Supplementary Online Content

Lin IF, Wu YY, Huang YH, et al: Clinical Clinical characteristics and beta-lactamase genes of carbapenem-nonsusceptible *Klebsiella pneumoniae* strains which remains susceptible to beta-lactams of narrower spectra. E-Da Med J 2023;10:12-23. doi:10.6966/EDMJ.202312_10(4).0002.

eFig. 1 Flow diagram of this study.
eFig. 2 Increasing prevalence of carbapenem nonsusceptibility among *Klebsiella pneumoniae*.

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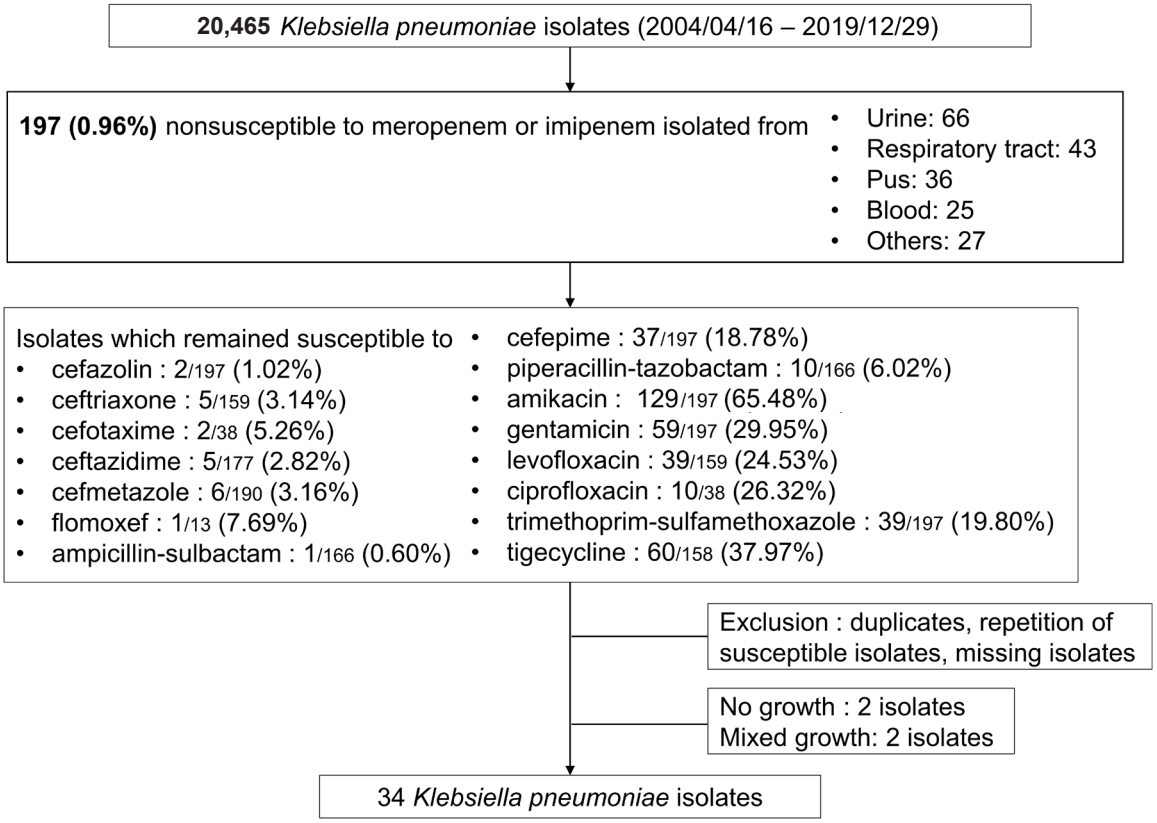
This supplementary material has been provided by the authors to give readers additional information about their work.



