

Supplementary materials

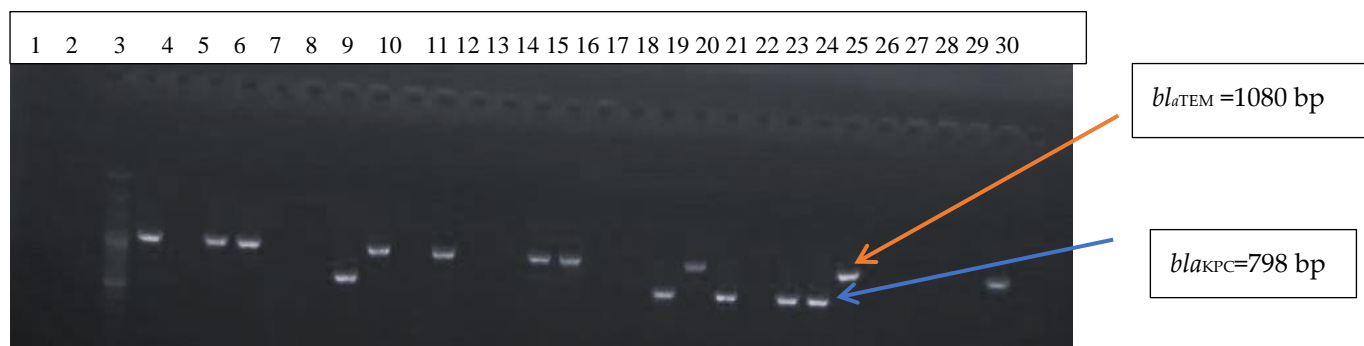


Figure S1. Electrophoresis gel for *bla*_{TEM} (1080 bp) and *bla*_{KPC} (798 bp) genes detection in *K. pneumoniae* strains. Lines: 1-Molecular Size Marker (ThermoScientific, 1500 bp); 2- strain 1; 3- 3; 4- 8; 5- 11; 6- 12; 7- 13; 8- 14; 9- 15; 10- 17; 11- 19; 12- 21; 13- 24; 14- 25; 15- 26; 16- 27; 17- 28; 18- 29; 19- 30; 20- 34; 21- 37; 22- 38; 23- *K. pneumoniae* positive control (for *bla*_{KPC}); 24- 47; 25- 48; 26- 49; 27- 50; 28- 51; 29- *K. pneumoniae* positive control (for *bla*_{TEM}); 30- 106. Positive strains for *bla*_{TEM} gene- 1; 8; 11; 15; 19; 25; 26; 30; 47; positive control. Positive strains for *bla*_{KPC} gene- 14; 29; 34; 38; positive control.

