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Genomic Epidemiology of Global Carbapenemase-Producing *Escherichia coli*, 2015–2017

Appendix

Details of the SMART and INFORM surveillance programs

The Merck Study for Monitoring Antimicrobial Resistance Trends (SMART) program (2015–17) included isolates from intra-abdominal and urinary tract infections from the following 55 countries: Egypt, Morocco, Kenya, South Africa, Tunisia (Africa); China, Hong Kong, India, Japan, Malaysia, Singapore, South Korea, Taiwan, Thailand, Vietnam (Asia); Croatia, Czech Republic, Estonia, France, Georgia, Greece, Germany, Hungary, Italy, Latvia, Lithuania, Portugal, Romania, Serbia, Slovenia, Spain, Switzerland, Turkey, United Kingdom (Europe); Argentina, Brazil, Chile, Colombia, Dominican Republic, Ecuador, Guatemala, Mexico, Puerto Rico, Panama, Uruguay, Venezuela (Latin America); Jordan, Lebanon, Israel, Saudi Arabia, UAE (Middle East); Canada, United States (North America); and Australia, New Zeeland, Philippines (South Pacific).

The INFORM surveillance program of antimicrobial resistance (2015–17) included isolates from intra-abdominal, urinary tract, blood, skin and soft tissue and lower respiratory tract infections from the following 42 countries: Egypt, Kenya, Nigeria, South Africa (Africa); China, South Korea, Taiwan, Thailand (Asia); Austria, Belgium, Bulgaria, Greece, Czech Republic, Denmark, France, Germany, Hungary, Italy, Macedonia, Portugal, Poland, Russia, Romania, Slovakia, Spain, Turkey, United Kingdom (Europe); Argentina, Brazil, Chile, Colombia, Mexico, Uruguay, Venezuela (Latin America); Lebanon, Israel, Syria, Kuwait (Middle East); United States (North America); and Australia, Philippines, Japan (South Pacific).

Both programs collected 100 consecutive clinically relevant non-repeat Gram-negative bacteria per annum from each institution.

Global distribution of dominant E. coli Sequence types (STs) and clades

ST410

The ST410-B3/*H24*Rx subclade showed a global distribution (Georgia [n = 1] with OXA-48, Kuwait [n = 1] with OXA-181, Mexico [n = 2] with VIM-23, Morocco [n = 1] with OXA-48, South Africa [n = 2] with OXA-181, USA [n = 2] with KPC-2 and Vietnam [n = 1] with KPC-2). The ST410-B4/*H24*RxC subclade was found in Jordan (n = 15 with OXA-181), Egypt (n = 11 with NDM-5 and OXA-181), Philippines (n = 1 with NDM-7), South Korea (n = 1 with NDM-5 and OXA-181), Thailand (n = 6 with NDM-5 and OXA-181 and Vietnam (n = 1 with NDM-5).

ST131

The ST131-A/H41 clade (n = 2) was positive for KPC-3 (from USA) and OXA-48 (from Lebanon). The ST131-C1_M27/H30 subclade (n = 4) was positive for NDM-1 (from Russia (n = 2), Philippines [n = 1]) and OXA-232 from Thailand (n = 1). The ST131-C1_nonM27/H30 subclade (n = 10) was positive for KPC-2 from Guatemala (n = 4), Israel (n = 2) and USA (n = 1); KPC-3 from Italy (n = 2) and KPC-18 from USA (n = 1). The ST131-C2/H30 subclade (n = 10) was positive for KPC-2 (n = 1 from Puerto Rico), KPC-3 (n = 4 from Italy), NDM-1 (n = 2 from Egypt), NDM-5 (n = 1 from Canada), OXA-48 (n = 1 from Egypt), and OXA-181 (n = 1 from Egypt). One ST131-C2 with NDM-1 was also positive for VIM-1.

ST167

The ST167-A clade (n = 2) was found in Guatemala with NDM-1, ST167-B1 subclade (n = 3) was found in Egypt with NDM-5; ST167-B2 subclade (n = 5) was found in Egypt (n = 2 with OXA-181), and Thailand (n = 3 with NDM-5); ST167-B3 subclade (n = 7) was present in Egypt (with NDM-1 [n = 1], NDM-5 [4]) and Italy (n = 2 with NDM-5).

ST405

The ST405-A clade was found in Egypt with NDM-5 and OXA-48. The ST405-B clade was present in Colombia (n = 1 with KPC-2), Spain (n = 1 with OXA-48), Vietnam (n = 4 with NDM-5 and KPC-2), Turkey (n = 2 with OXA-48) and UK (n = 1 with NDM-5.

The non-dominant STs (n = 112/229 [49%]) were positive for KPC-2, KPC-3, NDM-1, NDM-5, NDM-6, NDM-7, OXA-48, OXA-181, OXA-232, OXA-244, VIM-1 and IMP-59

(Appendix Table 1). Non-dominant STs showed a global distribution. They were found in Europe (Austria, Belgium, Georgia, Germany, Greece, Italy, Romania, Russia, Serbia, Spain, UK, Turkey), Africa (Egypt, Morocco, Tunisia), Middle East (Lebanon, Israel, Jordan, Kuwait, Saudi Arabia), Asia (Malaysia, Thailand, Philippines, Taiwan, Vietnam), Latin America (Argentina, Brazil, Colombia, Guatemala, Mexico, Puerto Rico, Venezuela), North America (USA) and Australia. Non-dominant STs were common in Turkey where they were linked with OXA-48; in Egypt where they were linked with NDM-1, NDM-5, OXA-181, OXA-244, and OXA-48; and Vietnam where they were linked with KPC-2, NDM-1, NDM-5, NDM-7, OXA-48 and OXA-181.

