

Characterization of aminoglycoside resistance in multidrug-resistant *Klebsiella pneumoniae* isolates

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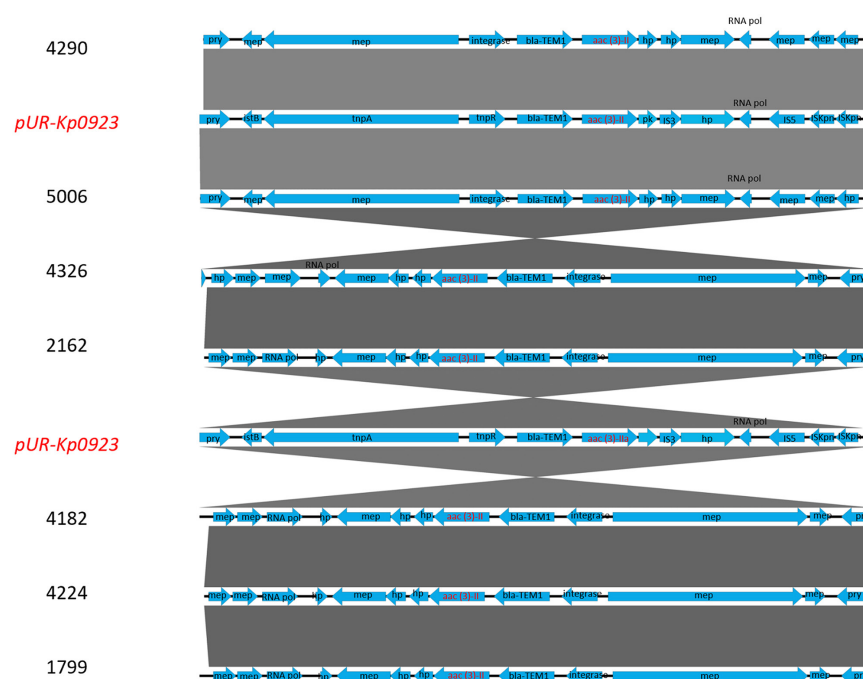
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Supplementary Figure S1 - Schematic drawing showing genetic elements surrounding the *aac* (3')-II gene in the plasmids described in this study. Arrows are proportional to the gene length and follow the transcription direction.

Supplementary Table S1 - Sequence types, betalactamases, aminoglycoside resistance genes and antimicrobial susceptibility testing of 70 isolates of *K. pneumoniae*

Study Group	NCBI Accession number	ID number	Year	Source	Country	MLST	Antimicrobial Susceptibility Testing				ESBL gene	Aminoglycoside resistance genes
							MEM	COL	GEN	AK		
E	SRR5713913	KP01	1980	Horse	France	23	S	S	R	R	SHV-11	aadA, aph3-ls
	GCA_013180385.1	KP02	2005	blood	Brazil	11	S	S	R	R	blaTEM, blaCTX-M2	aadA1, aadA2, aac(3)-IIa, aph(3)-IIa, aph(3)-Via
	SRR1561227	KP03	2009	Human	Guatemala	11	S	S	R	R	blaCTX-M-15, TEM-1D, SHV-11	aac(3)-IIId, aac(3)-Via (homolog), aadA2, aadA, aph3-ls, armA
	GCA_001968755.2	KP04	2011	Urban river	Brazil	437	R	R	S	S	blaCTX-M15, blaKPC-2	aph(3)-IIa
	GCA_001884385.1	KP05	2013	Hospital room swab	Canadá	278	R	S	S	S	NDM-7, CTX-M-15, TEM-1, SHV-27	-
	EuSCAPE_ES085	KP06	2013	Blood	Spain	11	R	S	R	R	blaKPC-2, SHV-11	aac(3)-IV, aadA2, aadA, aph(3)-IIa, aph(4)-IIa
	EuSCAPE_DE024	KP07	2013	Urine	Germany	147	R	R	S	S	blaKPC-2, SHV-11	
	EuSCAPE_RO115	KP08	2013	Lower respiratory tract secretion	Romania	101	R	S	R	R	blaCTX-M-15, OXA-48	aac(3)-IIa, aac(6')-Ib', aadA (homolog)
	EuSCAPE_DE051	KP09	2014	Blood	Germany	258	R	NA	R	I	TEM-1D, SHV-11, blaKPC-2	aac(6')-Ib', aadA2, aph3-ls
	EuSCAPE_DE010	KP10	2014	Lower respiratory tract secretion	Germany	101	R	R	R	R	OXA-1, OXA-9, TEM-1D, SHV-1, blaCTX-M-15, OXA-48	aac(3)-IIa, aac(6')-Ib', aadA (homolog)
	EuSCAPE_ES293	KP11	2014	Wound secretion	Spain	258	R	NA	R	R	TEM-1D, SHV-11, blaKPC-3	aac(6')-Ib', aph3-ls
