

Supplementary Table S1. Oligonucleotides used in this study.

Oligonucleotide name	Primer sequence 5'→3'	Amplicon size (bp)	Anneling temperature (°C)	Reference
<i>Pseudomonas</i> sp., detection				
PA-GS	GACGGGTGAGTAATGCCTA CACTGGTGTTCCCTTCCTATA	618	51	[33]
Carbapenemase-encoding genes				
<i>bla</i> _{OXA-48}	ATTATCGGAATGCCTGCGGT CGTCGAGCCAGAAACTGTCT	427	53	This study
<i>bla</i> _{VIM}	GATGGTGTTTGGTCGCATA CGAATGCGCAGCACCAG	389	53	This study
<i>bla</i> _{OXA-51}	TTTTGGCTGGTGGGTCCTTT GAGGCTGAACAACCCATCCA	223	53	This study
<i>bla</i> _{NDM}	ATATTATGCACCCGGTCGCG TCATCAGATCATGCTGGCC	720	53	This study
<i>bla</i> _{KPC}	GCCGTCTAGTTCTGCTGTCT CGCTGTGCTTGTATCCTTG	800	55	This study
<i>bla</i> _{OXA-1}	GCAGCGCCAGTGCATCAAC CCGCATCAAATGCCATAAGTG	420	51	[37]
<i>bla</i> _{OXA-23}	TTCTGGTTGTACGGTTCAGCA TGCCCAACCAGTCTTTCCAA	600	53	This study
<i>bla</i> _{IMP}	TCACTTGGTTTGTGGAGCGT TTTGCGTCACCCAAATTGCC	336	54	This study
<i>bla</i> _{GES}	CTCAGATCGGTGTTGCGATC TGTATCTCTGAGGTCGCCAG	416	53	[38]
Plasmid-mediated quinolone resistance genes				
<i>qnrA</i>	TCAGCAAGAGGATTCTCA GGCAGCACTATTACTCCA	605	46	[41]
<i>qnrB</i>	GATCGTGAAAGCCAGAAAGG ACGATGCCTGGTAGTTGTCC	469	51	[40]
<i>qnrC</i>	GGGTTGTACATTTATTGAATC TCCACTTTACGAGGTTCT	447	46	[41]
<i>qnrS</i>	ACGACATTCGTCAACTGCAA TAAATTGGCACCCTGTAGGC	417	51	[40]
<i>qnrD</i>	CGAGATCAATTTACGGGAATA AACAAGCTGAAGCGCCTG	582	51	[42]
<i>aac</i> -(6')-Ib	TTGCGATGCTCTATGAGTGGCTA CTCGAATGCCTGGCGTGGT	482	55	[43]
<i>oqxA</i>	GACAGCGTCGCACAGAATG GGAGACGAGGTTGGTATGGA	339	55	[44]
Plasmid-mediated colistin resistance				
<i>mcr-1</i>	GCAACCAAGCCTGATATGCG GCTTAAAATACGCAGGCCCG	519	55	This study

Supplementary Table S2. Breakpoint values of the antimicrobial agents used in this study.

Antimicrobial group	Antimicrobial agent	*MIC breakpoints (µg/mL)		
		S	I	R
Beta-lactam combination agents	Piperacillin-tazobactam	≤ 16/4	32/64-4	≥ 128/4
Cephalosporins	Ceftazidime	≤ 8	16	≥ 32
	Cefepime	≤ 8	16	≥ 32
	Ceftriaxone	≤ 8	16	≥ 32
Carbapenems	Doripenem	≤ 2	4	≥ 8
	Imipenem	≤ 2	4	≥ 8
	Meropenem	≤ 2	4	≥ 8
Lipopeptides	Colistin	≤ 0.5	≤ 2	≥ 4
Aminoglycosides	Gentamicin	≤ 4	8	≥ 16
	Amikacin	≤ 16	32	≥ 64
Fluoroquinolones	Ciprofloxacin	≤ 0.5	1	≥ 2
Glycylcycline	Tigecycline	≤ 2	4	≥ 8

*MIC values are based on the CLSI document M100-ED30 [34].

Supplementary Table S3. Antimicrobial susceptibility of carbapenem-resistant *P. aeruginosa* isolates.