			<u> </u>			a a= #	
	ST410	ST131	ST1284	ST167	ST405	Other STs [#]	All STs
Characteristic	n = 45 (%)	n = 26 (%)	n = 18 (%)	n = 17 (%)	n = 11 (%)	n = 112 (%)	n = 229 (%)
Geographic location	Global	Global	Turkey	Global	Global	Global	Global
QRDR mutations							
<i>gyrA</i> S83L	44 (98)	26 (100)	18 (100)	17 (100)	10 (91)	76 (68)	191 (83)
<i>gyrA</i> D87N	44 (98)	25 (96)	18 (100)	17 (100)	10 (91)	61 (54)	175 (77)
parC S80I	44 (98)	25 (96)	18 (100)	17 (100)	11 (100)	62 (55)	177 (78)
parC E84V	0ª	24 (92) ^b	0ª	0ª	0ª	1 (1)	25 (12)
parE 1529L	0ª	25 (96) ^b	0ª	0ª	0ª	1 (1)	26 (11)
Carbapenemases							
KPC-2	3 (7) ^a	8 (31) ^b	0ª	0ª	3 (27)	21 (19)	35 (15)
KPC-3	0ª	7 (27) ^b	0ª	0 ^a	0	7 (6)	14 (6)
KPC-18	0	1 (4)	0	0	0	Ò	1 (0.4)
NDM-1	0ª	4 (15) ^b	0	3 (18)	0	12 (11)	19 (8)
NDM-4	0	Û	0	Û	1 (9)	Ò	1 (0.4)
NDM-5	12 (27)ª	1 (4) ^b	0 ^b	11 (65) ^c	3 (27)	13 (12)	40 (17)
NDM-6	0) 0	0	Ò	Û	1 (1)	1 (0.4)
NDM-7	1 (2)	0	0	0	0	4 (4)	5 (2)
OXA-48	2 (4)	2 (8)	0	0	4 (36)	32 (29)	40 (17)
OXA-181	21 (47)ª	1 (4) ^b	18 (100) ^c	2 (12) ^b	0 ^b	6 (5)	48 (21)
OXA-232	Ò	1 (4)	О́	`0 ´	0	4 (4)	5 (2)
OXA-244	0	ò́	0	0	0	3 (3)	3 (1)
VIM-1	0	0	0	0	0	2 (2)	2 (1)
VIM-23	2 (4)	0	0	0	0	Ò́	2 (1)
IMP-59	ò́	0	0	0	0	2 (2)	2 (1)
NDM-1 + VIM-1	0	1 (4)	0	0	0	Ò	1 (0.4)
NDM-1 + OXA-181	0	ò́	0	0	0	2 (2)	2 (1)
NDM-5 + OXA-48	0	0	0	1 (6)	0	Ò́	1 (Ò.Á)
NDM-5 + OXA-181	4 (9)	0	0	ò	0	1 (1)	5 (2)
NDM-5 + OXA-232	ò́	0	0	0	0	2 (2)	2 (1)
Other β-lactamases*						()	()
OXAs	21 (47)ª	11 (42)ª	17 (94) ^b	7 (41) ^a	3 (27)ª	23 (21)	82 (36)
CMYs	40 (89)́ª	2 (8) ⁶	18 (Ì0Ó)ª	О ^ь	2 (18)́⁵	18 (16)	80 (35)
DHA-1	ò	ò́	`o ´	0	`0 ´	3 (3)	3 (1)
CTX-Ms	38 (84) ^a	13 (50) ^b	11 (61)	13 (77)	9 (82)	58 (52)	142 (62)

Appendix Table 1. Characteristics of dominant Sequence Types among carbapenemase-producing Escherichia coli

