Table S1. Clinical Characteristics and Resistant Phenotypes of 74 carbapenem-resistant *Klebsiella pneumoniae.*

											Indwelling devices			
node	Year	City	Location	Age (years)	Sex	Wards	Specimen type	infection type	Surgery within 30 days	Antibiotics exposure within 30 days	Central venous catheter	Urinary catheter	Tracheostomy	Gastrostomy tube	Outcome
CRKP1	2020	Taiyuan	Central Shanxi	25	Female	Hematology	sputum	pneumonia	1	1	0	0	0	0	Remission or clinical improvement
CRKP2	2020	Taiyuan	Central Shanxi	25	Female	Hematology	swab	pneumonia	1	1	0	0	0	0	Remission or clinical improvement
CRKP3	2020	Taiyuan	Central Shanxi	89	Male	RICU	sputum	pneumonia	1	1	1	1	0	1	Remission or clinical improvement
CRKP4	2020	Taiyuan	Central Shanxi	79	Male	Neurology	sputum	pneumonia	1	1	1	1	1	1	Remission or clinical improvement
CRKP5	2020	Taiyuan	Central Shanxi	69	Male	Respiratory	sputum	pneumonia	1	1	0	0	0	1	Remission or clinical improvement
CRKP6	2020	Taiyuan	Central Shanxi	59	Male	Respiratory	secretion	Skin and soft tissue infection	1	1	0	1	0	1	Remission or clinical improvement
CRKP7	2020	Taiyuan	Central Shanxi	19	Male	Respiratory	stool	Gastrointestinal system infections	1	1	0	0	0	0	Remission or clinical improvement
CRKP8	2020	Taiyuan	Central Shanxi	42	Female	Comprehensive ward	urine	Urinary infection	0	0	1	1	0	1	Remission or clinical improvement
CRKP9	2020	Taiyuan	Central Shanxi	59	Male	Orthopaedics	secretion	Skin and soft tissue infection	1	1	0	1	0	1	Remission or clinical improvement

CRKP10	2020	Taiyuan	Central Shanxi	45	Female	Rheumatology	secretion	Skin and soft tissue infection	0	1	0	0	0	0	Remission or clinical improvement
CRKP11	2020	Taiyuan	Central Shanxi	83	Male	Respiratory	sputum	pneumonia	1	1	0	1	1	1	Abandoned treatment
CRKP12	2020	Taiyuan	Central Shanxi	32	Female	Hematology	secretion	Gastrointestinal system infections	1	1	0	0	0	0	Remission or clinical improvement
CRKP13	2020	Taiyuan	Central Shanxi	38	Male	Orthopaedics	swab	Skin and soft tissue infection	1	0	0	0	0	0	Remission or clinical improvement
CRKP14	2020	Taiyuan	Central Shanxi	53	Male	ICU	sputum	pneumonia	1	1	0	1	1	1	Remission or clinical improvement
CRKP15	2020	Taiyuan	Central Shanxi	27	Male	Blood transplantation	sputum	pneumonia	1	1	0	0	0	0	Abandoned treatment
CRKP16	2020	Jincheng	Southeast Shanxi	27	Male	Blood transplantation	swab	pneumonia	1	1	0	0	0	0	Abandoned treatment
CRKP17	2020	Jincheng	Southeast Shanxi	86	Male	Respiratory	sputum	pneumonia	1	1	1	1	0	1	Remission or clinical improvement
CRKP18	2020	Jincheng	Southeast Shanxi	32	Female	Hematology	blood	Bloodstream infection	1	1	0	0	0	0	Remission or clinical improvement
CRKP19	2021	Jincheng	Southeast Shanxi	37	Male	Nephrology	sputum	pneumonia	1	1	0	0	0	0	Remission or clinical improvement
CRKP20	2021	Jincheng	Southeast Shanxi	45	Male	Blood transplantation	stool	Urinary infection	1	1	0	0	0	0	Remission or clinical improvement

CRKP21	2021	Jincheng	Southeast Shanxi	35	Male	Blood transplantation	stool	pneumonia	1	1	0	0	0	0	Abandoned treatment
CRKP22	2021	Yuncheng	Southern Shanxi	45	Male	Hematology	blood	Bloodstream infection	1	1	0	0	0	0	Abandoned treatment
CRKP23	2021	Yuncheng	Southern Shanxi	65	Male	Respiratory	sputum	pneumonia	1	1	0	0	0	1	Remission or clinical improvement
CRKP24	2018	Yuncheng	Southern Shanxi	65	Male	Hematology	blood	Bloodstream infection	1	1	0	0	0	0	Remission or clinical improvement
CRKP25	2018	Yuncheng	Southern Shanxi	32	Female	Neurosurgery	blood	Bloodstream infection	0	1	0	0	1	1	Remission or clinical improvement
CRKP26	2018	Yuncheng	Southern Shanxi	38	Male	Infection	blood	Bloodstream infection	1	1	0	0	0	0	Remission or clinical improvement
CRKP27	2018	Yuncheng	Southern Shanxi	44	Female	Hematology	blood	Bloodstream infection	1	1	0	0	0	0	Remission or clinical improvement
CRKP28	2018	Yuncheng	Southern Shanxi	76	Female	Neurosurgery	cerebrospinal fluid	Central nervous system infection	1	1	0	1	0	1	Remission or clinical improvement
CRK	2018	Dato	Northern	95	Male	ICU	sputu	pneumonia	0	1	1	1	0	1	Remission or clinical

