

Tiong Chan Lee<sup>1</sup>, Md Arif Asma<sup>2</sup>, Razali Nurul Huda<sup>4</sup>, Kulasingham Vicknesan<sup>3</sup>, Sukesh Hashvina<sup>3</sup>, Voon-yaa Tay<sup>3</sup>, Ghazali Mohd Ashraf<sup>3</sup>, Ewe Jin Koh<sup>3</sup>, Omar Sitinah<sup>5</sup>, Othman Hamizan<sup>2</sup>, Phang Teck Toh<sup>2</sup>

Jeffrey Cheah School of Medicine and Health Sciences, Monash University Malaysia<sup>1</sup>  
Administrative (Casemix System), Hospital Sultan Ismail, Johor<sup>2</sup>  
Department of Internal Medicine, Hospital Sultan Ismail, Johor<sup>3</sup>  
Clinical Research Center, Hospital Sultan Ismail, Johor<sup>4</sup>  
Microbiology Unit, Hospital Sultan Ismail<sup>5</sup>

NMRR NO:NMRR-18-2446-42720(IIR)

## Introduction

•*Klebsiella pneumoniae* bacteraemia is a major cause of morbidity and mortality in hospitals. Multidrug resistance associated with extended spectrum  $\beta$  lactamase and *K. pneumoniae* carbapenemase (KPC) organisms is a growing health threat. The purposes of this study is determine the demographic patterns, risk factors and outcome of *K. pneumoniae* bacteraemia in tertiary hospital in the Southern region of Malaysia.

## Methods

•Single-center retrospective analysis involving all adults with *K. pneumoniae* bacteraemia in Sultan Ismail Hospital, Johor Bahru, Malaysia in 2016

•Data on demographic patterns, risk factors, medical comorbidities, source of infection and in hospital mortality were obtained from the electronic medical records

•24,143 adult admissions with 5714 blood culture samples collected, of which 1124 (19.7%) were positive cultures

•825 blood culture samples met eligibility criterias. 299 samples were excluded as they were deemed clinically insignificant or contaminant

•Analysis of data performed using SPSS version 18. A p-value of <0.05 was considered statistically significant

## Results

•Gram negative bacteraemia accounted for 69.2% of total positive blood cultures.

•*Klebsiella pneumoniae* was the commonest blood-stream pathogen (185 cases, 22.4%) followed by *Escherichia coli* (179 cases, 21.7%) and *Staphylococcus aureus* (153 cases, 18.4%), *Streptococcus spp* (75 cases, 9.1%) and *Acinetobacter spp* (42 cases, 5.1%)

•Mean age was 54.9 (SD 15.4) with an overall in-hospital mortality rate of 46.5%. Extended Spectrum Beta Lactamase (ESBL) producing and Carbapenem resistant *K. pneumoniae* accounted for 37.3% (n=69) and 1.1% (n=2) cases respectively (Table 1)

Characteristic	Number (n = 185)	Percentage (%)
Gender		
Male	105	56.8
Female	80	43.2
Race		
Malay	120	64.9
Chinese	35	18.9
Indian	21	11.4
Others	9	4.9
Acquisition		
Community	65	35.1
Healthcare associated	41	22.1
Nosocomial	79	42.7
Resistant pattern		
ESBL <i>K.pneumoniae</i>	69	37.3
CRE	2	1.1

Table 1 Characteristics of patients with *K.pneumoniae* bacteraemia

Risk factor	Number (n)	Percentage (%)
Diabetes mellitus	95	51.4
Hypertension	53	28.6
Cancer	45	24.3
CKD/ ESRF	25	13.5
Heart disease	23	12.4
Stroke	16	8.6
Chronic liver disease	6	3.2
Others	26	14.1

Table 2 Risk factors for *K.pneumoniae* bacteraemia acquisition

•Diabetes mellitus (51.4%,  $p=0.029$ ), cancer (24.3%,  $p=0.001$ ) and alcohol use disorder (4.0%,  $p=0.025$ ) were significant risk factors for acquiring *K. pneumoniae* (Table 2)