$\begin{array}{c c c c c c c c c c c c c c c c c c c $		ST410	ST131	ST1284	ST167	ST405	Other STs [#]	All STs
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Characteristic	n = 45 (%)	n = 26 (%)	n = 18 (%)	n = 17 (%)	n = 11 (%)	n = 112 (%)	n = 229 (%)
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	TEM-1	35 (78)ª	18 (69) ^{a,c}	0 ^b	8 (47) ^{c,d}	3 (27) ^{b,d}	79 (71)	143 (62)
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	TEMs (ESBLs)	1 (2)	`0 ´	0	1 (6)	`0´	2 (2)	4 (2)
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	SHV-2	Ò	0	0	Ò́	0	1 (1)	1 (Ò.4)
$ \begin{array}{c} \mbox{Aminoglycosilde modifying enzymes} & \mbox{Aminoglycosilde modifying enzymes} \\ \mbox{acd} \lambda & 15 (33)^2 & 1 (4)^2 & 0^2 & 8 (47)^2 & 3 (27) & 13 (12) & 40 (17) \\ \mbox{acd} \lambda \lambda D & 0 & 0 & 0 & 0 & 6 (5) \\ \mbox{acd} \lambda Z & 0^{rr} & 0^{rr} & 0^{rr} & 0^{rr} & 0^{rr} & 5 (29)^{rr} & 0 & 0 & 5 (29) \\ \mbox{acd} \lambda Z & 0^{rr} & 0^{rr} & 0^{rr} & 0^{rr} & 0^{rr} & 1 (6)^{rr} & 4 (30) & 10 (24) \\ \mbox{acd} \lambda Z & 0^{rr} & 0^{rr} & 0^{rr} & 0^{rr} & 0^{rr} & 1 (6)^{rr} & 4 (30) & 10 (24) \\ \mbox{acd} \lambda Z & 0^{rr} & 0^{rr} & 0^{rr} & 0^{rr} & 0^{rr} & 1 (6)^{rr} & 2 (6)^{rr} & 4 (4) & 47 (2) \\ \mbox{acc} (2)^{rl} M & 3 & 1 (6)^{rr} & 3 (12)^{2} & 1 & 0^{rr} & 0^{rr$	SHV-12	0	2 (8)	0	2 (12)	0	8 (7)	12 (5)
$ \begin{array}{cccc} a a c A 2 & 1 & 0 & 0 & 2 & (8) & 0 & 1 & (6) & 3 & (27)^{c} & 23 & (21) & 29 & (13) \\ a a c A 2 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 6 & (6) & 6 & (3) \\ a a c A 2 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & (6) & (7) & (1) & (1) & (6) & (2) & (1$	Aminoglycoside modifying e	nzymes	()		()		()	()
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	aadA1	0ª	2 (8)	0	1 (6)	3 (27) ^b	23 (21)	29 (13)
$ \begin{array}{cccc} acdAzb & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & $	aadA2	15 (33)ª	1 (4) ^b	0 ^b	8 (47) ^a	3 (27)	13 (12)	40 (17)
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	aadA2b	Ò	Ò́	0	`0´	Ò Í	6 (5)	6 (3)
$ \begin{array}{cccc} a a c d 5 & 27 (60)^{a} & 11 (42)^{a} & 18 (100)^{b} & 7 (41)^{a} & 5 (46)^{a} & 34 (30) & 102 (45) \\ a a c (3)^{a} d & 2 (4)^{a} & 2 (8)^{a} & 18 (100)^{b} & 1 (6)^{a} & 2 (18)^{a} & 18 (16) & 43 (19) \\ a c c (3)^{a} d & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ a c c (5)^{a} b & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 & 0 &$	aadA22	0ª	0ª	0 ^a	5 (29) ^b	0	Ò	5 (2)
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	aadA5	27 (60)ª	11 (42) ^a	18 (100) ^b	7 (41) ^a	5 (46) ^a	34 (30)	102 (45)
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	aadA16	0	0	0	0	1 (9)	4 (4)	5 (2)
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	aac(3')-IIa	2 (4) ^a	2 (8)ª	18 (100) ^b	1 (6)ª	2 (18)ª	18 (16)	43 (19)
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	acc(3')-IId	31 (69)ª	3 (12) ^b	0 ^b	2 (12) ^b	1 (9) ^b	20 (18)	57 (25)
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	aac(6')-lb	0	0	0	0	0	4 (4)	4 (2)
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	aac(6')-Ib-cr	41 (91)ª	6 (23) ^b	17 (94) ^{a,c}	11 (65) ^{c,d}	5 (46) ^{b,d}	41 (37)	121 (53)
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	aac(6')-la	0	0	0	0	0	1 (1)	1 (0.4)
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	aac(6')-lla	0	0	0	0	0	1 (1)	1 (0.4)
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	aac(6')-33	0	1 (4)	0	0	0	1 (1)	2 (1)
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	ant(2')-1a	0	1 (4)	0	0	0	5 (5)	6 (3)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	aph(3')-la	0	1 (4)	0	0	1 (9)	6 (5)	8 (3)
aph(3)-V102 (8)01 (6)07 (6)10 (4)aph(6)-1d34 (75)*7 (27)*14 (78)*5 (29)*6 (55)38 (34)104 (45)mntB0*0*0*0*0*0*0*0*0*0*0*Other AMR determinants0003 (18)04 (4)7 (3)grnA101 (4)0002 (2)3 (1)grnA10000001 (1)1 (0.4)grnA10000001 (1)1 (0.4)grnA10000001 (1)1 (0.4)grnA10000001 (1)1 (0.4)grnA10000001 (1)1 (0.4)grnA10000002 (2)2 (1)grnA100000002 (2)2 (1)grnA200000002 (2)2 (1)grnA1000000002 (2)2 (1)grnA100000002 (2)2 (1)grnA100000002 (2)2 (1)grnA100000002 (2)2 (1) <td>aph(3')-lb</td> <td>15 (33)ª</td> <td>5 (19)ª</td> <td>17 (94)[°]</td> <td>4 (24)^a</td> <td>1 (9)ª</td> <td>16 (14)</td> <td>58 (25)</td>	aph(3')-lb	15 (33)ª	5 (19)ª	17 (94) [°]	4 (24) ^a	1 (9)ª	16 (14)	58 (25)
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	aph(3')-VI	0	2 (8)	0	1 (6)	0	7 (6)	10 (4)