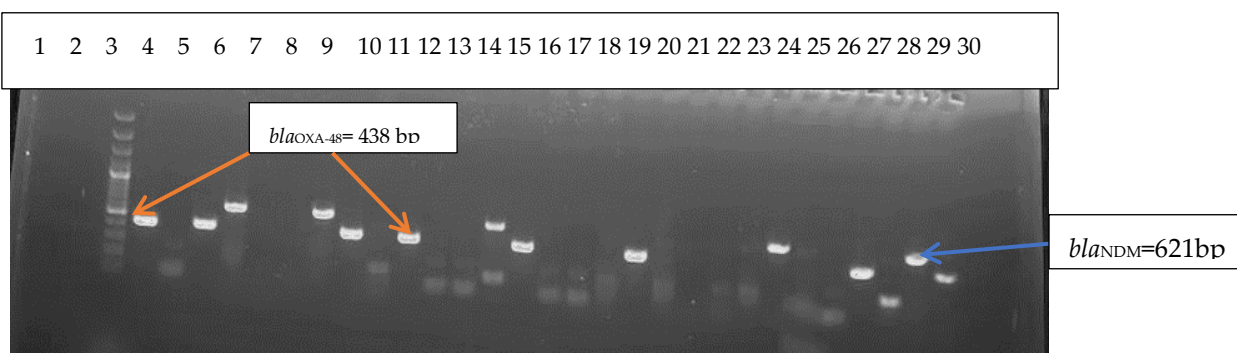


Figure S2. Electrophoresis gel for *bla*_{OXA-48} (438 bp) and *bla*_{NDM} (621 bp) genes detection in *K. pneumoniae* strains. Lines: 1- Molecular Size Marker (ThermoScientific, 1500 bp); 2- strain 1; 3- 3; 4- 8; 5- 11; 6- 12; 7- 13; 8- 14; 9- 15; 10- 17; 11- 19; 12- 21; 13- 24; 14- 25; 15- 26; 16- 27; 17- 28; 18- 29; 19- 30; 20- 34; 21- 37; 22- 38; 23- 43; 24- 47; 25- 48; 26- positive control (for *bla*_{OXA-48} gene); 27- 50; 28- positive control (for *bla*_{NDM} gene); 29- 52; 30- 106. Positive strains for *bla*_{NDM} gene- 11; 14; 25; 43; positive control. Positive strains for *bla*_{OXA-48} gene- 1; 8; 15; 17; positive control; 29; 52.

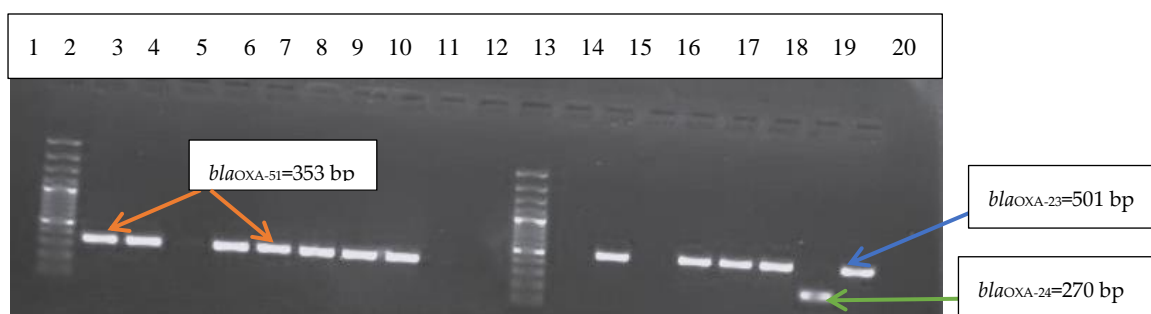


Figure S3. Electrophoresis gel for *bla*_{OXA-51} (346 bp), *bla*_{OXA-23} (501 bp) and *bla*_{OXA-24} (242 bp) genes detection in *A. baumannii* strains. Lines: 1- Molecular Size Marker (ThermoScientific, 1500 bp); 2- strain *A. baumannii* positive control for

*bla*_{OXA-51} gene ; 3- 3A51; 4- 17A51; 5- 21 A51; 6- 24 A51; 7- 27 A51; 8- 28 A51; 9- 49A; 10- 35S (negative control); 11- 51; 12- Molecular Size Marker (ThermoScientific, 1500 bp) ; 13- Acc; 14- *A. baumannii* positive control (for *bla*_{OXA-23}); 15- 17A3; 16- 21A3; 17- 24A3; 18- 27 A3; 19- *A. baumannii* positive control (for *bla*_{OXA-24}); 20- 49 A3. Positive strains for *bla*_{OXA-51} - positive control; 3A51; 21 A51; 24 A51; 27 A51; 28 A51; 49 A. Positive strains for *bla*_{OXA-23}- positive control; 21A3; 24A3; 27 A3; 49A3. Positive strains for *bla*_{OXA-24}- positive control.

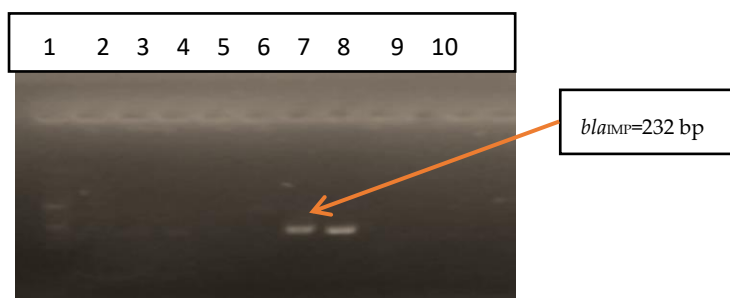


Figure S4. Electrophoresis gel for *bla*_{IMP} gene (232 bp) detection in *P. aeruginosa* strains. Lines: 1-Molecular Size Marker (ThermoScientific, 1500 bp); 2- strain 12; 3- 37; 4- 81; 5- 82; 6- 88; 7- 92; 8- *P. aeruginosa* positive control for *bla*_{IMP} gene; 9-98; 10- negativ control for *bla*_{IMP} gene. Positive strains for *bla*_{IMP} gene- 92; positive control.