P29		ng	Shanxi				m								improvement
CRKP30	2018	Datong	Northern Shanxi	38	Female	Orthopaedics	sputum	pneumonia	1	1	1	1	1	1	Remission or clinical improvement
CRKP31	2018	Datong	Northern Shanxi	42	Male	ICU	blood	Bloodstream infection	1	1	0	1	1	1	Remission or clinical improvement
CRKP32	2018	Datong	Northern Shanxi	95	Male	ICU	sputum	pneumonia	0	1	1	1	0	1	Remission or clinical improvement
CRKP33	2018	Datong	Northern Shanxi	76	Female	Neurosurgery	cerebrospinal fluid	Central nervous system infection	1	1	0	1	0	1	Abandoned treatment
CRKP34	2018	Datong	Northern Shanxi	71	Female	Respiratory	sputum	pneumonia	0	1	0	0	0	0	Remission or clinical improvement
CRKP35	2018	Datong	Northern Shanxi	67	Male	General surgery	sputum	pneumonia	1	1	1	1	0	1	Remission or clinical improvement
CRKP36	2018	Lvliang	Central Shanxi	57	Male	Hematology	sputum	pneumonia	0	1	0	0	0	1	Abandoned treatment
CRKP37	2018	Lvliang	Central Shanxi	68	Female	Hematology	blood	Bloodstream infection	0	1	0	0	0	0	Abandoned treatment
CRKP38	2018	Lvliang	Central Shanxi	48	Male	Emergency	pericardial fluid	Cardiovascular system infection	0	0	0	0	0	0	Abandoned treatment
CRKP39	2018	Lvliang	Central Shanxi	45	Male	ICU	blood	Bloodstream infection	1	1	1	1	0	1	Remission or clinical improvement
CRKP40	2018	Lvliang	Central Shanxi	62	Male	ICU	sputum	pneumonia	0	1	0	1	1	1	Remission or clinical improvement

CRKP41	2018	Lvliang	Central Shanxi	66	Male	Orthopaedics	sputum	pneumonia	1	1	1	1	0	1	Remission or clinical improvement
CRKP42	2018	Xinzhou	Northern Shanxi	44	Female	Hematology	blood	Bloodstream infection	0	1	0	1	0	0	Abandoned treatment
CRKP43	2018	Xinzhou	Northern Shanxi	85	Female	ICU	secretion	Skin and soft tissue infection	1	1	1	1	0	1	Died
CRKP44	2018	Xinzhou	Northern Shanxi	48	Male	ICU	sputum	pneumonia	0	1	0	1	0	1	Abandoned treatment
CRKP45	2018	Xinzhou	Northern Shanxi	78	Female	ICU	sputum	pneumonia	0	1	1	1	1	1	Abandoned treatment
CRKP46	2018	Xinzhou	Northern Shanxi	62	Male	Rheumatology	blood	Bloodstream infection	0	1	1	0	0	1	Remission or clinical improvement
CRKP47	2018	Xinzhou	Northern Shanxi	54	Male	ICU	sputum	pneumonia	0	1	1	1	1	1	Abandoned treatment
CRKP48	2018	Xinzhou	Northern Shanxi	44	Male	General surgery	puncture fluid	Gastrointestinal system infections	1	1	1	1	1	1	Remission or clinical improvement
CRKP49	2018	Xinzhou	Northern Shanxi	30	Male	Hematology	sputum	Bloodstream infection	1	1	0	0	0	0	Abandoned treatment
CRKP50	2018	Xinzhou	Northern Shanxi	88	Male	ICU	sputum	pneumonia	0	1	0	1	1	1	Died
CRKP51	2018	Xinzhou	Northern Shanxi	40	Male	ICU	sputum	pneumonia	0	1	0	1	1	1	Abandoned treatment
CRKP52	2018	Xinzhou	Northern Shanxi	75	Male	Neurosurgery	sputum	pneumonia	1	1	0	1	0	1	Abandoned treatment
CRK	2018	Xinz	Northern	54	Male	ICU	sputu	pneumonia	0	1	1	1	1	0	Died

P53		hou	Shanxi				m								
CRKP54	2018	Jinzhong	Central Shanxi	56	Male	RICU	sputum	pneumonia	0	1	1	1	1	1	Died
CRKP55	2018	Jinzhong	Central Shanxi	62	Male	Cardio-Thoracic Surgery	blood	Septic shock	1	1	0	1	1	1	Remission or clinical improvement
CRKP56	2019	Jinzhong	Central Shanxi	44	Male	Neurosurgery	sputum	Central nervous system infection	0	1	0	0	1	1	Remission or clinical improvement
CRKP57	2019	Jinzhong	Central Shanxi	56	Female	Hematology	blood	Bloodstream infection	0	1	0	1	0	0	Died
CRKP58	2019	Jinzhong	Central Shanxi	52	Male	ICU	sputum	pneumonia	0	1	1	1	1	1	Remission or clinical improvement
CRKP59	2019	Changzhi	Southeast Shanxi	76	Male	Neurology	cerebrospinal fluid	pneumonia	0	0	0	1	0	0	Remission or clinical improvement
CRKP60	2019	Changzhi	Southeast Shanxi	62	Male	Hematology	sputum	pneumonia	0	1	0	0	0	0	Remission or clinical improvement
CRKP61	2019	Changzhi	Southeast Shanxi	70	Male	Neurosurgery	sputum	Central nervous system infection	0	1	1	1	1	1	Remission or clinical improvement
CRKP62	2019	Linfen	Southern Shanxi	76	Male	ICU	sputum	Central nervous system infection	0	1	1	1	0	0	Remission or clinical improvement
CRK	2021	Linf	Southern	68	Male	Neurosurger	secret	pneumonia	1	1	0	1	1	1	Remission or clinical