aph(6):7d34 (76)*7 (27)*14 (78)*5 (29)*6 (55)38 (34)104 (45)mrtC02 (8)0003 (3)5 (2)Other AMR determinants0003 (18)04 (44)7 (3)qnrA101 (4)0002 (2)3 (1)qnrA101 (4)0002 (2)3 (1)qnrB10000001 (11)1 (0.4)qnrB20000003 (3)3 (1)qnrB60000002 (2)2 (1)qnrB40000002 (2)2 (1)qnrB40000002 (2)2 (1)qnrB50000002 (2)2 (1)qnrB40000002 (2)2 (1)qnrB40000002 (2)2 (1)qnrB40000002 (2)2 (1)qnrB40000002 (2)2 (1)qnrB501 (4)00002 (2)2 (1)qnrB501 (4)0001 (9)18 (16)1 (9)drA100001 (1)1 (0.4)qtrA1 <td>aph(4')-1a</td> <td>0</td> <td>0</td> <td>0</td> <td>3 (18)</td> <td>0</td> <td>2 (2)</td> <td>5 (2)</td>	aph(4')-1a	0	0	0	3 (18)	0	2 (2)	5 (2)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	aph(6')-1d	34 (76)ª	7 (27) ^o	14 (78) ^a	5 (29) ^b	6 (55)	38 (34)	104 (45)
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	rmtB	0ª	0ª	0ª	7 (41) ⁰	1 (9)	7 (6)	15 (7)
Other AMR determinants fosA 0 0 0 3 (18) 0 4 (4) 7 (3) qrnA1 0 1 (4) 0 0 0 2 (2) 3 (1) qrnB1 0 0 0 0 0 0 4 (4) 4 (2) qrnB2 0 0 0 0 0 1 (11) 1 (0.4) qrnB4 0 0 0 0 0 3 (3) 3 (1) qrnB6 0 0 0 0 0 3 (3) 3 (1) qrn751 26 (58) ^a 4 (15) ^b 18 (100) ^a 3 (18) ^b 1 (9) ^b 18 (16) 70 (31) dfrA1 0 1 (4) ^b 0 ^b 8 (47) ^a 3 (27) 17 (15) 45 (20) dfrA15 0 0 0 0 1 (9) 18 (16) 19 (8) dfrA17 35 (78) ^{b,c} 11 (42) ^b 18 (100) ^a 8 (47) ^{b,c} 3 (33) 113 (49)	rmtC	0	2 (8)	0	0	0	3 (3)	5 (2)
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	Other AMR determinants	0	•	0	0 (10)	•		7 (0)
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	TOSA	0	0	0	3 (18)	0	4 (4)	7 (3)
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	qnrA I	0	1 (4)	0	0	0	Z (Z)	3(1)
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	qnrB1 anrB2	0	0	0	0	0	4 (4)	4 (2)
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	qiiibz anrB10	0	0	0	0	0	1 (1) E (E)	T (0.4)
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	qiiiB19 aprB4	0	0	0	0	0	3(3)	3 (2) 3 (1)
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	qnrB6	0	0	0	0	0	3 (3)	3(1)
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	anrB0	0	0	0	0	0	3(3)	3(1)
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	anrS1	26 (58)ª	4 (15) ^b	18 (100)	3 (18) ^b	1 (9) ^b	18 (16)	70 (31)
dfrA1216 (36) ^a 1 (4) ^b 008 (47) ^a 3 (27)17 (15)45 (20)dfrA1400001 (9)18 (16)19 (8)dfrA15000001 (1)1 (0.4)dfrA1735 (78) ^{ac} 11 (42) ^b 18 (100) ^a 8 (47) ^{bc} 8 (73)33 (30)113 (49)dfrA270a1 (4)003 (27) ^b 6 (5)10 (4)dfrA480000001 (0.4)dfrA8000001 (0.4)sul234 (76) ^a 15 (58) ^b 18 (100) ^a 15 (88)8 (73)63 (56)160 (70)sul234 (76) ^a 8 (31) ^b 18 (100) ^a 5 (46) ^{bb} 40 (36)113 (49)sul30001 (6) ^b 5 (46) ^{bc} 33 (32)113 (49)sul30001 (6) ^b 5 (46) ^{bc} 35 (32)82 (36)tetB35 (78) ^{ac} 2 (8) ^b 4 (22) ^{bc} 1 (6) ^b 5 (46) ^{bc} 35 (32)82 (36)tetB01 (4)0002 (2)3 (1)Plasmid types	dfrA1	20 (00)	+(10)	0	0 (10)	0	5 (5)	6 (3)
diffA14000011101010diffA150000011111010diffA173578)*c11142)*18100*8(47)*c8(73)333330)113(49)diffA270a1(4)0003(27)*6(5)10(4)diffA50000003(3)3(1)diffA701(4)0000110(4)diffA8000001(1)1(0.4)sul234(76)*8(31)*18(100)*15(8)8(73)63(56)160(70)sul234(76)*8(31)*18(100)*16013(12)14(6)sul300116013(12)14(6)13(42)*(40)	dfrA12	16 (36)ª	1 (4) ^b	0	8 (47) ^a	3 (27)	17 (15)	45 (20)
diff A150000011101010111010101010101010111010101010101010101110 </td <td>dfrA14</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>1 (9)</td> <td>18 (16)</td> <td>19 (8)</td>	dfrA14	0	0	0	0	1 (9)	18 (16)	19 (8)
dfrA17 $35(78)^{a.c}$ $11(42)^{b}$ $18(100)^{a}$ $8(47)^{b.c}$ $8(73)$ $33(30)$ $113(49)$ dfrA27 $0a$ $1(4)$ 0 0 $3(27)^{b}$ $6(5)$ $10(4)$ dfrA5 0 0 0 0 0 $3(33)$ $3(1)$ dfrA7 0 $1(4)$ 0 0 0 0 $1(0.4)$ dfrA8 0 0 0 0 0 $1(1)$ $1(0.4)$ dfrA8 0 0 0 0 0 $1(1)$ $1(0.4)$ sul1 $41(91)^{a}$ $15(58)^{b}$ $18(100)^{a}$ $15(88)$ $8(73)$ $63(56)$ sul2 $34(76)^{a}$ $8(31)^{b}$ $18(100)^{a}$ $5(46)^{b.b}$ $40(36)$ $113(49)$ sul3 0 0 0 $1(6)$ 0 $13(12)$ $14(6)$ tetA $9(20)^{a.b}$ $9(35)^{a.c}$ 0^{b} $12(71)^{c}$ $5(46)^{a.c}$ $27(24)$ $62(27)$ tetB $35(78)^{a.c}$ $2(8)^{b}$ $4(22)^{b.c}$ $1(6)^{b}$ $5(46)^{b}$ $47(42)$ $132(58)$ IncFIA $44(98)^{a}$ $12(46)^{b}$ $18(100)^{a}$ $4(24)^{b}$ $10(91)^{a}$ $83(74)$ $184(80)$ IncFIB $45(100)^{a}$ $25(96)^{a.c}$ $7(39)^{b}$ $14(82)^{c}$ $10(91)^{a.c}$ $71(63)$ $172(75)$ IncH1 $6(13)^{a}$ $3(12)^{a}$ $18(100)^{b}$ $10(59)^{c}$ $6(55)^{c}$ $30(27)$ $73(32)$ IncFIB $45(100)^{a}$ $25(96)^{a.c}$ $7(39)^{b}$ </td <td>dfrA15</td> <td>Ő</td> <td>Ő</td> <td>Ő</td> <td>õ</td> <td>0</td> <td>1 (1)</td> <td>1(0 4)</td>	dfrA15	Ő	Ő	Ő	õ	0	1 (1)	1(0 4)