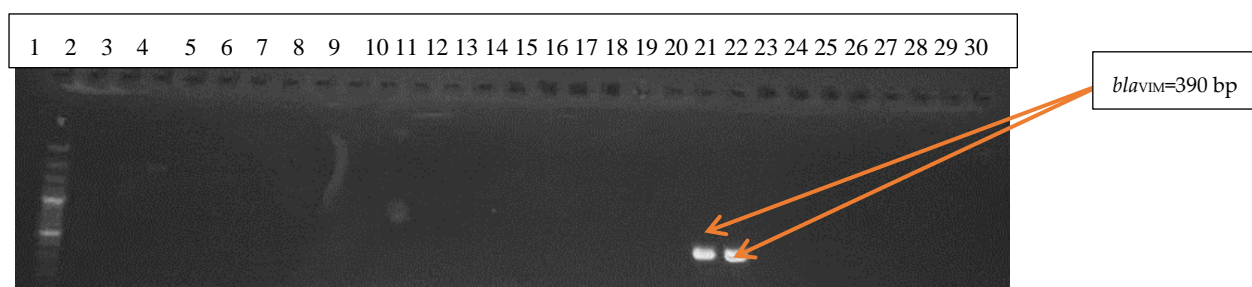


Figure S5. Electrophoresis gel for *bla*_{VIMlike} (390 bp) gene detection: one strain of *P. aeruginosa* encoded 81 was positive and the positive control. Lines: 1- Molecular Size Marker (ThermoScientific, 1500 bp); 2- strain 105; 3- 107; 4- 110; 5- 97; 6- 98; 7- 100; 8- 64; 9- 66; 10- 72; 11- 112; 12- 54; 13- 59; 14- 60; 15- 61; 16- 67; 17- 35; 18- Acc; 19- 78; 20- 79; 21- 81; 22- *P. aeruginosa* positive control for *bla*_{VIMlike} gene; 23- 88; 24- 92; 25- 94; 26- 95; 27- 86; 28- PSB; 29- SA; 30- negativ control.