Strain ID	CIP	IMI	MEM	DOR	COL	TG	TZP	CEF	CAZ	CRO	AMK	GEN
PHH1	≥ 4	≥ 16	≥ 16	≥ 8	2	≥ 8	16	4	4	≥ 64	≤ 2	2
PHH2	2	≥ 16	≥ 16	≥ 8	Nd	≥ 8	16	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH3	≥ 4	Nd	≥ 16	Nd	2	Nd	Nd	32	≥ 64	≥ 64	≥ 64	≥ 16
PHH4	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	≥ 128	32	≥ 64	≥ 64	4	≥ 16
PHH5	≥ 4	Nd	≥ 16	≥ 8	≤ 0.5	≥ 8	Nd	32	≥ 64	≥ 64	≥ 64	≥ 16
PHH6	≤ 0.25	8	Nd	≥ 8	2	≥ 8	≥ 128	8	32	≥ 64	4	≤ 1
PHH7	≥ 4	≥ 16	≥ 16	≥ 8	2	≥ 8	64	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH8	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	≥ 128	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH9	≥ 4	≥ 16	8	≥ 8	2	≥ 8	≥ 128	4	4	≥ 64	≥ 64	8
PHH10	0.5	≥ 16	≥ 16	≥ 8	1	≥ 8	32	8	8	≥ 64	≤ 2	≤ 1
PHH11	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	64	16	16	≥ 64	8	8
PHH12	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	32	16	16	≥ 64	8	8
PHH13	0.5	≥ 16	≥ 16	≥ 8	≥ 16	≥ 8	≥ 128	8	32	≥ 64	≤ 2	≤ 1
PHH14	≥ 4	Nd	≥ 16	Nd	Nd	Nd	Nd	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH15	≥ 4	≥ 16	≥ 16	≥ 8	2	≥ 8	≥ 128	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH16	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	≥ 128	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH17	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	≥ 128	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH18	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	16	8	32	≥ 64	≥ 64	≥ 16
PHH19	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	≥ 128	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH20	≥ 4	≥ 16	≥ 16	≥ 8	Nd	≥ 8	≥ 128	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH21	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	≥ 128	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH22	> 2	> 4	> 8	Nd	Nd	Nd	> 64	>16	> 16	> 32	≥ 32	> 8
PHH23	0.5	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	32	8	16	≥ 64	4	≤ 1
PHH24	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	Nd	≥ 128	≥ 64	≥ 64	Nd	≥ 64	≥ 16
PHH25	≥ 4	Nd	≥ 16	Nd	Nd	Nd	Nd	≥ 64	≥ 64	Nd	≥ 64	≥ 16
PHH26	0.5	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	32	8	16	Nd	≤ 2	≤ 1
PHH27	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	32	≥ 64	≥ 64	≥ 64	≥ 64	4
PHH28	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	≥ 128	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH29	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	≥ 128	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH30	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	≥ 128	≥ 64	Nd	≥ 64	≥ 64	≥ 16
PHH31	≥ 4	Nd	≥ 16	Nd	Nd	Nd	Nd	≥ 64	Nd	≥ 64	≥ 64	≥ 16
PHH32	2	Nd	≥ 16	Nd	Nd	Nd	Nd	8	Nd	≥ 64	≤ 2	≤ 1
PHH33	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	Nd	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH34	≥ 4	≥ 16	≥ 16	≥ 8	≤ 1	≥ 8	≥ 128	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH35	≥ 4	Nd	≥ 16	Nd	2	Nd	Nd	32	≥ 64	≥ 64	≥ 64	≥ 16
PHH36	≥ 4	≥ 16	≥ 16	≥ 8	2	≥ 8	≥ 128	32	≥ 64	≥ 64	≥ 64	≥ 16
PHH37	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	≥ 128	32	≥ 64	≥ 64	≥ 64	≥ 16
PHH38	0.5	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	Nd	8	4	≥ 64	≤ 2	3
PHH39	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	64	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH40	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	Nd	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16

CIP: ciprofloxacin, IMI: imipenem, MEM: meropenem, DOR: doripenem, COL: colistin, TG: tigecycline, TZP: peracillin/tazobactam, CEF: cefepime, CAZ: ceftazidime, CRO: ceftriaxone, AMK: amikacin, GEN: gentamicin; Nd: non-determined.