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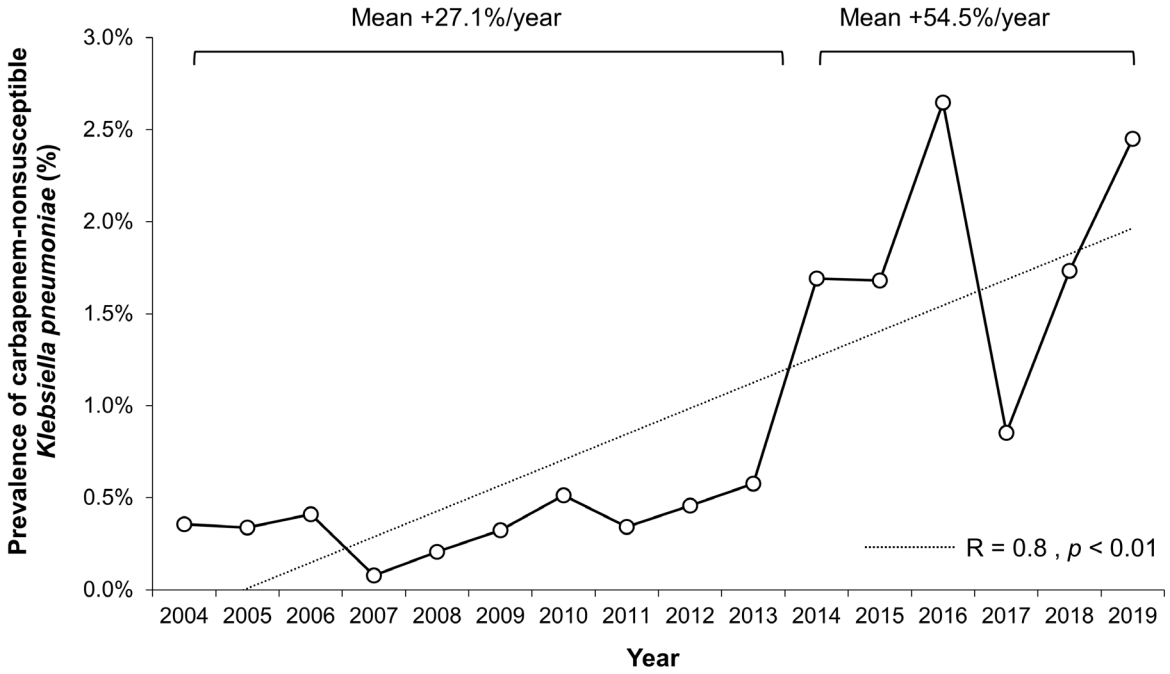

eFig. 2 Increasing prevalence of carbapenem nonsusceptibility among Klebsiella pneumoniae.

eTable 1. PCR primer sequences used for amplification of genes encoding ESBLs, AmpC β-lactamases, and carbapenemases.

Target gene	Primer name	Sequence (5' – 3')	Reference
Genes encoding ESBLs			
SHV	bla-SHV.SE bla-SHV.AS	ATGCGTTATATTCGCCTGTG TGCTTTGTTATTCGGGCCAA	Monstein HJ et al.[21]
TEM	TEM-164.SE TEM-165.AS	TCGCCGCATACACTATTCTCAGAATGA ACGCTCACCGGCTCCAGATTTAT	Monstein HJ et al.[21]
CTX-M	CTX-M-U1 CTX-M-U2	ATGTGCAGYACCAGTAARGTKATGGC TGGGTRAARTARGTSACCAGAAYCAGCGG	Monstein HJ et al.[21]
Genes encoding AmpC β-lactamases			
CMY	CMY-F CMY-R	CAAGTTTGATTCCTTGGACTCT CTCATCGTCAGTTATTGCAGCT	Chiu SK et al.[4]
DHA-1	DHA-1-F DHA-1-R	CTGATGAAAAAATCGTTATC ATTCCAGTGCACTCAAAATA	Chiu SK et al.[4]
Genes encoding class A carbapenemases			
GES	GES-F GES-MR	GCTTCATTCACGCACTATT CGATGCTAGAAACCGCTC	Hong SS et al.[22]
IMI/NMCA	IMI(NMC)-F1 IMI(NMC)-R1	TGCGGTCGATTGGAGATAAA CGATTCTTGAAGCTTCTGCG	Hong SS et al.[22]
SME	SME-F1 SME-R1	ACTTTGATGGGAGGATTGGC ACGAATTCGAGCATCACCAG	Hong SS et al.[22]
KPC	KPCF2 KPCFR	GTATCGCCGTCTAGTTCTGC GGTCGTGTTTCCCTTTAGCC	Hong SS et al.[22]
Genes encoding class B metalloenzymes			
IMP-1	IMP-1-F IMP-1-R	TGAGCAAGTTATCTGTATTC TTAGTTGCTTGGTTTTGATG	Chiu SK et al.[4]
IMP-2	IMP-2-F IMP-2-R	GGCAGTCGCCCTAAAACAAA TAGTTACTTGGCTGTGATGG	Chiu SK et al.[4]
NDM	NDM-F NDM-R	TCTCGACAATGCCGGGTTT GAGATTGCCGAGCGACTT	Chiu SK et al.[4]
Genes encoding class D oxacillinases			
OXA-48-type	OXA-48-F OXA-48-R	TTGGTGGCATCGATTATCGG GAGCACTTCTTTTGTGATGGC	Chiu SK et al.[4]