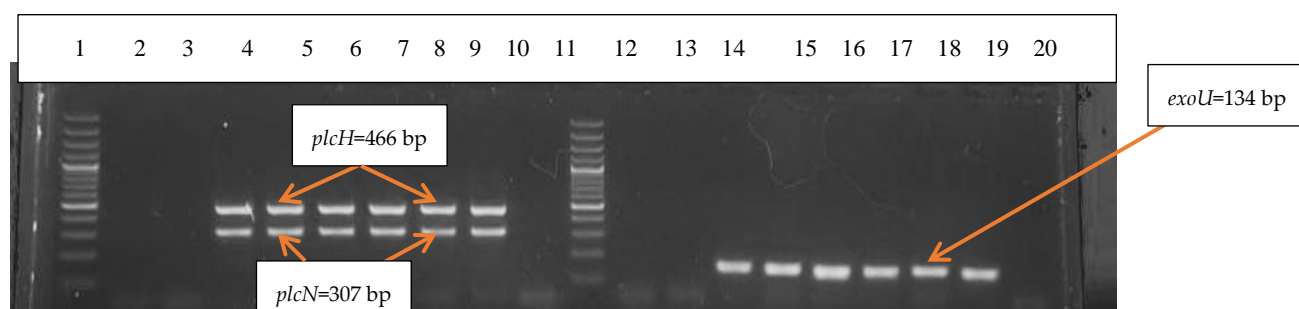


Figure S6. Electrophoresis gel for *plcN* (307 bp), *plcH* (466 bp), *exoU* (134 bp) and *exoT* (152 bp) genes detection in *P. aeruginosa* strains. Lines: 1- Molecular Size Marker (ThermoScientific, 1500 bp); 2 – strain 12; 3- 37; 4- 81; 5- 82; 6- 88; 7- 92; 8- 98; 9- *P. aeruginosa* positive control for *plcH* and *plcN* genes; 10- negativ control for *plcH* and *plcN* genes; 11- Molecular Size Marker (ThermoScientific, 1500 bp); 12- 12; 13- 37; 14- 81; 15- 82; 16- 88; 17- 92; 18- 98; 19- *P. aeruginosa* positive control for *exoU* gene; 20- negativ control for *exoU* gene. Positive strains for *plcH/N* genes- 81; 82; 88; 92; 98; positive control. Positive strains for *exoU* gene- 81; 82; 88; 92; 98; positive control.

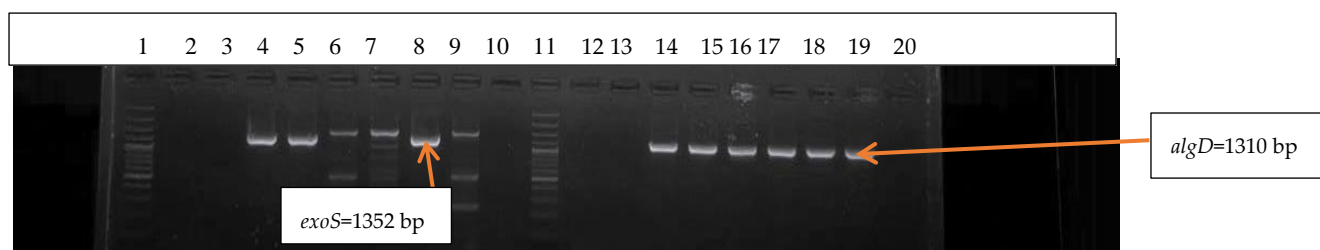


Figure S7. Electrophoresis gel for *exoS* (1352 bp) and *algD* (1310 bp) genes detection in *P. aeruginosa* strains. Lines: 1- Molecular Size Marker (ThermoScientific, 1500 bp); 2- strain 12; 3- 37; 4- 81; 5- 82; 6- 88; 7- 92; 8- *P. aeruginosa* positive control for *exoS* gene; 9- PsB; 10- negative control for *exoS* gene; 11- Molecular Size Marker (ThermoScientific, 1500 bp); 12- 12; 13- 37; 14- 81; 15- 82; 16- 88; 17- 92; 18- 98; 19- *P. aeruginosa* positive control for *algD* gene; 20- negative control for *algD* gene. Positive strains for *exoS* gene- 81; 82; positive control. Positive strains for *algD* gene- 81; 82; 88; 92; 98; positive control.

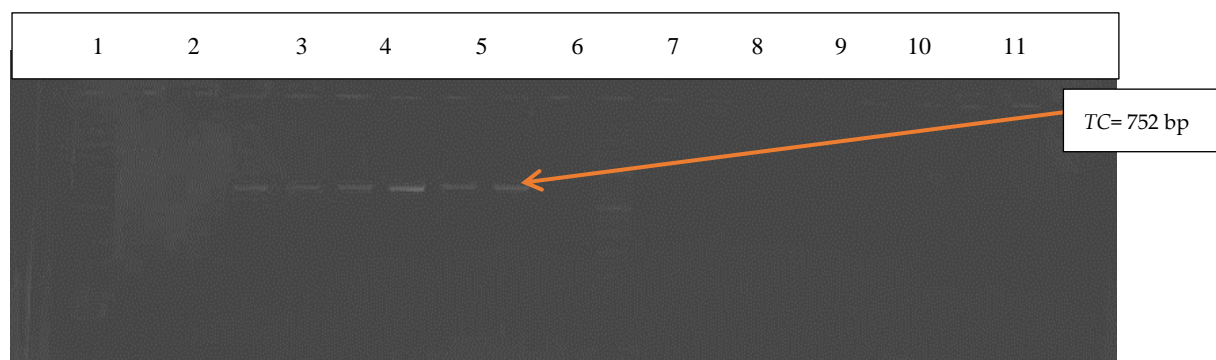


Figure S8. Electrophoresis gel for *TC* gene (752 bp) detection in *P. aeruginosa* strains. Lines: 1- Molecular Size Marker (ThermoScientific, 1500 bp); 2- strain 37; 3- 81; 4- 82; 5- 88; 6- 92; 7- 98; 8- 98; 9- *P. aeruginosa* positive control for *TC* gene; 10- negative control for *TC* gene; 11- Molecular Size Marker (ThermoScientific, 1500 bp). Positive strains for *TC* gene- 81; 82; 88; 92; 98; positive control.