Supplementary Table S3. Antimicrobial susceptibility of carbapenem-resistant *P. aeruginosa* strains (continuation).

Strain ID	CIP	IMI	MEM	DOR	COL	TG	TZP	CEF	CAZ	CRO	AMK	GEN
PHH41	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	Nd	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH42	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	≥ 128	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH43	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	≥ 128	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH44	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	Nd	≥ 128	32	Nd	≥ 64	≥ 64	≥ 16
PHH45	≥ 4	Nd	≥ 16	Nd	Nd	Nd	Nd	16	32	≥ 64	≥ 64	≥ 16
PHH48	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	≥ 128	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH49	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	Nd	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH50	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	≥ 128	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH51	≥ 4	≥ 16	≥ 16	≥ 8	1	≥ 8	≥ 128	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH52	≥ 4	≥ 16	≥ 16	≥ 8	4	≥ 8	≥ 128	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16
PHH53	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	≥ 128	≥ 64	≥ 64	≥ 64	4	8
PHH54	≥ 4	≥ 16	≥ 16	≥ 8	≤ 0.5	≥ 8	≥ 128	≥ 64	≥ 64	≥ 64	≥ 64	≥ 16

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Supplementary Table S4. Carbapenemase-encoding and Plasmid-mediated quinolone resistant genes in *P. aeruginosa*.

ID	CIP-MIC values (µg/mL)	CIP-susceptibility interpretation	Carbapenemase-encoding genes			PMQR genes			PMCR
			MBL	OXA	SBL	Qnr variants	Efflux pumps	Aminoglycoside variant	<i>mcr-1</i>
PHH1	≥ 4	R	<i>bla_{IMP}</i>	<i>bla_{OXA-51}</i>		<i>qnrC</i>	<i>oqxA</i>	<i>aac</i> -(6')-Ib	
PHH2	2	R		<i>bla_{OXA-51}</i>				<i>aac</i> -(6')-Ib	
PHH3	≥ 4	R		<i>bla_{OXA-51}</i>			<i>oqxA</i>		
PHH4	≥ 4	R		<i>bla_{OXA-51}</i>				<i>aac</i> -(6')-Ib	
PHH5	≥ 4	R	<i>bla_{VIM}</i>	<i>bla_{OXA-51}</i>				<i>aac</i> -(6')-Ib	
PHH6	≤ 0.25	S	<i>bla_{VIM}</i>	<i>bla_{OXA-51}</i>			<i>oqxA</i>		
PHH7	≥ 4	R	<i>bla_{VIM}</i>		<i>bla_{KPC}</i>	<i>qnrB, qnrC, qnrS</i>	<i>oqxA</i>		
PHH8	≥ 4	R		<i>bla_{OXA-51}</i>					
PHH9	≥ 4	R				<i>qnrC, qnrS</i>	<i>oqxA</i>		
PHH10	0.5	S				<i>qnrC, qnrS</i>	<i>oqxA</i>		
PHH11	≥ 4	R				<i>qnrC, qnrS</i>	<i>oqxA</i>		
PHH12	≥ 4	R	<i>bla_{VIM}</i>	<i>bla_{OXA-48}</i>		<i>qnrS</i>			<i>mcr-1</i>
PHH13	0.5	S		<i>bla_{OXA-48}</i>	<i>bla_{KPC}</i>	<i>qnrS</i>	<i>oqxA</i>		
PHH14	≥ 4	R				<i>qnrC</i>			
PHH15	≥ 4	R						<i>aac</i> -(6')-Ib	
PHH16	≥ 4	R		<i>bla_{OXA-51}</i>			<i>oqxA</i>		
PHH17	≥ 4	R							
PHH18	≥ 4	R		<i>bla_{OXA-51}, bla_{OXA-1}</i>			<i>oqxA</i>		
PHH19	≥ 4	R		<i>bla_{OXA-51}, bla_{OXA-1}</i>			<i>oqxA</i>	<i>aac</i> -(6')-Ib	

CIP: ciprofloxacin. MIC values ≥ 4 represent resistant to ciprofloxacin, MIC values ≤ 0.5 represent susceptibility to ciprofloxacin.