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	dfrA17	35 (78) ^{a,c}	11 (42) ^b	18 (100)ª	8 (47) ^{b,c}	8 (73)	33 (30)	113 (49)
$\begin{array}{c c c c c c c c c c c c c c c c c c c $	dfrA27	0a	1 (4)	0	0	3 (27) ^b	6 (5)	10 (4)
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	dfrA5	0	ò́	0	0	0	3 (3)	3 (1)
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	dfrA7	0	1 (4)	0	0	0	Ò	1 (0.4)
$sul1$ $41 (91)^a$ $15 (58)^b$ $18 (100)^a$ $15 (88)$ $8 (73)$ $63 (56)$ $160 (70)$ $sul2$ $34 (76)^a$ $8 (31)^b$ $18 (100)^c$ $8 (47)^{a,b}$ $5 (46)^{a,b}$ $40 (36)$ $113 (49)$ $sul3$ 0 0 0 $1 (6)$ 0 $13 (12)$ $14 (6)$ $tetA$ $9 (20)^{a,c}$ $9 (35)^{a,c}$ 0^b $12 (71)^c$ $5 (46)^{a,c}$ $27 (24)$ $62 (27)$ $tetB$ $35 (78)^{a,c}$ $2 (8)^b$ $4 (22)^{b,c}$ $1 (6)^b$ $5 (46)^c$ $35 (32)$ $82 (36)$ $tetD$ 0 $1 (4)$ 0 0 0 $2 (2)$ $3 (1)$ Plasmid types $-c$ $-c$ $-c$ $-c$ $-c$ $-c$ Col-like $44 (98)^a$ $12 (46)^b$ $18 (100)^a$ $6 (35)^b$ $5 (46)^b$ $47 (42)$ $132 (58)$ IncFIA $44 (98)^a$ $16 (62)^b$ $18 (100)^a$ $4 (24)^b$ $10 (91)^a$ $83 (74)$ $184 (80)$ IncFIB $45 (100)^a$ $24 (92)^a$ $18 (100)^a$ $4 (24)^b$ $10 (91)^a$ $83 (74)$ $184 (80)$ IncFII $45 (100)^a$ $25 (96)^{a,c}$ $7 (39)^b$ $14 (82)^c$ $10 (91)^{a,c}$ $71 (63)$ $172 (75)$ IncH12 0 0 0 0 0 0 0 $172 (75)$ IncH2 $2 (4)$ $4 (15)$ 0 0 0 $13 (12)$ $19 (8)$ IncA 0 0 0 0 $14 (36)^b$ $20 (18) (26) (11)$ In	dfrA8	0	ò	0	0	0	1 (1)	1 (0.4)
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	sul1	41 (91)ª	15 (58) ^b	18 (100)ª	15 (88)	8 (73)	63 (56)	16Ò (7Ó)
su/30001160131214146tetA99935 $^{3.c}$ 012(71)^c5(46)^{a.c}27(24)62(27)tetB35(78)^{a.c}2(8)^b4(22)^{b.c}1(6)^b5(46)^c35(32)82(36)Plasmid types01400002(2)31(12)14(6)Col-like44(98)^a12(46)^b18(100)^a6(35)^b5(46)^b47(42)132(58)IncFIA44(98)^a12(46)^b18(100)^a6(35)^b5(46)^b47(42)132(58)IncFIB45(100)^a24(92)^a18(100)^a4(24)^b10(91)^a83(74)184(80)IncFIC000000010(91)^a.c71(63)172(75)Incl16(13)^a31(12)^a18(100)^b10(59)^c6(55)^c30(27)73(32)IncH120000000013(12)19(8)IncA000000013(12)19(8)IncL2(4)000	sul2	34 (76)ª	8 (31) ⁶	18 (100)°	8 (47) ^{a,b}	5 (46) ^{á,b}	40 (36)	113 (49)
tetA9 (20)^{a,b}9 (35)^{a,c}0^b12 (71)^c5 (46)^{a,c}27 (24)62 (27)tetB35 (78)^{a,c}2 (8)^b4 (22)^{b,c}1 (6)^b5 (46)^c35 (32)82 (36)tetD01 (4)0002 (2)3 (1)Plasmid types	sul3	0	0	Û	1 (6)	Û	13 (12)	14 (6)
tetB $35 (78)^{a,c}$ $2 (8)^b$ $4 (22)^{b,c}$ $1 (6)^b$ $5 (46)^c$ $35 (32)$ $82 (36)$ tetD0 $1 (4)$ 000 $2 (2)$ $3 (1)$ Plasmid types $Col-like$ $44 (98)^a$ $12 (46)^b$ $18 (100)^a$ $6 (35)^b$ $5 (46)^b$ $47 (42)$ $132 (58)$ IncFIA $44 (98)^a$ $16 (62)^b$ $18 (100)^a$ $17 (100)^a$ $9 (82)$ $39 (35)$ $143 (62)$ IncFIB $45 (100)^a$ $24 (92)^a$ $18 (100)^a$ $4 (24)^b$ $10 (91)^a$ $83 (74)$ $184 (80)$ IncFIC00000010 (9) $10 (4)$ IncFII $45 (100)^a$ $25 (96)^{a,c}$ $7 (39)^b$ $14 (82)^c$ $10 (91)^{a,c}$ $71 (63)$ $172 (75)$ Incl1 $6 (13)^a$ $3 (12)^a$ $18 (100)^b$ $10 (59)^c$ $6 (55)^c$ $30 (27)$ $73 (32)$ IncH12000002 (2) $2 (1)$ IncB/O/K/Z0 $1 (4)$ 000 $8 (7)$ $8 (3)$ IncL $2 (4)^a$ 0^a 0^a 0^a $4 (36)^b$ $20 (18)$ $26 (11)$ IncM0000 16 0 $4 (44)$ $5 (2)$ IncN $4 (9)$ $2 (8)$ 0 0^a 0^a $4 (36)^b$ $20 (18)$ $26 (11)$ IncB/O/K/Z0 $1 (4)$ 00 0^a $4 (36)^b$ $20 (18)$ $26 (11)$ IncM000	tetA	9 (20) ^{a,b}	9 (35) ^{a,c}	0 ^b	12 (71)⁰	5 (46) ^{a,c}	27 (24)	62 (27)
tetD01 (4)0002 (2)3 (1)Plasmid typesCol-like44 (98)a12 (46)b18 (100)a6 (35)b5 (46)b47 (42)132 (58)IncFIA44 (98)a16 (62)b18 (100)a17 (100)a9 (82)39 (35)143 (62)IncFIB45 (100)a24 (92)a18 (100)a4 (24)b10 (91)a83 (74)184 (80)IncFIC0000010 (9)10 (4)IncFII45 (100)a25 (96)a.c7 (39)b14 (82)c10 (91)a.c71 (63)172 (75)IncI16 (13)a3 (12)a18 (100)b10 (59)c6 (55)c30 (27)73 (32)IncH12000008 (7)8 (3)IncA000008 (7)9 (4)IncB/O/K/Z01 (4)00013 (12)19 (8)IncL2 (4)a0a0a0a4 (36)b20 (18)26 (11)IncM00004 (36)b20 (18)26 (11)IncM000001 (15)00IncN4 (9)2 (8)0001 (1)5 (2)IncQ32 (71)a0b0b0b01 (1)5 (2)IncR2 (4)2 (8)03 (18)1 (9)8 (7)16 (7)	tetB	35 (78) ^{a,c}	2 (8) ^b	4 (22) ^{b,c}	1 (6) ⁶	5 (46)°	35 (32)	82 (36)
