quaternary ammonium compound resistance	4847517..4847864 4853917..4854264 4868975..4869322 4875375..4875722
		<i>sul1</i>	Sulphonamide resistance	4846684..4847523 4853084..4853923

					4868142..4868981 4874542..4875381
		Δ Tn5393c	<i>strA</i>	Aminoglycoside resistance	5003486..5004289
			<i>strB</i>	Aminoglycoside resistance	5004289..5005125
		ISCR2- <i>floR</i> unit	<i>floR</i>	Phenicol resistance	5006081..5007295
		Truncated ISCR2- <i>sul2</i> unit	<i>sul2</i>	Sulphonamide resistance	5002610..5003425
	Tn6577	In525	<i>aadA2</i>	Aminoglycoside resistance	3266082..3266861
			<i>ereA</i>	Macrolide resistance	3266958..3268178
			<i>dfrA32</i>	Trimethoprim resistance	3268371..3268844
		Truncated <i>chrA-orf98</i> unit	<i>chrA</i>	Chromate resistance	3270710..3271915
		Tn6581c	<i>bleO</i>	Bleomycin resistance	3273260..3273646
		Unnamable In37-like element	<i>aacA4cr</i>	Fluoroquinolone and aminoglycoside resistance	3279093..3279692
			<i>bla_{OXA-1}</i>	β -lactam resistance	3278132..3278962
			<i>catB3</i>	Phenicol resistance	3277362..3277994
			<i>arr-3</i>	Rifampicin resistance	3276825..3277277
			<i>qacED1</i>	Quaternary ammonium compound resistance	3276255..3276602
			<i>sul1</i>	Sulphonamide resistance	3275422..3276261
		IS26- <i>aacC4</i> -ISEc59- <i>aph(4)-Ia</i> unit	<i>aph(4)-Ia</i>	Aminoglycoside resistance	3281614..3282639
			<i>aacC4</i>	Aminoglycoside resistance	3280609..3281385
		ISCR2- <i>sul2</i> unit	<i>sul2</i>	Sulphonamide resistance	3287486..3288301 3364494..3365309
		Truncated ISCR2- <i>floR</i> unit	<i>floR</i>	Phenicol resistance	3290804..3292018
		Δ Tn6503a	<i>bla_{CTX-M-14}</i>	β -lactam resistance	3301009..3301884
		Δ Tn6309	<i>tetA(C)</i>	Tetracycline resistance	3306927..3308117
		-	<i>bla_{HMS-1}</i>	β -lactam resistance	3360360..3361223
Tn7-related	Tn7	In2-4	<i>aadA1</i>	Aminoglycoside resistance	9884..10672

elements			<i>sat2</i>	Aminoglycoside resistance	10730..11254	
			<i>dfrA1</i>	Trimethoprim resistance	11349..11822	
	Tn6726	In2-3		<i>sat2</i>	Aminoglycoside resistance	5062468..5062992
				<i>dfrA1</i>	Trimethoprim resistance	5063087..5063560
		ΔTn1548		<i>dfrA12</i>	Trimethoprim resistance	5112659..5113156
				<i>aadA2</i>	Aminoglycoside resistance	5113576..5114355
				<i>qacED1</i>	Quaternary ammonium compound resistance	5114519..5114866
				<i>sul1</i>	Sulphonamide resistance	5114860..5115699
				<i>armA</i>	Aminoglycoside resistance	5119044..5119817
				<i>msr(E)</i>	Macrolide resistance	5122116..5123591
				<i>mph(E)</i>	Macrolide resistance	5123647..5124531
			Truncated IS <i>Aba14</i> - <i>aphA6</i> -IS <i>Aba14</i> unit	<i>aphA6</i>	Aminoglycoside resistance	5129839..5130618
	ΔTn125-1		<i>bla_{NDM-1}</i>	β-lactam resistance	5133051..5133863	
			<i>ble_{MBL}</i>	Bleomycin resistance	5133867..5134232	
	40.7-kb Tn7-related element	In2-16		<i>lnu(F)</i>	Lincosamide resistance	33793..34638
				<i>dfrA1</i>	Trimethoprim resistance	34635..35108
				<i>aadA1a</i>	Aminoglycoside resistance	35125..35916
				<i>bla_{NDM-1}</i>	β-lactam resistance	41431..42243 47085..47897
				<i>ble_{MBL}</i>	Bleomycin resistance	41062..41427 46716..47081
				<i>qacED1</i>	Quaternary ammonium compound resistance	36214..36561
			<i>sul1</i>	Sulphonamide resistance	36555..37394	
ΔTn1548			<i>armA</i>	Aminoglycoside resistance	52047..52820	
			<i>msr(E)</i>	Macrolide resistance	55119..56594	

			<i>mph(E)</i>	Macrolide resistance	56650..57534
		Δ Tn4352	<i>aphA1</i>	Aminoglycoside resistance	62707..63522
Tn6591-related IMEs	Tn6591	Backbone	<i>ars</i> locus	Arsenic resistance	2603040..2605703
		ISCR2- <i>sul2</i> unit	<i>sul2</i>	Sulphonamide resistance	2598850..2599665
	Tn6590	Backbone	<i>ars</i> locus	Arsenic resistance	2261006..2263669
		Truncated ISCR2- <i>sul2</i> unit	<i>sul2</i>	Sulphonamide resistance	2267197..2268012
		Δ Tn5393c	<i>strA</i>	Aminoglycoside resistance	2266333..2267136
<i>strB</i>	Aminoglycoside resistance		2265497..2266333		