Supplementary Table S4. Carbapenemase-encoding and Plasmid-mediated quinolone resistant genes in *P. aeruginosa*. (continuation).

ID	CIP-MIC values (µg/mL)	CIP-susceptibility interpretation	Carbapenemase-encoding genes			PMQR genes			PMCR
			MBL	OXA	SBL	Qnr variants	Efflux pumps	Aminoglycoside variant	<i>mcr-1</i>
PHH20	≥ 4	R	<i>bla_{VIM}</i>	<i>bla_{OXA-51}</i> , <i>bla_{OXA-1}</i>					
PHH21	≥ 4	R	<i>bla_{VIM}</i>	<i>bla_{OXA-51}</i>					
PHH22	> 2	R		<i>bla_{OXA-51}</i>			<i>oqx_A</i>		
PHH23	0.5	S					<i>oqx_A</i>		
PHH24	≥ 4	R		<i>bla_{OXA-1}</i>					
PHH25	≥ 4	R		<i>bla_{OXA-51}</i>					
PHH26	0.5	S	<i>bla_{VIM}</i>						
PHH27	≥ 4	R		<i>bla_{OXA-51}</i>		<i>qnr_C</i>	<i>oqx_A</i>		
PHH28	≥ 4	R							
PHH29	≥ 4	R		<i>bla_{OXA-48}</i>		<i>qnr_S</i>	<i>oqx_A</i>		
PHH30	≥ 4	R					<i>oqx_A</i>		
PHH31	≥ 4	R	<i>bla_{IMP}</i>	<i>bla_{OXA-51}</i>					
PHH32	2	R		<i>bla_{OXA-51}</i>					
PHH33	≥ 4	R		<i>bla_{OXA-51}</i>	<i>bla_{KPC}</i>		<i>oqx_A</i>		
PHH34	≥ 4	R		<i>bla_{OXA-51}</i> , <i>bla_{OXA-48}</i>					
PHH35	≥ 4	R		<i>bla_{OXA-51}</i>					
PHH36	≥ 4	R					<i>oqx_A</i>		
PHH37	≥ 4	R					<i>oqx_A</i>		
PHH38	0.5	S			<i>bla_{GES}</i>	<i>qnr_B</i> , <i>qnr_S</i>	<i>oqx_A</i>		
PHH39	≥ 4	R					<i>oqx_A</i>	<i>aac-(6')-Ib</i>	
PHH40	≥ 4	R	<i>bla_{NDM}</i>				<i>oqx_A</i>		

CIP: ciprofloxacin. MIC values ≥ 4 represent resistant to ciprofloxacin, MIC values ≤ 0.5 represent susceptibility to ciprofloxacin.

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			MBL	OXA	SBL	Qnr variants	Efflux pumps	Aminoglycoside variant	<i>mcr-1</i>
PHH41	≥ 4	R							
PHH42	≥ 4	R		<i>bla_{OXA-1}</i>					
PHH43	≥ 4	R		<i>bla_{OXA-1}</i>		<i>qnrS</i>		<i>aac-(6')-Ib</i>	
PHH44	≥ 4	R	<i>bla_{NDM}</i>	<i>bla_{OXA-1}</i>				<i>aac-(6')-Ib</i>	
PHH45	≥ 4	R	<i>bla_{NDM}</i>	<i>bla_{OXA-1}</i>					
PHH48	≥ 4	R		<i>bla_{OXA-51}</i>			<i>oqxA</i>		
PHH49	≥ 4	R		<i>bla_{OXA-51}</i>			<i>oqxA</i>	<i>aac-(6')-Ib</i>	
PHH50	≥ 4	R						<i>aac-(6')-Ib</i>	
PHH51	≥ 4	R	<i>bla_{VIM}</i>					<i>aac-(6')-Ib</i>	
PHH52	≥ 4	R							
PHH53	≥ 4	R						<i>aac-(6')-Ib</i>	
PHH54	≥ 4	R							

CIP: ciprofloxacin. MIC values ≥ 4 represent resistant to ciprofloxacin, MIC values ≤ 0.5 represent susceptibility to ciprofloxacin.