P63		en	Shanxi			y	ion								improvement
CRKP64	2021	Linfen	Southern Shanxi	73	Female	Neurosurgery	sputum	pneumonia	1	1	0	1	1	1	Remission or clinical improvement
CRKP65	2021	Linfen	Southern Shanxi	71	Female	General surgery	pus	pneumonia	1	1	0	0	0	0	Abandoned treatment
CRKP66	2021	Linfen	Southern Shanxi	76	Female	Neurosurgery	sputum	pneumonia	0	1	0	1	1	1	Abandoned treatment
CRKP67	2021	Shuozhou	Northern Shanxi	49	Male	Neurosurgery	sputum	pneumonia	1	1	1	1	1	1	Remission or clinical improvement
CRKP68	2021	Shuozhou	Northern Shanxi	66	Male	Orthopaedics	sputum	pneumonia	1	1	1	0	1	1	Remission or clinical improvement
CRKP69	2021	Shuozhou	Northern Shanxi	35	Male	Neurosurgery	secretion	pneumonia	1	1	1	0	1	1	Remission or clinical improvement
CRKP70	2021	Yangquan	Central Shanxi	66	Male	Orthopaedics	secretion	pneumonia	1	1	1	1	1	0	Remission or clinical improvement
CRKP71	2021	Yangquan	Central Shanxi	57	Male	Neurosurgery	sputum	pneumonia	0	1	1	1	1	1	Remission or clinical improvement
CRKP72	2021	Yangquan	Central Shanxi	47	Female	General surgery	blood	pneumonia	1	1	1	0	1	1	Abandoned treatment
CRK	2021	Yan	Central	72	Female	Urology	urine	Urinary	0	0	1	1	0	1	Remission or clinical

P73		gquan	Shanxi			Surgery		infection							improvement
CRKP74	2021	Yangquan	Central Shanxi	1	Male	Pediatrics	sputum	pneumonia	0	1	0	0	0	0	Remission or clinical improvement

Table S1. continued

	Antibotypes				Antimicrobial Susceptibility Testing (S = susceptible, I = intermediate, R = resistant, ND = Not done)																
node	a	b	MARI*	Antibotypes	meropenem	imipenem	ertapenem	cefaclor	ceftriaxone	ceftazidime	cefepime	Aztreonam	Cefoperazone/Sulbactam	Piperacillin/Tazobactam	ciprofloxacin	levofloxacin	Minocycline	Fosfomycin	Chloramphenicol	Amikacin	Tigecycline	Colistin
CRKP1	10	13	0.8	A23	R	R	ND	ND	R	R	R	R	R	R	R	R	ND	ND	ND	S	S	S
CRKP2	10	13	0.8	A23	R	R	ND	ND	R	R	R	R	R	R	R	R	ND	ND	ND	S	S	S
CRKP3	9	13	0.7	A28	R	R	ND	ND	R	R	R	R	R	S	R	R	ND	ND	ND	S	S	S
CRKP4	11	13	0.8	A19	R	R	ND	ND	R	R	R	R	R	R	R	R	ND	ND	ND	S	S	R
CRKP5	11	13	0.8	A18	R	R	ND	ND	R	R	R	R	R	R	R	R	ND	ND	ND	R	S	S
CRKP6	8	13	0.6	A29	R	R	ND	ND	R	R	R	R	R	R	S	S	ND	ND	ND	S	S	S
CRKP7	5	8	0.6	A39	R	R	ND	ND	ND	ND	ND	R	R	ND	ND	R	ND	ND	ND	S	S	S
CRK	1	1	0.	A23	R	R	ND	N	R	R	R	R	R	R	R	R	ND	ND	ND	S	S	S

P8	0	3	8					D													
CRK P9	10	13	0.8	A24	R	R	ND	ND	R	R	R	R	R	R	S	R	ND	ND	ND	R	I	S
CRK P10	10	13	0.8	A23	R	R	ND	ND	R	R	R	R	R	R	R	R	ND	ND	ND	S	S	S
CRK P11	11	13	0.8	A18	R	R	ND	ND	R	R	R	R	R	R	R	R	ND	ND	ND	R	S	S
CRK P12	9	13	0.7	A26	R	R	ND	ND	R	R	R	R	R	R	R	I	ND	ND	ND	S	S	S
CRK P13	5	8	0.6	A39	R	R	ND	ND	ND	ND	ND	R	R	ND	ND	R	ND	ND	ND	S	S	S
CRK P14	9	13	0.7	A27	R	R	ND	ND	R	R	R	R	R	R	S	R	ND	ND	ND	S	S	S
CRK P15	8	13	0.6	A30	R	R	ND	ND	R	R	R	R	I	S	R	R	ND	ND	ND	S	S	S
CRK P16	5	8	0.6	A39	R	R	ND	ND	ND	ND	ND	R	R	ND	ND	R	ND	ND	ND	S	S	S
CRK P17	11	13	0.8	A18	R	R	ND	ND	R	R	R	R	R	R	R	R	ND	ND	ND	R	I	S
CRK P18	7	13	0.5	A31	R	R	ND	ND	R	R	R	S	R	R	S	S	ND	ND	ND	S	S	S
CRK P19	11	13	0.8	A18	R	R	ND	ND	R	R	R	R	R	R	R	R	ND	ND	ND	R	S	S
CRK P20	6	8	0.8	A34	R	R	ND	ND	ND	ND	ND	R	R	ND	ND	R	ND	ND	ND	R	S	S
CRK	6	8	0.	A34	R	R	ND	N	ND	ND	ND	R	R	ND	ND	R	ND	ND	ND	R	S	S