	EuSCAPE_UK070	KP12	2014	Urine	UK	13	R	S	S	S	SHV-1, blaKPC-2	-
	EuSCAPE_IL061	KP13	2014	Wound secretion	USA	13	S	S	R	R	blaCTX-M-15, OXA-1, SHV-1	aac(3)-IIa, aac(6')-Ib-cr, aadA5, aph3-ls
	EuSCAPE_ES257	KP14	2014	Urine	Spain	278	S	S	R	R	SHV-27	strA, strB
	EuSCAPE_PT025	KP15	2014	Urine	Portugal	11	S	S	R	R	DHA-1, OXA-1, SHV-11	aac(6')-Ib-cr, aph3-ls
	GCA_002251715.1	KP16	2014	Rectal swab	Brazil	437	R	R	S	R	laSHV11, blaCTX-M15, blaTEM-1 and blaOXA-1, blaKPC-2	(aph(3')-IIa, ac(3)-IIId and ac(6')Ib-cr),
	GCA_003063065.1	KP17	2014	Cloacal swab	Germany	3128	NA	NA	R	NA	blaSHV-2, blaSHV-1, fosA-like, sul1, dfrA12, tet(D),	aadA1, aadA2, aac(3)-like,
	GCA_000805735.1	KP18	2014	Rectal swab	Brazil	323	R	NA	R	R	blaNDM-1, blaTEM, blaSHV, blaCTX-M, qnrA	aadA, aac(3)-IIa, aac(6')-Iq
	GCA_004127475.1	KP19	2014	Dog swab anal	China	147	S	NA	R	NA	blaNDM-5	NA
	G18000639	KP20	2015	Urine	Colombia	13	R	S	R	R	blaCTX-M-15, OXA-1, SHV-1, blaKPC-3	aac(3)-IIa, strA, strB
	NZ_CP026392.1	KP21	2016	Wastewater/sludge	USA	252	R	S	S	S	SHV-1, blaKPC-2	-
	G18001008	KP22	2016	Urine	Colombia	340	R	NA	R	R	OXA-1, SHV-11, blaCTX-M-15, blaKPC-2, aadA16 (homolog),	aadA2, strA, strB
	CP025515.1	KP23	2016	Wastewater	Switzerland	147	R	NA	R	R	ctx-M15, bla-NDM-9, blaOXA-9and blaTEM-1	aacA4, aadA1, aadA1_2 and aph(3)-VI
	GCA_002934865.1	KP24	2016	Rectum pig	Cameroon	3794	S	S	R	S	blaSHV-1, blaCTX-M-15, blaTEM-1B	aac(3)-IIa , aadA1, strA, strB,
	GCA_003583155.1	KP25	2016	River water	Austria	11	I	S	S	NA	blaCTX-M-15, blaOXA-1, blaOXA48	, aph3-ls, aadA2, aac(6')Ib-cr,
	SRR5943226	KP26	2016	Pig	Thailand	1	S	R	R	R	CMY-2, SHV-1, blaCTX-M-14	aac(3)-IIa, strA, strB
	GCA_002934845.1	KP27	2016	Nasal swab Pig	Cameroon	14	S	S	S	S	blaTEM-116, blaSHV-28, blaCTX-M-15	strA, strB,
	GCA_002934815.1	KP28	2016	Hand swab human	Cameroon	307	S	S	R	R	blaOXA-9, blaLEN-12, blaSHV-134, blaTEM-1A,	aac(6')-Ib, strA, strB, aac(3)-IIId, aac(6')Ib-cr*, aadA1, aadA16,