Source of Infections of *K.Pneumoniae* Bacteraemia

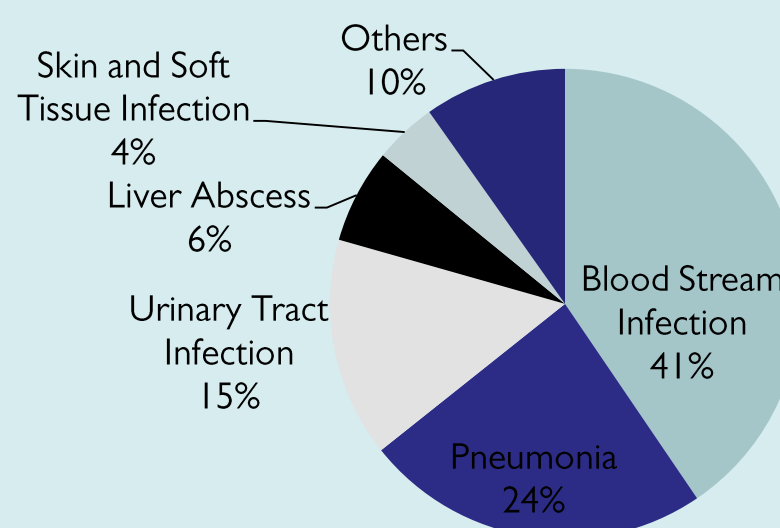


Chart 1 :- Sources of infection

•The common sources of *K. pneumoniae* bacteraemia were primary bloodstream infections (40.5%, n=75), followed by pneumonia (23.8%, n=44) and urinary tract infection (15.1%, n=28), liver abscess (6.5%, n=12) and skin and soft tissue infection (4.3%, n=8) (Chart 1)

•Older age ( $p=0.005$ ) and chronic liver disease ( $p=0.008$ ) were predictors of in-hospital mortality (Table 3)

Variables	Alive n=99	Deceased n=86	P value
Age, mean $\pm$ S.D, years	52.00 $\pm$ 16.352	58.29 $\pm$ 13.603	0.005
Comorbidities, n (%)			
Chronic Liver Disease	0	6 (7.0)	0.008
Cancer	30 (30.0)	15 (17.4)	0.042
Source of infection, n (%)			
Urinary System	21 (21.2)	7 (8.1)	0.013

Table 3 Chi-Square analysis of risk of mortality due to *K.pneumoniae* infection

## Discussion

•Gram negative bacteraemia accounted for 69.2% of total positive blood cultures, compared to a study conducted in a teaching hospital in Kuala Lumpur 2 decades ago which reported higher Gram positive bacteraemia (56.7% of the blood cultures) (1)

•*K.pneumoniae* has surpassed *Escherichia coli* to become the predominant gram negative pathogen in our institution (22.4% versus 21.7%)

•Multidrug resistance associated with extended spectrum  $\beta$  lactamase (37.3%) and *K. pneumoniae* carbapenemase (1.1%) organisms is a growing health threat (2)

•Diabetes mellitus, cancer and alcohol use disorders were risk factors associated with *K. pneumoniae* bacteraemia similar to previous reported study (3).

•Overall in-hospital mortality rate of 46.5%, similar to other reported study (4). Older age and chronic liver disease were associated with higher mortality rate

## Conclusion

•Diabetes mellitus, cancer and alcohol use disorders were independent risk factors associated with *Klebsiella pneumoniae* bacteraemia.

•Higher mortality rate was observed in elderly and patients with chronic liver disease.

## References

- Juan, C., Chuang, C., Chen, C. et al. Clinical characteristics, antimicrobial resistance and capsular types of community-acquired, healthcare-associated, and nosocomial *Klebsiella pneumoniae* bacteremia. *Antimicrob Resist Infect Control* 8, 1 (2019)
- Gupta, A., Ampofo, K., Rubenstein, D. et al. Extended Spectrum  $\beta$  Lactamase-producing *Klebsiella pneumoniae* Infections: a Review of the Literature. *J Perinatol* 23, 439–443 (2003). <https://doi.org/10.1038/sj.jp.7210973>
- Meatherall BL, Gregson D, Ross T, Pitout JD, Laupland KB. Incidence, risk factors, and outcomes of *Klebsiella pneumoniae* bacteremia. *Am J Med* 2009;122:866-873.
- Kang CI, Kim SH, Bang JW, Kim HB, Kim NJ, Kim EC, et al. Community-acquired versus nosocomial *Klebsiella pneumoniae* bacteremia: clinical features, treatment outcomes, and clinical implication of antimicrobial resistance. *Journal of Korean medical science*. 2006;21(5):816-22.