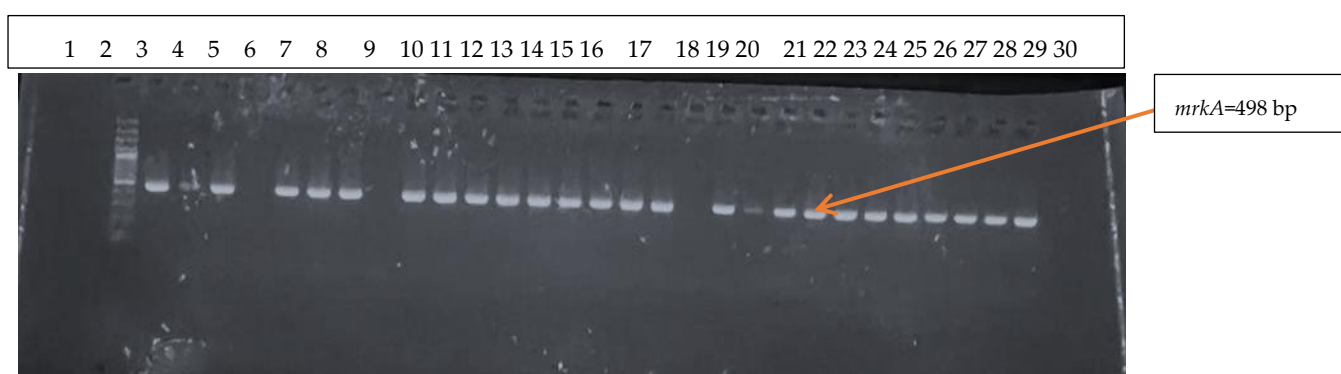


Figure S9. Electrophoresis gel for *mrkA* (498 bp) and *mrkD* (756 bp) genes detection in *K. pneumoniae* strains. Lines: 1- Molecular Size Marker (ThermoScientific, 1500 bp); 2- strain 1; 3- 8; 4- 11; 5- 13; 6- 14; 7- 15; 8- 19; 9- 25; 10- 26; 11- 29; 12- 34; 13- 38; 14- 43; 15- 47; 16- 49; 17- 50; 18- 51; 19- 52; 20- 54; 21- 59; 22- 60; 23- 61; 24- 64; 25- 66; 26- 72; 27- 76; 28- 78; 29- 79; 30- *K. pneumoniae* positive control for *mrkA* gene. Positive strains for *mrkA* gene- 1; 8; 11; 14; 15; 19; 26; 29; 34; 38; 43; 47; 49; 50; 51; 54; 59; 60; 61; 64; 66; 72; 76; 78; 79; positive control. All strains are negative for *mrkD* gene.

