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# Incidence and Risk Factors of Carbapenem-resistant Enterobacterales: Experience from Hospital Tuanku Fauziah, Perlis

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## INTRODUCTION

The incidence of Carbapenem-resistant Enterobacterales (CRE) has been increasing worldwide.

## OBJECTIVE

We aim to descriptively report the incidence and risk factors for hospital acquired infection or colonisation with CRE at Hospital Tuanku Fauziah (HTF), Perlis.

## METHODS

### STUDY DESIGN:
Retrospective, cross-sectional study

### POPULATION:
Hospitalised patients with a culture (+) for organism(s) in the Enterobacterales order causing clinical infection or colonisation with evidence of resistance tested as per local laboratory standard to at least one carbapenem.

### STUDY DURATION:
1 January - 31 December 2023

## RESULTS

**2022**

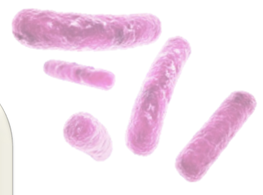
Total hospital admission
29,097

CRE infection/colonisation
9 cases

**2023**

Total hospital admission
33,313

CRE infection/colonisation
**29 cases**
(Incidence rate:
0.09 / 100 admissions)



**Mean age:** 57.6 years old
(Range: 16-90 years old)

**Distribution of isolates:**

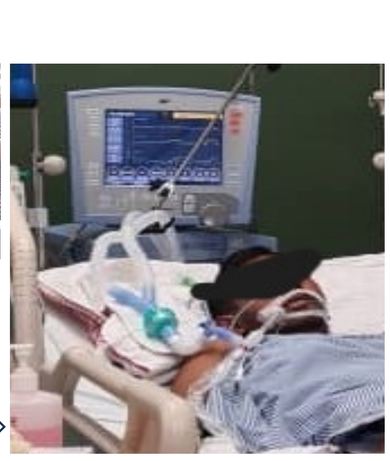
| | |
|---|---|
| *Klebsiella pneumoniae* | 62..1% |
| *Escherichia coli* | 10.3% |
| *Enterobacter hormaechei* | 10.3% |
| Others | 17.3% |

### Identified Risk Factors for CRE:

96.5% cases had indwelling urinary catheters

75.9% cases had central venous catheter placement

Prior ICU admission and mechanical ventilation contributed to 79.3% of cases



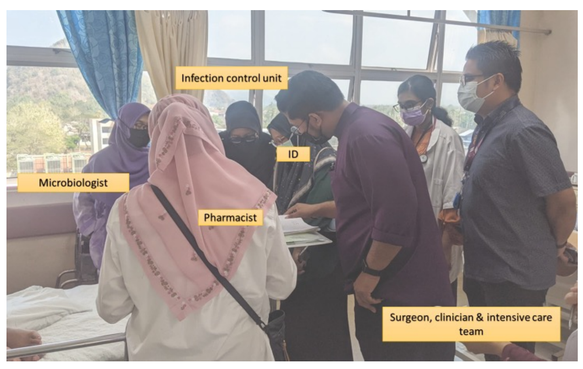

Prolonged hospital stays (>2 weeks) were noted in 44.8% of cases

51.7% were exposed to at least 3 types of antibiotics

### Intervention Strategies by Infection Control Unit (HTF):

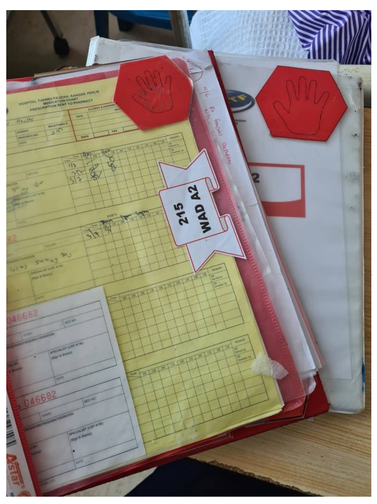

Infection Control Corner in clinical ward to improve awareness

Regular hand hygiene campaign in wards for reinforcement of practice among healthcare staffs




Multidisciplinary AMS round to improve healthcare system delivery and patient care

Tagging on CRE patients' folder for contact precaution




## DISCUSSION / CONCLUSION

- CRE incidence rate in Malaysia has increased from around 0.05/100 admissions (2016 – 2019) to 0.09/100 admissions in 2020 and 0.15/100 admissions in 2022 (1).
- HTF is also experiencing a marked increase in CRE incidence in 2023 with the rate of 0.09/100 admissions compared to 0.03/100 admissions in 2022 and 0.02/100 admissions in 2021.
- Majority of patients were exposed to multiple risk factors, but the most common predisposing factor was the presence of medical devices (i.e., urinary catheter, CVC and mechanical ventilation), which is consistent with national data (1). Other predisposing factor was antibiotic exposure, in which 95% of the cases were prescribed with one or more types of antibiotics before CRE diagnosis (1).
- *Klebsiella pneumoniae* is especially common among patients in intensive care unit (2). This organism typically infects patients with indwelling medical devices where biofilm formation on these devices is important in the pathogenesis of CRE infections.
- The increasing trend of CRE infection warrants the need for a robust and continuous surveillance system (1) by:
  - strengthening the implementation of preventive care bundles (CVC, urinary catheter and VAP care bundles) to reduce devices-associated infections
  - ensure IPC practices compliance to prevent transmission
  - supporting the antimicrobial stewardship (AMS) programme
- The AMS strategies to minimize selective pressure of antimicrobial resistance (3) is by:
  - de-escalation therapy - the spectrum of empirical antibiotics is narrowed when susceptibility result is available
  - adequate duration of treatment to achieve optimal clinical outcome

### RELATED LITERATURE

1. 2022 Annual Report Infection Prevention & Control and Antimicrobial Resistance Containment Program
2. Zawawi RD, Ramli R, Sidik TM, Naina-Mohamed I, Loon LC. Clinical Characteristics and Risk Factors of Carbapenem-Resistant Enterobacteriaceae: A Case-Control Study in a Tertiary Hospital in Malaysia. Malaysian Journal of Medicine & Health Sciences. 2021 Oct 1;17(4).
3. Karam G, Chastre J, Wilcox MH & Vincent JL. Antibiotic strategies in the era of multidrug resistance. Crit Care 2016;20:136. doi:10.1186/ s13054-016-1320-7