	G18001049	KP29	2017	Blood	Colombia	11	R	R	R	R	OXA-1, TEM-104, SHV-11, blaCTX-M-15, blaKPC-3	aac(3)-IIId, strA (homolog), strB (homolog)
	SRR11486232	KP30	2017	Human	Argentina	307	R	S	R	R	blaCTX-M-15, OXA-1, SHV-28, blaKPC-2	aac(3)-IIa, aac(3)-IV, aadA2, aadA, aph(4)-IIa, strA, strB
	SRR10153258	KP31	2017	Human	Brazil	11	R	S	R	R	blaNDM-1, blaCTX-M-15, OXA-9, TEM-1D, SHV-11	aac(6')-Ib', aadA, aph(3)-VI
	SRR10581305	KP32	2018	Cat	brazil	273	S	S	R	R	blaCTX-M-15, OXA-1, TEM-1D, SHV-11	aac(3)-IIa, aac(6')-Ib-cr, strA, strB
	GCA_011078225.1	KP33	2018	Soil in chicken farm	China	789	R	R	R	NA	blaNDM-5	-
	GCA_016055535.1	KP34	2019	Blood	Brazil	258	R	R	R	R	blaKPC-2	aph(3')-IIa
	GCA_013303005.1	KP35	2019	Urine dog	Brazil	258	R	S	R	R	blaKPC-2, blaCTX-M-15, blaOXA-1, blaSHV-11	aac(3)-IIa, aadA2, aph(3')-IIa
I	QEFS000000000	KP36	2011	Tracheal secretion	Brazil	11	8 (R)	0.5 (S)	≤ 4 (S)	8 (I)	blaCTX-M-2, blaKPC-2, blaTEM-1B	aac(3)-IIa, aadA1, aadA2, aph(3')-IIa, aph(3')-Via
	QEGC000000000	KP37	2011	Nervous tissue	Brazil	442	> 8 (R)	32 (R)	> 32 (R)	>256 (R)	blaOXA-9, blaKPC-2, blaTEM-1A	aac(6')-Ib, aadA1, aadA2, aph(3')-IIa, rmtG, aac(6')Ib-cr
	QEFT000000000	KP38	2011	Urine	Brazil	11	>4 (R)	32 (R)	64 (R)	32 (R)	-	aadA1, aph(3')-Via, aac(3)-IIa
	QEFY000000000	KP39	2012	Tracheal secretion	Brazil	340	≤ 1 (S)	1 (S)	> 32 (R)	>256 (R)	blaCTX-M-14, blaSHV-27, blaTEM-1B	aac(3)-IIId, aadA2, aph(3')-IIa
	QEFX000000000	KP40	2012	Bone marrow	Brazil	258	8 (R)	64 (R)	8 (S)	64 (R)	blaCTX-M-15, blaKPC-2, blaOXA-1, blaTEM-1B	aac(3)-IIId, aadA2, aph(3')-IIa, rmtB, strA, strB
	MZZQ000000000	KP41	2013	Blood	Brazil	340	> 8 (R)	32 (R)	> 32 (R)	>256 (R)	blaCTX-M-14, blaKPC-2, blaTEM-1B	aac(3)-IIId, aadA2, aph(3')-Via, strA, strB
	NBSC000000000	KP42	2013	Urinary catheter	Brazil	340	≤ 1 (S)	32 (R)	16 (I)	4 (S)	blaCTX-M-8, blaLEN9, blaOXA-9, blaTEM-1A	aac(3)-IIId, aadA2, aph(3')-Via, strA, strB

Supplementary Table S1 - Sequence types, betalactamases, aminoglycoside resistance genes and antimicrobial susceptibility testing of 70 isolates of *K. pneumoniae* (cont.)