Plasmid typesCol-like44 (98)a12 (46)b18 (100)a6 (35)b5 (46)b47 (42)132 (58)IncFIA44 (98)a16 (62)b18 (100)a17 (100)a9 (82)39 (35)143 (62)IncFIB45 (100)a24 (92)a18 (100)a4 (24)b10 (91)a83 (74)184 (80)IncFIC0000010 (9)10 (4)IncFII45 (100)a25 (96)ac7 (39)b14 (82)c10 (91)ac71 (63)172 (75)IncI16 (13)a3 (12)a18 (100)b10 (59)c6 (55)c30 (27)73 (32)IncH12000008 (7)9 (4)IncA0000013 (12)19 (8)IncC2 (4)4 (15)00013 (12)19 (8)IncL2 (4)4 (15)004 (36)b20 (18)26 (11)IncM0001 (6)04 (4)5 (2)IncN4 (9)2 (8)0001 (1)5 (2)IncQ32 (71)a0b0b0b0b1 (9)b15 (13)48 (21)IncR2 (4)2 (8)03 (18)1 (9)8 (7)16 (7)	tetD	0	1 (4)	0	0	0	2 (2)	3 (1)
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Plasmid types							
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	Col-like	44 (98) ^a	12 (46) ^b	18 (100)ª	6 (35) ^b	5 (46) ^ь	47 (42)	132 (58)
IncFIB $45 (100)^a$ $24 (92)^a$ $18 (100)^a$ $4 (24)^b$ $10 (91)^a$ $83 (74)$ $184 (80)$ IncFIC00000010 (91)^a.10 (9)10 (4)IncFII $45 (100)^a$ $25 (96)^{a,c}$ $7 (39)^b$ $14 (82)^c$ $10 (91)^{a,c}$ $71 (63)$ $172 (75)$ Inc1 $6 (13)^a$ $3 (12)^a$ $18 (100)^b$ $10 (59)^c$ $6 (55)^c$ $30 (27)$ $73 (32)$ IncH12000008 (7) $8 (3)$ IncA000002 (2)2 (1)IncB/O/K/Z01 (4)0008 (7)9 (4)IncC2 (4)4 (15)00013 (12)19 (8)IncL2 (4)^a 0^a 0^a 0^a $4 (36)^b$ 20 (18)26 (11)IncN4 (9)2 (8)004 (36)14 (13)24 (10)IncP0 $4 (15)$ 0001 (1)5 (2)IncQ $32 (71)^a$ 0^b 0^b 0^b 1 (9)^b15 (13)48 (21)IncR2 (4) $2 (8)$ 0 $3 (18)$ $1 (9)$ $8 (7)$ $16 (7)$	IncFIA	44 (98) ^a	16 (62) ^ь	18 (100)ª	17 (100)ª	9 (82)	39 (35)	143 (62)
$\begin{array}{cccccccccccccccccccccccccccccccccccc$	IncFIB	45 (100)ª	24 (92) ^a	18 (100)ª	4 (24) ^b	10 (91)ª	83 (74)	184 (80)
IncFII45 (100) ^a 25 (96) ^{a,c} 7 (39) ^o 14 (82) ^c 10 (91) ^{a,c} 71 (63)172 (75)Incl16 (13) ^a 3 (12) ^a 18 (100) ^b 10 (59) ^c 6 (55) ^c 30 (27)73 (32)IncH120000008 (7)8 (3)IncA000002 (2)2 (1)IncB/O/K/Z01 (4)0008 (7)9 (4)IncC2 (4)4 (15)00013 (12)19 (8)IncL2 (4) ^a 0 ^a 0 ^a 0 ^a 4 (36) ^b 20 (18)26 (11)IncM0001 (6)04 (4)5 (2)IncN4 (9)2 (8)0001 (1)5 (2)IncQ32 (71) ^a 0 ^b 0 ^b 0 ^b 1 (9) ^b 15 (13)48 (21)IncR2 (4)2 (8)03 (18)1 (9)8 (7)16 (7)	IncFIC	0	0	0	0	0	10 (9)	10 (4)
Incl1 $6(13)^a$ $3(12)^a$ $18(100)^b$ $10(59)^c$ $6(55)^c$ $30(27)$ $73(32)$ IncH120000008(7)8(3)IncA000002(2)2(1)IncB/O/K/Z01(4)0008(7)9(4)IncC2(4)4(15)00013(12)19(8)IncL2(4)^a0^a0^a0^a4(36)^b20(18)26(11)IncM0001(6)04(4)5(2)IncN4(9)2(8)004(36)14(13)24(10)IncP04(15)0001(1)5(2)IncQ32(71)^a0^b0^b0^b1(9)^b15(13)48(21)IncR2(4)2(8)03(18)1(9)8(7)16(7)	IncFII	45 (100)ª	25 (96) ^{a,c}	7 (39)⁰	14 (82) ^c	10 (91) ^{a,c}	71 (63)	172 (75)
IncH12000008 (7)8 (3)IncA000002 (2)2 (1)IncB/O/K/Z01 (4)0008 (7)9 (4)IncC2 (4)4 (15)00013 (12)19 (8)IncL2 (4) ^a 0 ^a 0 ^a 0 ^a 4 (36) ^b 20 (18)26 (11)IncM0001 (6)04 (4)5 (2)IncN4 (9)2 (8)004 (36)14 (13)24 (10)IncP04 (15)0001 (1)5 (2)IncQ32 (71) ^a 0 ^b 0 ^b 0 ^b 1 (9) ^b 15 (13)48 (21)IncR2 (4)2 (8)03 (18)1 (9)8 (7)16 (7)	Incl1	6 (13)ª	3 (12)ª	18 (100) [°]	10 (59)°	6 (55)°	30 (27)	73 (32)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	IncH12	0	0	0	0	0	8 (7)	8 (3)
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$		0	0	0	0	0	2 (2)	2(1)
Incc $2 (4)$ $4 (15)$ 0 0 0 0 $13 (12)$ $19 (8)$ IncL $2 (4)^a$ 0^a 0^a 0^a 0^a $4 (36)^b$ $20 (18)$ $26 (11)$ IncM 0 0 0 $1 (6)$ 0 $4 (4)$ $5 (2)$ IncN $4 (9)$ $2 (8)$ 0 0 $4 (36)^b$ $14 (13)$ $24 (10)$ IncP 0 $4 (15)$ 0 0 0 $1 (1)$ $5 (2)$ IncQ $32 (71)^a$ 0^b 0^b 0^b $1 (9)^b$ $15 (13)$ $48 (21)$ IncR $2 (4)$ $2 (8)$ 0 $3 (18)$ $1 (9)$ $8 (7)$ $16 (7)$			1 (4)	U	U	U	8 (7)	9 (4)
IncL $2 (4)^{n}$ 0^{n} 0^{n} 0^{n} $4 (36)^{n}$ $20 (18)$ $26 (11)$ IncM0001 (6)04 (4)5 (2)IncN4 (9)2 (8)004 (36)14 (13)24 (10)IncP04 (15)0001 (1)5 (2)IncQ32 (71)^{a}0^{b}0^{b}0^{b}1 (9)^{b}15 (13)48 (21)IncR2 (4)2 (8)03 (18)1 (9)8 (7)16 (7)	Incu	2(4)	4 (15)	U	U		13 (12)	19 (8)
Incluin0001 (b)04 (4)5 (2)IncN4 (9)2 (8)004 (36)14 (13)24 (10)IncP04 (15)0001 (1)5 (2)IncQ32 (71) ^a 0 ^b 0 ^b 0 ^b 1 (9) ^b 15 (13)48 (21)IncR2 (4)2 (8)03 (18)1 (9)8 (7)16 (7)	IncL	∠ (4)"	0~	0~		4 (30)	∠U (18)	20(11)
Incl $4 (9)$ $2 (0)$ 0 0 $4 (30)$ $14 (13)$ $24 (10)$ IncP0 $4 (15)$ 000 $1 (1)$ $5 (2)$ IncQ $32 (71)^a$ 0^b 0^b 0^b $1 (9)^b$ $15 (13)$ $48 (21)$ IncR $2 (4)$ $2 (8)$ 0 $3 (18)$ $1 (9)$ $8 (7)$ $16 (7)$			U 2 (9)	0	(0)	U 4 (26)	4 (4) 14 (12)	⊃ (∠) 24 (10)
Incc 0 4 (13) 0 0 0 0 1 (1) 5 (2)IncQ 32 (71) ^a 0^b 0^b 0^b 1 (9) ^b 15 (13) 48 (21)IncR 2 (4) 2 (8) 0 3 (18) 1 (9) 8 (7) 16 (7)	Incin Incin	4 (9)	∠ (0) 1 (15)	0	0	4 (30)	14 (13)	24 (10) 5 (2)
IncR $2(4)$ $2(8)$ 0 $3(18)$ $1(9)$ $8(7)$ $16(7)$		0 32 (71\a		0 ^b	0 ^b	1 (Q) ^b	15 (13)	J (∠) 48 (21)
	IncR	2 (4)	2 (8)	õ	3 (18)	1 (9)	8 (7)	16 (7)