P21			8					D													
CRK P22	8	13	0.6	A31	R	R	ND	ND	R	R	R	S	R	R	R	I	ND	ND	ND	S	S	S
CRK P23	8	13	0.6	A31	R	R	ND	ND	R	R	R	S	R	R	R	I	ND	ND	ND	S	S	S
CRK P24	11	18	0.6	A20	R	R	R	R	R	R	R	R	R	R	S	S	S	S	S	S	R	S
CRK P25	15	18	0.8	A5	R	R	R	R	R	R	R	R	R	R	R	R	S	R	R	R	S	S
CRK P26	14	18	0.8	A8	R	R	R	R	R	R	R	R	R	R	R	R	R	S	S	S	R	S
CRK P27	14	18	0.8	A9	R	R	R	R	R	R	R	R	R	R	R	R	S	S	R	S	R	S
CRK P28	14	18	0.8	A10	R	R	R	R	R	R	R	R	R	R	R	S	I	R	R	S	R	S
CRK P29	15	18	0.8	A4	R	R	R	R	R	R	R	R	R	R	R	R	R	S	R	S	R	S
CRK P30	14	18	0.8	A9	R	R	R	R	R	R	R	R	R	R	R	R	S	S	R	S	R	S
CRK P31	15	18	0.8	A4	R	R	R	R	R	R	R	R	R	R	R	R	R	S	R	S	R	S
CRK P32	15	18	0.8	A6	R	R	R	R	R	R	R	R	R	R	R	R	I	R	I	R	R	S
CRK P33	14	18	0.8	A11	R	R	R	R	R	R	R	R	R	R	R	R	S	R	R	S	S	S
CRK	1	1	0.	A14	R	R	R	R	R	R	R	R	R	R	R	R	S	S	R	S	S	S

P34	3	8	7																	
CRK P35	14	18	0.8	A7	R	R	R	R	R	R	R	R	R	R	R	R	R	S	R	S	S	S
CRK P36	13	18	0.7	A15	R	R	R	R	R	R	R	R	R	R	S	S	R	S	R	S	R	S
CRK P37	13	18	0.7	A17	R	S	R	R	R	R	R	R	R	R	S	S	R	R	R	S	R	S
CRK P38	6	18	0.3	A38	S	S	R	R	R	R	R	S	S	S	S	S	S	S	I	S	R	S
CRK P39	13	18	0.7	A14	R	R	R	R	R	R	R	R	R	R	R	R	S	I	R	S	S	S
CRK P40	17	18	0.9	A1	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	S
CRK P41	15	18	0.8	A4	R	R	R	R	R	R	R	R	R	R	R	R	R	S	R	S	R	S
CRK P42	11	18	0.6	A21	R	R	R	R	R	R	R	S	R	R	S	S	I	S	R	S	R	S
CRK P43	14	18	0.8	A12	R	R	R	R	R	R	R	R	R	S	R	R	R	S	R	S	R	S
CRK P44	13	18	0.7	A14	R	R	R	R	R	R	R	R	R	R	R	R	S	S	R	S	S	S
CRK P45	13	18	0.7	A14	R	R	R	R	R	R	R	R	R	R	R	R	S	S	R	S	S	S
CRK P46	13	18	0.7	A14	R	R	R	R	R	R	R	R	R	R	R	R	S	S	R	S	S	S
CRK	1	1	0.	A22	S	I	R	R	R	R	R	R	R	R	R	R	S	S	R	S	S	S

P47	1	8	6																		
CRK P48	13	18	0.7	A14	R	R	R	R	R	R	R	R	R	R	R	R	S	S	R	S	S	S
CRK P49	14	18	0.8	A13	R	R	R	R	R	R	R	R	S	R	S	R	R	R	R	S	R	S
CRK P50	13	18	0.7	A14	R	R	R	R	R	R	R	R	R	R	R	R	S	S	R	S	S	S
CRK P51	13	18	0.7	A14	R	R	R	R	R	R	R	R	R	R	R	R	S	S	R	S	S	S
CRK P52	15	18	0.8	A5	R	R	R	R	R	R	R	R	R	R	R	R	S	R	R	R	S	S
CRK P53	13	18	0.7	A14	R	R	R	R	R	R	R	R	R	R	R	R	S	S	R	S	S	S
CRK P54	15	18	0.8	A3	R	R	R	R	R	R	R	R	R	R	R	R	R	I	R	R	S	S
CRK P55	14	18	0.8	A7	R	R	R	R	R	R	R	R	R	R	R	R	R	I	R	S	S	S
CRK P56	15	18	0.8	A4	R	R	R	R	R	R	R	R	R	R	R	R	R	S	R	S	R	S
CRK P57	13	18	0.7	A12	S	R	R	R	R	R	R	R	R	I	R	R	R	I	R	S	R	S
CRK P58	13	18	0.7	A16	R	I	R	R	R	R	R	R	R	R	R	R	R	S	R	S	S	S
CRK P59	14	18	0.8	A7	R	R	R	R	R	R	R	R	R	R	R	R	R	S	R	S	S	S
CRK	1	1	0.	A7	R	R	R	R	R	R	R	R	R	R	R	R	R	S	R	S	S	S