QEFV000000000	KP43	2013	Tracheal secretion	Brazil	25	> 8 (R)	0.5 (S)	≤ 4 (S)	32 (R)	<i>bla</i> CTX-M-15, <i>bla</i> KPC-2, <i>bla</i> SHV-11, <i>bla</i> TEM-1B	<i>aac</i> (6')-Ib, <i>aadA1</i> , <i>aac</i> (6')/Ib-cr
MZZV000000000	KP44	2013	Blood	Brazil	11	> 8 (R)	12 (R)	≤ 4 (S)	32 (R)	<i>bla</i> CTX-M-2, <i>bla</i> CTX-M-8, <i>bla</i> KPC-2, <i>bla</i> OXA-2, <i>bla</i> SHV-11	<i>aac</i> (3')-IIa, <i>aacA4</i> , <i>aac</i> (6')/Ib-cr
MZZX000000000	KP45	2013	Blood	Brazil	11	> 8 (R)	48 (R)	8 (S)	128 (R)	<i>bla</i> CTX-M-2, <i>bla</i> KPC-2, <i>bla</i> OXA-2, <i>bla</i> SHV-11, <i>bla</i> TEM-1B	<i>aac</i> (3')-IIa, <i>aacA4</i> , <i>aadA2</i> , <i>aph</i> (3')-Ia, <i>aac</i> (6')/Ib-cr
NBSB000000000	KP46	2013	Blood	Brazil	11	> 8 (R)	64 (R)	8 (S)	128 (R)	<i>bla</i> CTX-M-2, <i>bla</i> KPC-2, <i>bla</i> OXA-2, <i>bla</i> TEM-1B	<i>aac</i> (3')-IIa, <i>aacA4</i> , <i>aadA2</i> , <i>aph</i> (3')-Ia, <i>aac</i> (6')/Ib-cr
MZZT000000000	KP47	2013	Blood catheter	Brazil	258	> 8 (R)	32 (R)	> 32 (R)	>256 (R)	<i>bla</i> CTX-M-14, <i>bla</i> KPC-2, <i>bla</i> SHV-11, <i>bla</i> TEM-1B	<i>aac</i> (3')-IId, <i>aadA2</i> , <i>aph</i> (3')-Ia, <i>rmIB</i> , <i>strA</i> , <i>strB</i>
NBOT000000000	KP48	2013	Blood catheter	Brazil	11	2 (I)	16 (R)	16 (S)	>256 (R)	<i>bla</i> CTX-M-2, <i>bla</i> KPC-2, <i>bla</i> OXA-2, <i>bla</i> SHV-11	<i>aacA4</i> , <i>aadA1</i> , <i>aph</i> (3')-Ia, <i>aac</i> (6')/Ib-cr
QEFZ000000000	KP49	2012	Tracheal secretion	Brazil	234	> 8 (R)	0,125 (S)	8 (S)	128 (R)	<i>bla</i> CTX-M-2, <i>bla</i> KPC-2, <i>bla</i> OXA-2, <i>bla</i> SHV-11, <i>bla</i> TEM-1B	<i>aac</i> (3')-IId, <i>aadA2</i> , <i>rmIB</i> , <i>strA</i> , <i>strB</i>
QOIC000000000	KP50	2013	Rectal swab	Brazil	11	4 (R)	64 (R)	32 (R)	>32 (R)	<i>bla</i> KPC-2, <i>bla</i> TEM-1B, <i>bla</i> SHV-182	<i>aadA2</i> , <i>aadB</i> , <i>aph</i> (3')-Ia, <i>strA</i> , <i>strB</i> , <i>aac</i> (3')-IIa
MZZR000000000	KP51	2014	Blood	Brazil	11	> 8 (R)	12 (R)	≤ 4 (S)	64 (R)	<i>bla</i> KPC-2, <i>bla</i> OXA-2, <i>bla</i> SHV-11, <i>bla</i> TEM-1B	<i>aac</i> (3')-IIa, <i>aacA4</i> , <i>aadA2</i> , <i>aac</i> (6')/Ib-cr
QOUE000000000	KP52	2014	Ascitic fluid	Brazil	11	> 8 (R)	8 (R)	8 (S)	64 (R)	<i>bla</i> CTX-M-2, <i>bla</i> KPC-2, <i>bla</i> OXA-2, <i>bla</i> OXA-9, <i>bla</i> SHV-36, <i>bla</i> TEM-1A	<i>aac</i> (3')-IIa, <i>aacA4</i> , <i>aadA2</i> , <i>aph</i> (3')-Ia, <i>aac</i> (6')/Ib-cr