	ST410	ST131	ST1284	ST167	ST405	Other STs [#]	All STs
Characteristic	n = 45 (%)	n = 26 (%)	n = 18 (%)	n = 17 (%)	n = 11 (%)	n = 112 (%)	n = 229 (%)
IncX1	1 (2)	1 (4)	0	0	1 (9)	5 (5)	8 (3)
IncX3	27 (60)ª	2 (8) ^b	18 (100) ^c	10 (59)ª	1 (9) ^b	23 (21)	81 (35)
IncX4	2 (4)	2 (8)	0	3 (18)	0	5 (5)	12 (5)
IncX5	0	0	0	0	0	1 (1)	1 (0.4)
IncU	0	0	0	0	0	2 (2)	2 (1)
IncY	9 (20)	0	0	0	0	12 (11)	21 (9)

QRDRs; quinolone resistance-determining regions;

^{a-d}Rates followed by different letters indicate significant differences between dominant STs at the 5% level (adjusted for multiple comparisons for each outcome);

"⁴Other STs (no) include the following: ST10 (5), ST12 (2), ST34 (1), ST38 (10), ST44 (1), ST46 (5), ST58 (2), ST69 (3), ST73 (1), ST88 (1), ST95 (4), ST127 (1), ST141 (1), ST156 (3), ST191 (1), ST205 (1), ST244 (1), ST345 (1), ST349 (1), ST357 (2), ST361 (9), ST404 (1), ST488 (4), ST538 (1), ST540 (1), ST607 (1), ST617 (4), ST624 (1), ST635 (1), ST648 (8), ST973 (1), ST1148 (1), ST1193 (2), ST1196 (1), ST1431 (1), ST1434 (1), ST1470 (1), ST1487 (1), ST1722 (1), ST2003 (2), ST2083 (2), ST2172 (1), ST2279 (1), ST3580 (1), ST4553 (1), ST5229 (1), ST6802 (1), ST11260 (6);

³ T1200 (0), * Other β-lactamases (no) include the following: OXA-1 (66), OXA-9 (11), OXA-10 (5), CMY-2 (40), CMY-4 (4), CMY-6 (4), CMY-16 (1), CMY-42 (30), CMY-146 (1), CTX-M-3 (2), CTX-M-8 (1), CTX-M-9 (1), CTX-M-14 (8), CTX-M-15 (103), CTX-M-24 (12), CTX-M-27 (6), CTX-M-55 (8), CTX-M-196 (1), TEM-33 (1), TEM-35 (1), TEM-52 (1), TEM-143 (1).