P60	4	8	8																		
CRK P61	16	18	0.9	A2	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	S	S
CRK P62	17	18	0.9	A1	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	R	S
CRK P63	6	13	0.5	A35	R	R	S	ND	R	ND	R	R	R	S	S	S	ND	ND	ND	S	S	S
CRK P64	2	8	0.3	A44	R	R	ND	ND	ND	ND	ND	S	S	ND	ND	S	ND	ND	ND	S	S	S
CRK P65	6	13	0.5	A37	R	R	R	ND	R	ND	R	S	S	S	S	S	ND	ND	ND	S	R	S
CRK P66	6	13	0.5	A36	R	R	R	ND	R	ND	R	R	I	S	I	I	ND	ND	ND	S	I	S
CRK P67	7	14	0.5	A33	R	R	R	ND	R	ND	R	R	I	S	S	I	R	ND	ND	S	S	S
CRK P68	4	8	0.5	A40	R	R	ND	ND	ND	ND	ND	R	R	ND	ND	I	ND	ND	ND	S	S	S
CRK P69	3	12	0.3	A43	R	S	ND	ND	R	ND	R	S	S	S	S	S	ND	ND	ND	S	I	S
CRK P70	4	8	0.5	A40	R	R	ND	ND	ND	ND	ND	R	R	ND	ND	I	ND	ND	ND	S	S	S
CRK P71	8	13	0.6	A32	R	R	S	ND	R	ND	R	R	S	S	R	R	ND	ND	ND	R	S	S
CRK P72	10	12	0.8	A25	R	R	ND	ND	R	ND	R	R	R	R	R	R	ND	ND	ND	R	S	S
CRK	4	1	0.	A42	R	R	ND	N	R	ND	R	S	S	S	S	S	ND	ND	ND	S	S	S

P73		2	3					D													
CRK P74	4	1 2	0. 3	A41	S	R	ND	N D	R	ND	R	R	I	S	I	S	ND	ND	ND	S	S	S

* Multiple antibiotic resistance index (MARI) was measured as a/b, where a = the total number of antibiotics to which an isolate was resistant and b = the total number of antibiotics tested.

Table S2. The sequence of primers for antibiotic resistant gene and virulence gene.

Primers	Primer sequences 5'-3'	Length(bp)	The annealing temperature
Ambler A group carbapenemase			
KPC	F: TGTCACTGTATCGCCGTC R: CTCAGTGCTCTACAGAAAACC	1010	58℃
NMC	A: GCATTGATATACCTTTAGCAGAGA B: CGGTGATAAAATCACACTGAGCATA	2158	54℃
SME	A: AGATAGTAAATTTTATAG B: CTCTAACGCTAATAG	1138	54℃
IMI	A: ATAGCCATCCTTGTTTAGCTC B: TCTGCGATTACTTTATCCTC	818	54℃
GES	C: GTTTTGCAATGTGCTCAACG D: TGCCATAGCAATAGGCGTAG	371	54℃
Ambler B group carbapenemase			
NDM	F: ATGGAATTGCCCAATATTATGCAC R: TCAGCGCAGCTTGTCGGC	816	61℃
IMP-1,4,5,6,9,10,18	F: TGAGCAAGTTATCTGTATTC R: TTAGTTGCTTGGTTTTGATG	740	55℃
IMP-2,8,13,19,20	F: GGCAGTCGCCCTAAAACAAA R: TAGTTACTTGGCTGTGATGG	678	55℃
VIM-1,2,4,5	F: TTATGGAGCAGCAACCGATGT R: CAAAAGTCCCGCTCCAACGA	920	55℃
VIM-2,6,8-11	F: AAAGTTATGCCGCACTCACC R: TGCAACTTCATGTTATGCCG	865	55℃
SPM-1	F: CCTACAATCTAACGGCGACC R: TCGCCGTGTCCAGGTATAAC	650	54℃
GIM-1	F: AGAACCTTGACCGAACGCAG R: ACTCATGACTCCTCACGAGG	748	54℃
SIM-1	F: TACAAGGGATTCGGCATCG R: TAATGGCCTGTTCCCATGTG	571	54℃
AmpC enzyme gene			
DHA	F: CTGATGAAAAAATCGTTATC R: ATTCCAGTGCACTCAAAATA	1141	56℃
CMY	F: TGTCAACACGGTGCAAATCA R: AGCAACGACGGGCAAAATG	1346	56℃
ACT	F: CGAACGAATCATTATTCAGCACCG R: CGGCAATGTTTACTACACAGCG	1518	56℃
Ambler D group carbapenemase			
OXA-48-like	F: GCGTGGTTAAGGATGAACAC R: CATCAAGTTCAACCCAACCG	438	55℃
OXA-23-like	F: GATCGGATTGGAGAACCAGA	501	55℃