QOUG000000000	KP53	2014	Blood	Brazil	23	> 8 (R)	4 (R)	≤ 4 (S)	64 (R)	<i>bla</i> CTX-M-2, <i>bla</i> KPC-2, <i>bla</i> LEN12, <i>bla</i> OXA-2, <i>bla</i> TEM-1B	<i>aac</i> (3')-IIa, <i>aacA4</i> , <i>aac</i> (6')/Ib-cr
QOUF000000000	KP54	2014	Ascitic fluid	Brazil	11	> 8 (R)	16 (R)	> 32 (R)	256 (R)	<i>bla</i> CTX-M-2, <i>bla</i> LEN12, <i>bla</i> OXA-2, <i>bla</i> TEM-1B	<i>aac</i> (3')-IIa, <i>aac</i> (6')-Iq, <i>aacA4</i> , <i>aadA1</i> , <i>aph</i> (3')-Ia, <i>aac</i> (6')/Ib-cr
QOVT000000000	KP55	2014	Intra-abdominal collection	Brazil	11	> 8 (R)	32 (R)	> 32 (R)	≤0,5 (S)	<i>bla</i> CTX-M-15, <i>bla</i> KPC-2, <i>bla</i> SHV-11	<i>aac</i> (3')-IIa, <i>aacA4</i> , <i>aadA2</i> , <i>aac</i> (6')/Ib-cr
QOVV000000000	KP56	2014	Colletion	Brazil	340	> 8 (R)	8 (R)	≤ 4 (S)	≤0,5 (S)	<i>bla</i> KPC-2, <i>bla</i> LEN12, <i>bla</i> SHV-11	<i>aadA2</i> , <i>aph</i> (3')-Ia, <i>aph</i> (3')-Via
QOVU000000000	KP57	2014	Peritoneal fluid	Brazil	437	> 8 (R)	16 (R)	≤ 4 (S)	≤0,5 (S)	<i>bla</i> CTX-M-15, <i>bla</i> KPC-2, <i>bla</i> OXA-1, <i>bla</i> SHV-11, <i>bla</i> TEM-1B	<i>aadA2</i> , <i>aph</i> (3')-Ia
MZZU000000000	KP58	2015	Blood	Brazil	340	> 8 (R)	16 (R)	≤ 4 (S)	64 (R)	<i>bla</i> CTX-M-2, <i>bla</i> KPC-2, <i>bla</i> OXA-2, <i>bla</i> TEM-1B	<i>aac</i> (3')-IIa, <i>aac</i> (6')/Ib-cr, <i>aph</i> (3')-Ia, <i>strA</i> , <i>strB</i>
QOIA000000000	KP59	2015	Blood	Brazil	11	>16 (R)	32 (R)	16 (I)	4 (S)	<i>bla</i> KPC-2, <i>bla</i> TEM-1B, <i>bla</i> OXA-2, <i>bla</i> SHV-182	<i>aadA2</i> , <i>aac</i> (3')-IIa, <i>aac</i> (6')-Ib3, <i>aac</i> (6')/Ib-cr
NBOU000000000	KP60	2015	Blood	Brazil	11	> 8 (R)	64 (R)	> 32 (R)	>256 (R)	<i>bla</i> CTX-M-14, <i>bla</i> KPC-2, <i>bla</i> SHV-11, <i>bla</i> TEM-1B	<i>aacA4</i> , <i>aac</i> (3')-IIa, <i>aadA2</i> , <i>aph</i> (3')-Ia, <i>aac</i> (6')/Ib-cr
MZZY000000000	KP61	2015	Blood	Brazil	258	> 8 (R)	12 (R)	> 32 (R)	4(S)	<i>bla</i> CTX-M-15, <i>bla</i> KPC-2, <i>bla</i> OXA-1	<i>aac</i> (3')-IId, <i>aadA2</i> , <i>rmIB</i> , <i>strA</i> , <i>strB</i>
NBIT000000000	KP62	2015	Blood	Brazil	16	> 8 (R)	12 (R)	≤ 4 (S)	32 (R)	<i>bla</i> CTX-M-15, <i>bla</i> OXA-1, <i>bla</i> TEM-1B	<i>aac</i> (6')/Ib-cr, <i>aadA2</i> , <i>aph</i> (3')-Ia