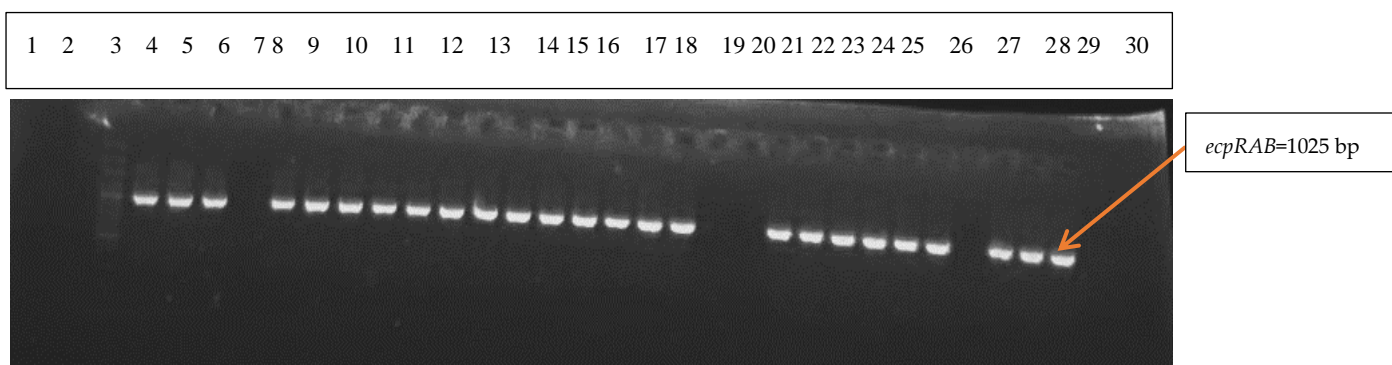


Figure S10. Electrophoresis gel for *ecpRAB* (1025 bp) gene detection in *K. pneumoniae* strains. Lines: 1- Molecular Size Marker (ThermoScientific, 1500 bp); 2- strain 1; 3- 8; 4- 11; 5- 13; 6- 14; 7- 15; 8- 19; 9- 25; 10- 26; 11- 29; 12- 30; 13- 34; 14- 38; 15- 43; 16- 47; 17- 48; 18- 50; 19- 51; 20- 52; 21- 54; 22- 59; 23- 60; 24- 61; 25- 69; 26- 66; 27- 72; 28- 76; 29- 78; 30- *K. pneumoniae* positive control for *ecpRAB* gene. Positive strains for *ecpRAB* gene- 1;8; 11; 13; 15; 19; 25; 26; 29; 30; 34; 38; 43; 47; 48; 50; 54; 59; 60; 61; 69; 66; 76; 78; positive control.



Figure S11. Electrophoresis gel for *fimA* (500 bp) gene detection in *K. pneumoniae* strains. Lines: 1- Molecular Size Marker (ThermoScientific, 1500 bp); 2- strain 1; 3- 8; 4- 11; 5- 13; 6- 14; 7- 15; 8- 19; 9- 25; 10- 26; 11- 29; 12- 30; 13- 34; 14- 38; 15- 43; 16- 47; 17- 48; 18- 50; 19- 51; 20- 52; 21- 54; 22- 59; 23- 60; 24- 61; 25- 64; 26- 66; 27- *K. pneumoniae* positive control for *fimA* gene; 28- 76; 29- 78; 30- 79. Positive strains for *fimA* gene- 1; 8; 11; 15; 29; 34; 38; 43; 47; 52; 54; 59; 61; 66; positive control.

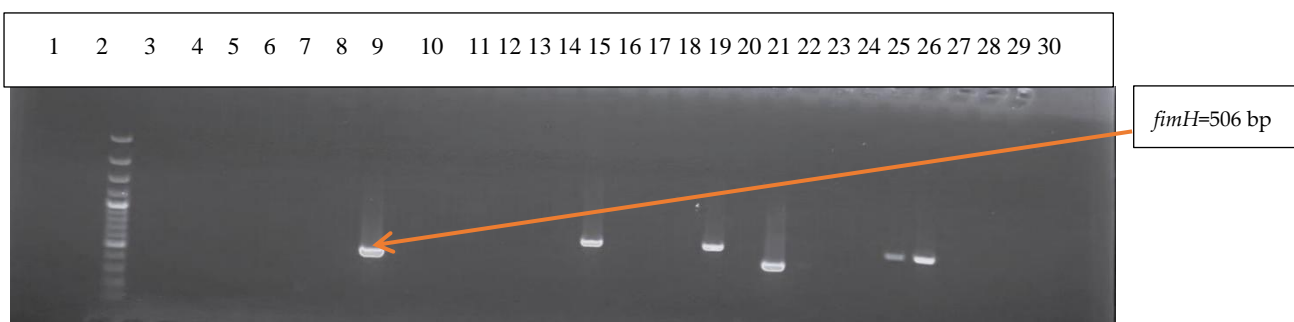


Figure S12. Electrophoresis gel for *fimH* (506 bp) gene detection in *K. pneumoniae* strains. Lines: 1- Molecular Size Marker (ThermoScientific, 1500 bp); 2- strain 1; 3- 8; 4- 11; 5- 13; 6- 14; 7- 15; 8-19; 9- 25; 10- 26; 11- 29; 12- 30; 13- 34; 14-

38; 15- 43; 16- 47; 17- 48; 18- 50; 19- 51; 20- 52; 21- 54; 22- *K. pneumoniae* positive control for *fimH* gene; 23- 60; 24- 61; 25- 64; 26-66; 27- 72; 28- 76; 29- 78; 30- 79. Positive strains for *fimH* gene- 25; positive control.