	R: ATTTCTGACCGCATTTCCAT		
OXA-24-like	F: GGTTAGTTGGCCCCCTTAAA R: AGTTGAGCGAAAAGGGGATT	246	55℃
OXA-58-like	F: AAGTATTGGGGCTTGTGCTG R: CCCCTCTGCGCTCTACATAC	353	55℃
OXA-51-like	F: TAATGCTTTGATCGGCCTTG R: TGGATTGCACTTCATCTTGG	599	55℃
ESBLs gene			
CTX-M-1,3,10-12,15	F: TTTCGGAAGCATAAAATCGG R: GGCGATAAACAAAAACGGAA	1021	56℃
CTX-M-2, 4-7, Toho-1	F: ATGATGACTCAGAGCATTCG R: TCCCGACGGCTTTCCGCCTT	832	65℃
CTX-M-9, 13-14, 16-19, Toho-2	F: AAAAATGATTGAAAGGTGGT R: GTGAAGAAGGTGTTGCTGAC	1242	56℃
SHV	F: AGCCGCTTGAGCAAATTAAAC R: ATCCCGCAGATAAATCACCAC	713	62℃
TEM	F: CATTTCCGTGTCGCCCTTATTC R: CGTTCATCCATAGTTGCCTGAC	800	62℃
Virulence gene			
iucA	F: AATCAATGGCTATTCCCGCTG R: CGCTTCACTTCTTTCACTGACAGG	239	59℃
iutA	F: AATCACCTGGGGGCTGGATGCT R: CCGCACCTTCCACGCCGTAAAT	683	58℃
iroN	F: CCGCAAAGAGACGAACCGCCTT R: CGGGCAATCCCCGCTTTGACTT	546	58℃
rmpA	F: GAGTAGTTAATAAAATCAATAGCAAT R: CAGTAGGCATTGCAGCA	332	50℃
rmpA2	F: GTGCAATAAGGATGTTACATTA R: GGATGCCCTCCTCCTG	430	50℃
ureA	F: GCTGACTTAAGAGAACGTTATG R: GATCATGGCGCTACCT(C/T)A	337	55℃
ugeA	F: GATCATCCGGTCTCCCTGTA R: TCTTCACGCCTTCCTTCACT	534	53℃
fimH	F: GCTCTGGCCGATAC(C/T)AC(C/G)ACGG R: GC(G/A)(A/T)A(G/A)TAACG(T/C)GCCTGGA ACGG	423	55℃
mrkD	F: TAT(T/C)G(G/T)CTTAATGGCGCTGG R: TAATCGTACGTCAGGTTAAAGA(C/T)C	920	50℃
kfu	F: GAAGTGACGCTGTTTCTGGC R: TTTCGTGTGGCCAGTGACTC	797	55℃
Peg344	F: CTTGAAACTATCCCTCCAGTC R: CCAGCGAAAGAATAACCCC	508	53℃

Peg589	F: TGAACCCCTGAAGGTCTATC R: GTGATGAATAAACTACTGCGGC	236	55°C

Table S3. Antibiotypes (antibiotic resistance patterns) of 74 carbapenem-resistant Klebsiella pneumoniae isolates.

Antibiotypes	Number of resistant antibiotics	MARI*	Isolates	Antibiotypes
A1	17	0.9	2 (2.7)	MEM-IPM-ETM-CCL-CRO-CAZ-FEP-ATM-CSL-TZP-CIP-LVX-MIN-FOS-CHL-AMK-TGC
A2	16	0.9	1 (1.4)	MEM-IPM-ETM-CCL-CRO-CAZ-FEP-ATM-CSL-TZP-CIP-LVX-MIN-FOS-CHL-AMK
A3	15	0.8	1 (1.4)	MEM-IPM-ETM-CCL-CRO-CAZ-FEP-ATM-CSL-TZP-CIP-LVX-MIN-CHL-AMK
A4	15	0.8	4 (5.4)	MEM-IPM-ETM-CCL-CRO-CAZ-FEP-ATM-CSL-TZP-CIP-LVX-MIN-CHL-TGC
A5	15	0.8	2 (2.7)	MEM-IPM-ETM-CCL-CRO-CAZ-FEP-ATM-CSL-TZP-CIP-LVX-FOS-CHL-AMK
A6	15	0.8	1 (1.4)	MEM-IPM-ETM-CCL-CRO-CAZ-FEP-ATM-CSL-TZP-CIP-LVX-FOS-AMK-TGC
A7	14	0.8	4 (5.4)	MEM-IPM-ETM-CCL-CRO-CAZ-FEP-ATM-CSL-TZP-CIP-LVX-MIN-CHL
A8	14	0.8	1 (1.4)	MEM-IPM-ETM-CCL-CRO-CAZ-FEP-ATM-CSL-TZP-CIP-LVX-MIN-TGC
A9	14	0.8	2 (2.7)	MEM-IPM-ETM-CCL-CRO-CAZ-FEP-ATM-CSL-TZP-CIP-LVX-CHL-TGC
A10	14	0.8	1 (1.4)	MEM-IPM-ETM-CCL-CRO-CAZ-FEP-ATM-CSL-TZP-CIP-FOS-CHL-TGC
A11	14	0.8	1 (1.4)	MEM-IPM-ETM-CCL-CRO-CAZ-FEP-ATM-CSL-TZP-CIP-LVX-FOS-CHL
A12	14	0.8	2 (2.7)	MEM-IPM-ETM-CCL-CRO-CAZ-FEP-ATM-CSL-CIP-LVX-MIN-CHL-TGC
A13	14	0.8	1 (1.4)	MEM-IPM-ETM-CCL-CRO-CAZ-FEP-ATM-TZP-LVX-MIN-FOS-CHL-TGC
A14	13	0.7	9 (12.2)	MEM-IPM-ETM-CCL-CRO-CAZ-FEP-ATM-CSL-TZP-CIP-LVX-CHL
A15	13	0.7	1 (1.4)	MEM-IPM-ETM-CCL-CRO-CAZ-FEP-ATM-CSL-TZP-MIN-CHL-TGC
A16	13	0.7	1 (1.4)	MEM-ETM-CCL-CRO-CAZ-FEP-ATM-CSL-TZP-CIP-LVX-MIN-CHL
A17	13	0.7	1 (1.4)	MEM-ETM-CCL-CRO-CAZ-FEP-ATM-CSL-TZP-MIN-FOS-CHL-TGC
A18	11	0.8	4 (5.4)	MEM-IPM-CRO-CAZ-FEP-ATM-CSL-TZP-CIP-LVX-AMK
A19	11	0.8	1 (1.4)	MEM-IPM-CRO-CAZ-FEP-ATM-CSL-TZP-CIP-LVX-CO