NBSD000000000	KP63	2015	Blood	Brazil	101	> 8 (R)	24 (R)	≤ 4 (S)	≤0,5 (S)	<i>bla</i> CTX-M-15, <i>bla</i> KPC-2, <i>bla</i> SHV-11	<i>aac</i> (3')-IId, <i>aac</i> (6')/Ib-cr, <i>aph</i> (3')-Ia, <i>strA</i> , <i>strB</i>
MZZW000000000	KP64	2014	Blood catheter	Brazil	340	> 8 (R)	8 (R)	> 32 (R)	>256 (R)	<i>bla</i> CTX-M-14, <i>bla</i> KPC-2, <i>bla</i> SHV-11, <i>bla</i> TEM-1B	<i>aph</i> (3')-Ia
MZZS000000000	KP65	2016	Blood	Brazil	258	2 (I)	32 (R)	32 (R)	64 (R)	<i>bla</i> CTX-M-15, <i>bla</i> SHV-11, <i>bla</i> TEM-1B	<i>aac</i> (3')-IId, <i>aadA2</i> , <i>rmIB</i> , <i>strA</i> , <i>strB</i>
QORQ000000000	KP66	2016	Blood	Brazil	16	≥16 (R)	64 (R)	8 (S)	4 (S)	<i>bla</i> CTX-M-15, <i>bla</i> OXA-1	<i>aadA2</i> , <i>aph</i> (3')-Ia, <i>aac</i> (6')/Ib-cr
QOUA000000000	KP67	2017	Tracheal secretion	Brazil	258	≥16 (R)	64 (R)	> 32 (R)	>256 (R)	<i>bla</i> KPC-2, <i>bla</i> TEM-1B, <i>bla</i> CTX-M-14, <i>bla</i> SHV-182	<i>aadA2</i> , <i>aph</i> (3')-Ia, <i>strA</i> , <i>strB</i> , <i>aac</i> (3')-IId, <i>rtmB</i>
QOHV000000000	KP68	2017	Blood	Brazil	11	≥16 (R)	16 (R)	15 (I)	4 (S)	<i>bla</i> KPC-2	-
QOHS000000000	KP69	2017	Urinary catheter	Brazil	258	≥16 (R)	32 (R)	> 32 (R)	256 (R)	<i>bla</i> KPC-2, <i>bla</i> TEM-1B, <i>bla</i> CTX-M-14, <i>bla</i> SHV-182	<i>aadA1</i> , <i>aph</i> (3')-Via, <i>aac</i> (3')-IIa
QOTX000000000	KP70	2017	Blood	Brazil	11	≥16 (R)	16 (R)	8 (S)	64 (R)	<i>bla</i> KPC-2, <i>bla</i> TEM-1B, <i>bla</i> OXA-2, <i>bla</i> SHV-182	<i>aac</i> (3')-IIa, <i>aac</i> (6')-Ib3, <i>aac</i> (6')/Ib-cr

E = external group; I = internal group; MLST = Multilocus sequence typing; MIC = minimal inhibitory concentration; MEM = meropenem; COL = colistin; GEN = gentamicin; AK = Amikacin; ESBL = Extended-Spectrum β-Lactamase; AMEs = Aminoglycoside-Modifying Enzymes (chromosomal aminoglycoside phosphotransferase gene, *aph*(3')-Iib; gene *aac*(6')- Streptomycin 3"- adenylyltransferase; AAC = aminoglycoside acetyltransferase(3–2"); AAD = aminoglycoside adenylyltransferase; aph = aminoglycoside phosphotransferase; Quinolone-resistance genes = acetyltransferase AAC(6')-Ib-cr); R = resistant; I = intermediate; S = susceptible; NA = Not Available.