Appendix Table 2.	Virulence profiles	associated with	dominant S	Sequence 1	Types a	mong carbap	enemase-p	oroducing E	scherichia
coli									

	ST410	ST131	ST1284	ST167	ST405	Other STs [#]	All STs
Characteristic	n = 45 (%)	n = 26 (%)	n = 18 (%)	n = 17 (%)	n = 11 (%)	n = 112 (%)	n = 229 (%)
Adhesions							
papA	0 ^a	21 (81) ^b	0 ^a	0 ^a	4 (36) ^c	24 (21)	49 (21)
papC	1 (2)ª	10 (38) ^b	0 ^a	0 ^a	2 (18)	20 (18)	33 (14)
iha	0ª	20 (77) ^b	0 ^a	0 ^a	0ª	18 (16)	38 (17)
fimH	45 (100)	26 (100)	18 (100)	17 (100)	11 (100)	112 (100)	229 (100)
tsh	Û	Û	Û	Û	Û	4 (4)	4 (2)
hra	11 (24)ª	14 (54) ^b	0 ^c	15 (88) ^d	9 (82) ^{b,d}	40 (36)	89 (39)
afaABCD	Ò ^a	5 (Ì9) ⁶	0	Ò	`O´	15 (13)	20 (9)
draABCDP	0	`0 ´	0	0	0	Ò	0 ´
Toxins							
hlyA	1 (2)	0	0	0	0	23 (21)	24 (10)
sat	0ª	21 (81) ^b	0 ^a	0 ^a	0 ^a	17 (15)	38 (17)
vat	0	Ò	0	0	0	15 (13)	15 (7)
astA	0 ^a	2 (8)ª	18 (100) ^b	0 ^a	0ª	13 (12)	33 (14)
cnf1	0 ^a	7 (27) ^b	О ^а	0 ^a	0	5 (4)	12 (5)
Siderophores		()					
iroN	1 (2)	0	0	0	0	27 (24)	28 (12)
fyuA	15 (33́)ª	26 (100) ^b	0°	9 (53) ^a	11 (100) ^b	64 (57)	125 (55)
ireA	Ò	1 (4)	0	Û	0	9 (8)	10 (4)
iutA	7 (16)ª	20 (77) ^b	18 (100) ^b	4 (24) ^a	3 (27) ^a	48 (43)	100 (44)
Capsular antigen	. ,		. ,		. ,		
kpsM II	0 ^a	18 (69) ^b	0 ^a	0 ^a	7 (64) ^b	36 (32)	61 (27)
kpsMT III	0 ^a	Òª	0 ^a	0 ^a	4 (36) ^b	1 (1)	5 (2)
Miscellaneous					. ,		. ,
usp	0 ^a	26 (100) ^b	0 ^a	0 ^a	0 ^a	23 (21)	49 (21)
traT	8 (18)ª	24 (92) ^b	18 (100) ^b	15 (88) ^b	10 (91) ^b	71 (63)	146 (64)
ompT	1 (2) ^a	26 (100) ^b	0ª	2 (12) ^a	0ª	48 (43)	77 (34)
iss	3 (7) ^a	25 (96) ^b	18 (100) ^b	17 (100) ^b	0 ^a	56 (50)	119 (52)
malX	0ª	26 (100) ^b	0ª	0ª	0 ^a	16 (14)	42 (18)
cdtB	0	`O	0	0	0	ò	ò
cvaC	1 (2)	0	0	0	1 (9)	20 (18)	22 (10)
ibeABC	Ò	0	0	0	Ò	11 (10)	11 (5)
Virulence scores*	2 (1–7) ^a	11 (8–15) ^b	5 (5–5)°	5 (4–6) ^c	5 (3–7) ^c	6 (1–16)	5 (1–16)

papAC, genes of P fimbriae operon; *iha*, iron-regulated adhesin; *fimH*, type-1 fimbriae; *tsh*, temperature sensitive hemagglutinin; *hra*, heat-resistant agglutinin, *afa*, afimbrial adhesin; *dra*, Dr binding adhesins; *hlyA*, α-hemolysin; *sat*, secreted autotransporter toxin; *vat*, vacuolating autotransporter toxin; *astA*, enteroaggregative *E*. *coli* toxin; *cnf1*, cytotoxic necrotizing factor; *iroN*, salmochelin (siderophore) receptor; *fyuA*, yersiniabactin (siderophore) receptor; *ireA*, iron-regulated element (catecholate siderophore); *iutA*, aerobactin (siderophore) receptor; *treA*, iron-regulated element (catecholate siderophore); *iutA*, aerobactin (siderophore) receptor; *treA*, inon-regulated element (catecholate siderophore); *iutA*, aerobactin (siderophore) receptor; *ireA*, inon-regulated element (catecholate siderophore); *iutA*, aerobactin (siderophore) receptor; *ireA*, ison-regulated element (catecholate siderophore); *iutA*, aerobactin (siderophore) receptor; *ireA*, inon-regulated element; *syp*, uropathogenic-specific protein; *traT*, complement inhibition protein; *ompT*, outer membrane protein T; *iss*, increased serum survival; *malX*, pathogenicity island marker; *cdtB*, cytolethal distending toxin B; *cvaC*, factor facilitating colonization; *ibeABC*, invasion of brain endothelium;

^{a-d}Rates followed by different letters indicate significant differences between dominant STs at the 5% level (adjusted for multiple comparisons for each outcome);

*The virulence gene score was the number of virulence operons detected (median; range).