A20	11	0.6	1 (1.4)	MEM-IPM-ETM-CCL-CRO-CAZ-FEP-ATM-CSL-TZP-TGC
A21	11	0.6	1 (1.4)	MEM-IPM-ETM-CCL-CRO-CAZ-FEP-CSL-TZP-CHL-TGC
A22	11	0.6	1 (1.4)	ETM-CCL-CRO-CAZ-FEP-ATM-CSL-TZP-CIP-LVX-CHL
A23	10	0.8	4 (5.4)	MEM-IPM-CRO-CAZ-FEP-ATM-CSL-TZP-CIP-LVX
A24	10	0.8	1 (1.4)	MEM-IPM-CRO-CAZ-FEP-ATM-CSL-TZP-LVX-AMK
A25	10	0.8	1 (1.4)	MEM-IPM-CRO-FEP-ATM-CSL-TZP-CIP-LVX-AMK
A26	9	0.7	1 (1.4)	MEM-IPM-CRO-CAZ-FEP-ATM-CSL-TZP-CIP
A27	9	0.7	1 (1.4)	MEM-IPM-CRO-CAZ-FEP-ATM-CSL-TZP-LVX
A28	9	0.7	1 (1.4)	MEM-IPM-CRO-CAZ-FEP-ATM-CSL-CIP-LVX
A29	8	0.6	1 (1.4)	MEM-IPM-CRO-CAZ-FEP-ATM-CSL-TZP
A30	8	0.6	1 (1.4)	MEM-IPM-CRO-CAZ-FEP-ATM-CIP-LVX
A31	8	0.6	3 (4.1)	MEM-IPM-CRO-CAZ-FEP-CSL-TZP-CIP
A32	8	0.6	1 (1.4)	MEM-IPM-CRO-FEP-ATM-CIP-LVX-AMK
A33	7	0.5	1 (1.4)	MEM-IPM-ETM-CR0-FEP-ATM-MIN
A34	6	0.8	2 (2.7)	MEM-IPM-ATM-CSL-LVX-AMK
A35	6	0.5	1 (1.4)	MEM-IPM-CRO-FEP-ATM-CSL
A36	6	0.5	1 (1.4)	MEM-IPM-ETM-CRO-FEP-ATM
A37	6	0.5	1 (1.4)	MEM-IPM-ETM-CRO-FEP-TGC
A38	6	0.3	1 (1.4)	ETM-CCL-CRO-CAZ-FEP-TGC
A39	5	0.6	3 (4.1)	MEM-IPM-ATM-CSL-LVX
A40	4	0.5	2 (2.7)	MEM-IPM-ATM-CSL
A41	4	0.3	1 (1.4)	IPM-CRO-FEP-ATM
A42	4	0.3	1 (1.4)	MEM-IPM-CRO-FEP
A43	3	0.3	1 (1.4)	MEM-CRO-FEP
A44	2	0.3	1 (1.4)	MEM-IPM

MEM, meropenem; IPM, imipenem; ETM, ertapenem; CCL, cefaclor; CRO, ceftriaxone; CAZ, ceftazidime; FEP, cefepime; ATM, aztreonam; CSL, cefoperazone and sulbactam; CIP, ciprofloxacin; LVX, levofloxacin; CHL, chloramphenicol; TZP, piperacillin and tazobactam; TGC, tigecycline; MIN, minocycline; FOS, fosfomycin; AMK, amikacin; CO, Colistin. * Multiple antibiotic resistance index (MARI) was measured as a/b, where a = the total number of antibiotics to which an isolate was resistant and b = the total number of antibiotics tested.