eTable 2. Antibiograms, treatment outcomes and ß-lactamase genes of nine isolates which were identified as susceptible to meropenem in customized broth microdilution assays. In every column of antibiotics, the left panels are minim inhibitory concentrations (MICs) obtained by automated antimicrobial susceptibility testing at the time of isolation, and the right panels are MICs obtained by customized broth microdilution assays at the time of this study.

Site of isolation	Cefazolin		Ceftriaxone		Ceftazidime		Cefepime		Piperacillin-tazobactam		Meropenem		Treatment	Outcome	Gene of ß-lactamase
Blood	≤ 4	2	≤ 2[*]	≤ 0.5	≤ 2	≤ 1	≤ 2	≤ 4	8/4	≤ 8/4	> 8[†]	≤ 0.5	Amp-sulb	Death	bla_{SHV}
Urine	R[§]	> 16	R[*§]	8	R	> 16	R[§]	≤ 4	S[§]	≤ 8/4	I[†§]	≤ 0.5	Ciprofloxacin	Survival	bla_{SHV}, bla_{DHA-1}
Blood	≤ 4	2	4	≤ 0.5	≤ 1	≤ 1	≤ 1	≤ 4	8	≤ 8/4	2	≤ 0.5	Pip-tazo → Imipenem	Survival	bla_{SHV}
Blood	≥ 64	> 16	≥ 64	> 32	≥ 64	> 16	≤ 1	≤ 4	≥ 128	> 128/4	4	≤ 0.5	Pip-tazo	Death	bla_{SHV}, bla_{DHA-1}
Urine	≥ 64	> 16	≥ 64	1	≥ 64	8	4	≤ 4	≥ 128	≤ 8/4	4	≤ 0.5	Cefazolin	Survival	bla_{TEM}, bla_{DHA-1}
Urine	≥ 64	> 16	≥ 64	16	≥ 64	> 16	8	≤ 4	≥ 128	64/4	2	≤ 0.5	Cefazolin	Survival	bla_{TEM}, bla_{DHA-1}, bla_{CMY}
Urine	≥ 64	> 16	4	4	≥ 64	> 16	≤ 1	≤ 4	64	≤ 8/4	2	≤ 0.5	Cefmetazole	Survival	bla_{TEM}, bla_{DHA-1}
Urine	≥ 64	> 16	2	1	16	8	≤ 1	≤ 4	16	≤ 8/4	I[§]	≤ 0.5	Cefmetazole	Survival	bla_{SHV}, bla_{DHA-1}
Urine	≥ 64	> 16	≥ 64	> 32	16	> 16	≥ 64	> 32	≥ 128	> 8/4	4	≤ 0.5	Ceftriaxone	Survival	bla_{SHV}, bla_{TEM}, bla_{CTX-M}, bla_{DHA-1}

[*] MIC of cefotaxime.
[†] MIC of imipenem.
[§] The antimicrobial susceptibility was determined by disk diffusion method.
Amp-sulb: ampicillin-sulbactam; Pip-tazo: piperacillin-tazobactam.