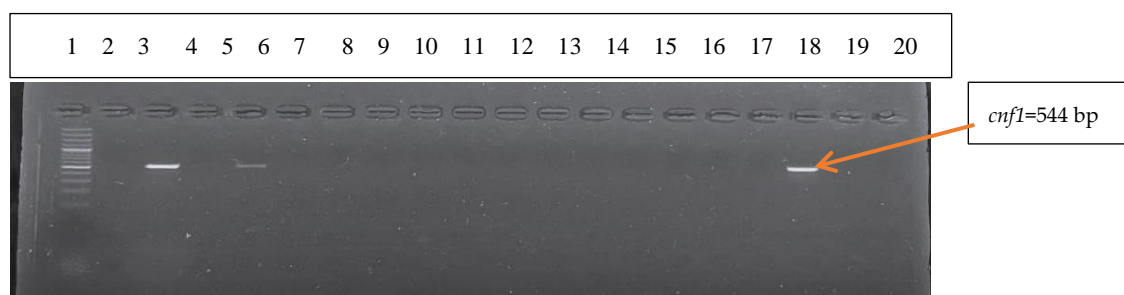


Figure S13. Electrophoresis gel for *cnf1* (544bp) gene detection in *K. pneumoniae* strains. Lines: 1- Molecular Size Marker (ThermoScientific, 1500 bp); 2- strain 54; 3- 59; 4- 60; 5- 61; 6- 64; 7- 66; 8- 72; 9- 76; 10- 78; 11- 79; 12- 86; 13- 94; 14- 95; 15- 97; 16- 100; 17- 105; 18- *K. pneumoniae* positive strain for *cnf1* gene; 19-107; 20- 110. Positive strains for *cnf1* gene - 59; positive control.

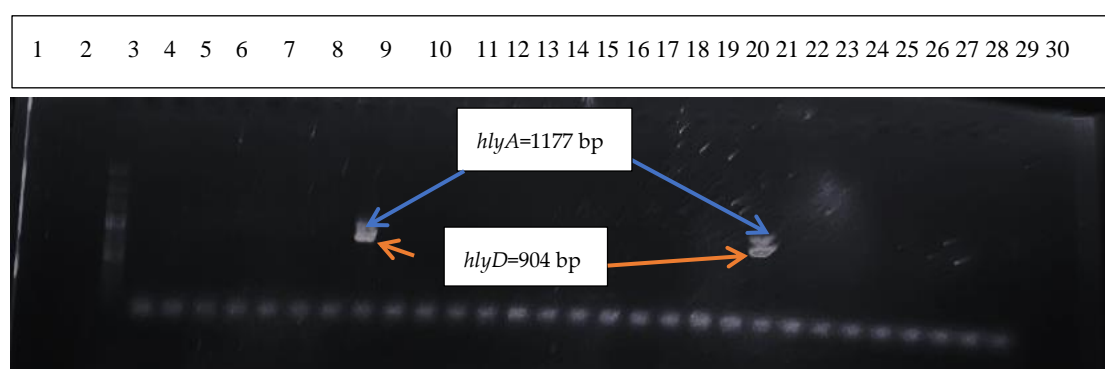


Figure S14. Electrophoresis gel for *hlyA* (1177 bp) and *hlyD* (904 bp) genes detection in *K. pneumoniae* strains. Lines: 1- Molecular Size Marker (ThermoScientific, 1500 bp); 2- strain 8; 3- 11; 4- 13; 5- 14; 6- 15; 7- 19; 8- 25; 9- 26; 10- 29; 11- 30; 12- 34; 13- 38; 14- 43; 15- 47; 16- 48; 17- 50; 18- 51; 19- 51; 20- 54; 21- 59; 22- *K. pneumoniae* positive control for *hlyA* and *hlyD* genes; 23- 60; 24- 64; 25- 66; 26- 72; 27- 76; 28- 78; 29- 79; 30- 86. Positive strains for *hlyA* and *hlyD* genes – 26; positive control.