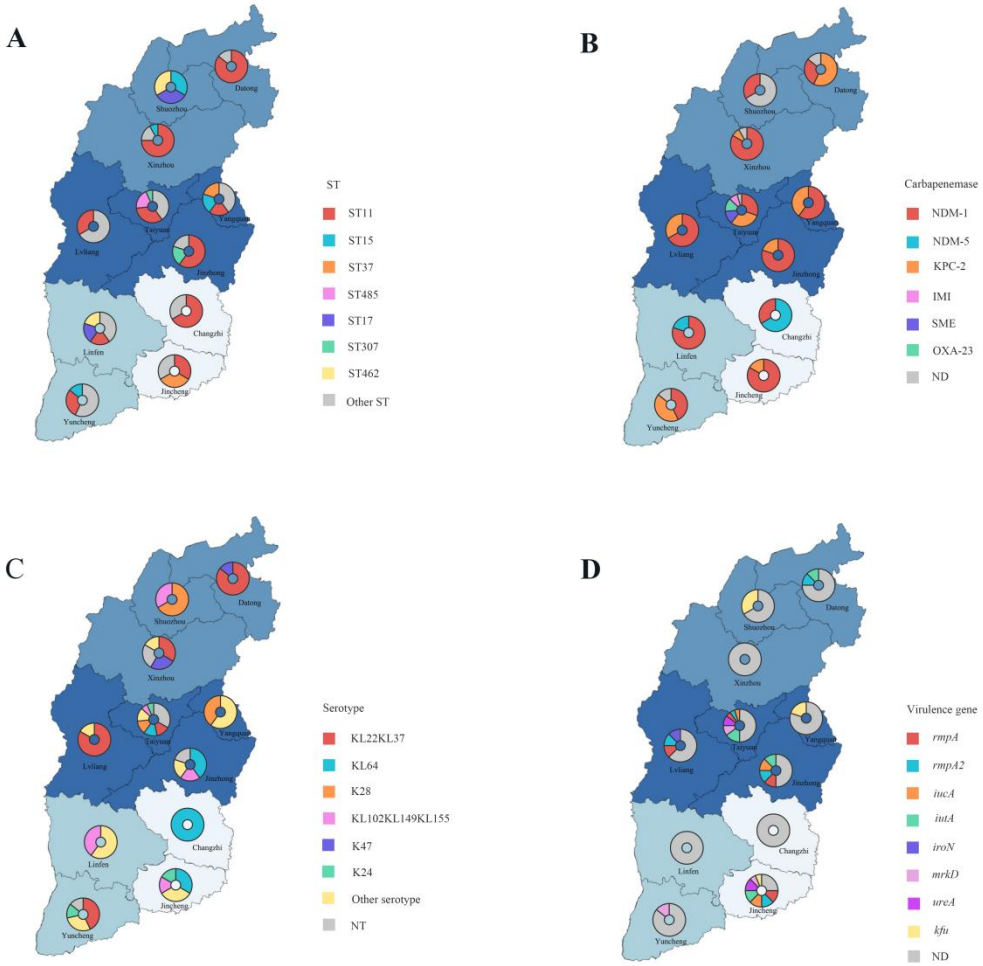

Figure S1. Distribution of ST (A), carbapenemase (B), seroytpe (C) and virulence gene (D) of Carbapenem-Resistant Klebsiella pneumoniae in different cities of Shanxi, China. ST, sequencing type; NT, non typable; ND, none detected.

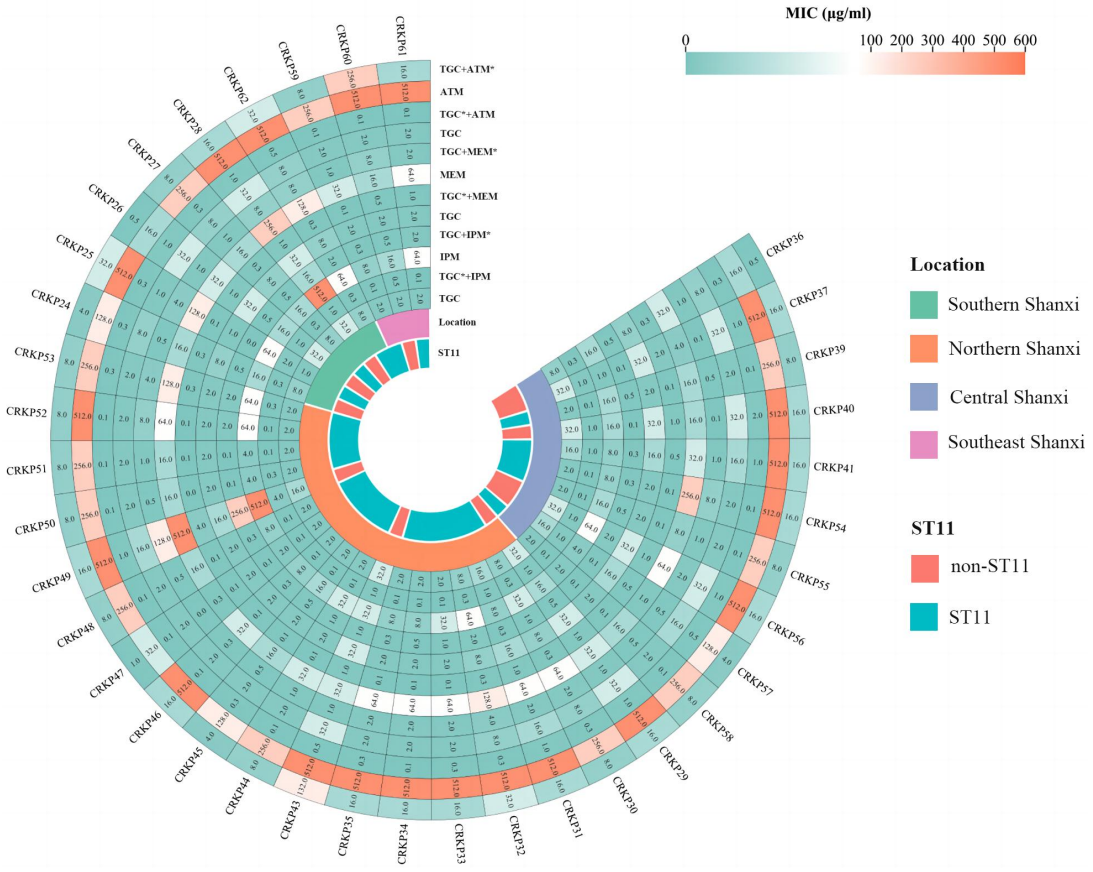

Figure S2. Results of combination therapy. TGC, tigecycline; IPM, imipenem; MEM, meropenem; ATM, aztreonam. ST, sequencing type; NT, non typable. * Minimum inhibitory concentration (MIC) of the antibiotic after combination therapy.