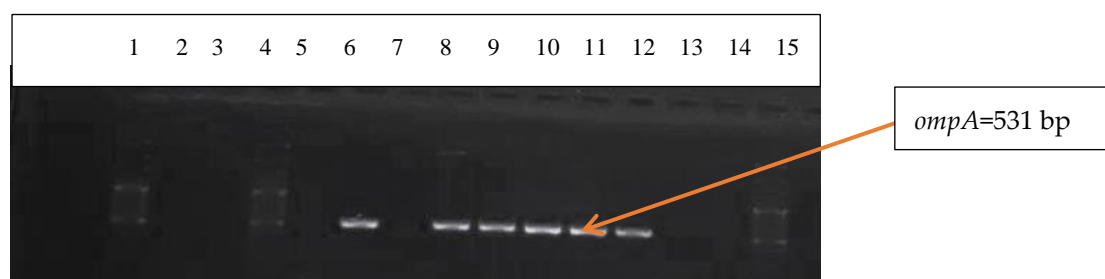


Figure S15. Electrophoresis gel for *ompA* (531 bp) gene detection in *A. baumannii* strains. Lines: 1- Molecular Size Marker (ThermoScientific, 1500 bp); 2- strain 35; 3- 23; 4- Molecular Size Marker (ThermoScientific, 1500 bp) ; 5- Acc; 6- *A. baumannii* positive control for *ompA* gene; 7- 17; 8- 21; 9- 24; 10- 27; 11- 28; 12- 49; 13- 35; 14- negative control; 15- Molecular Size Marker (ThermoScientific, 1500 bp). Positive strains for *OmpA* gene– positive control; 21; 24; 27; 28; 49.

Table S1. The resistance pattern of the isolated strains.

Microorganism	Source of isolation	Resistance to FQ, Carbapenems, Third generation Cephalosporins (% from total strains)	Resistance to TZP (% from total strains)	Resistance to AG (% from total strains)	Resistance to CZA (% from total strains)	Resistance to SXT (% from total strains)
<i>K. pneumoniae</i>	Urine	100	100	13.7 (AK)/ 21.6 (G)	9.8	41.2
	Blood culture	100	100	5.9 (AK)/ 11.8 (G)	5.9	11.8
	Other*	100	100	10 (AK)/ 11.9 (G)	2	21.6
<i>Acinetobacter</i> spp.	Urine	100	100	100		9.1
	Blood culture	100	100	100	NA	18.2
	Other*	100	100	100		27.3
<i>P. aeruginosa</i>	Urine	100	20	100	0	
	Blood culture	100	10	100	0	NA
	Other*	100	0	100	0	

*Biological fluids, wounds, endotracheal secretions, stool cultures, rectal swabs
Abbreviations- FQ= fluoroquinolones, TZP=Piperacillin/tazobactam, AG= Aminoglycosides, SXT= Trimethoprim/sulfamethoxazole, AK=Amikacin, G=Gentamycin, NA=not applicable (no strain was tested for this antibiotic)

Table S2. Virulence and β -lactamase encoding genes.

[illegible]

<i>bla_{OXA-51}</i>	3(100)	3(100)	0	1(100)	1(100)	1(100)	1(100)	0	0	0.088
<i>bla_{OXA-23}</i>	0	3(100)	0	1(100)	1(100)	1(100)	1(100)	0	0	0.088
<i>bla_{OXA-24}</i>	1(33.3)	0	0	0	0	0	0	0	0	0.817
<i>ompA</i>	3(100)	3(100)	0	1(100)	1(100)	1(100)	1(100)	0	0	0.088

* N= number of isolates with a virulence gene or resistance gene. Percentages were calculated considering the total number of samples of a specific strain encountered in each isolation source. ** P-values reflected the significance between the differences in distribution of a virulence gene or resistance gene over the source types. Every p-value was obtained using a chi-test and only those values < 0.05 were considered significant. Abbreviation- NA=not applicable.