

# Analysis of MDRO Infections on Clinical Outcomes: A Study of WHO Priority Pathogen List in Hospitalized Patients

Zinatul Hayati<sup>1,2\*</sup>, Asyriva Yossadania<sup>3</sup>

<sup>1</sup> Department of Microbiology, Faculty of Medicine, Syiah Kuala University, Banda Aceh, Indonesia;

<sup>2</sup> Department of Clinical Microbiology, Dr Zainoel Abidin General Hospital, Banda Aceh, Indonesia;

<sup>3</sup> Clinical Microbiology Study Program, Faculty of Medicine, Syiah Kuala University, Banda Aceh, Indonesia

\*corresponding author: [hayatikarmil@usk.ac.id](mailto:hayatikarmil@usk.ac.id)

## BACKGROUND

The incident of multidrug-resistant organisms (MDROs) in healthcare settings poses a significant challenge to patient management and clinical outcomes. Notably, infections caused by MDRO pathogens have been reported to be associated with heightened morbidity and mortality among hospitalized patients.

## METHODS

The study analyzed clinical outcomes related to infections caused by MDROs in hospitalized patients at Dr. Zainoel Abidin General Hospital in Banda Aceh, Indonesia, using microbiological laboratory data collected throughout 2024. The researchers sorted the data to identify cases involving key MDRO pathogens and concluded the hospitalized patients from whom any of these pathogens were isolated. Additionally, they gathered demographic information, including age, sex, length of stay, and patient outcomes. Chi-square was used to see the relationship between MDRO pathogenic bacteria and patient outcomes.

## RESULTS

There are four major MDROs bacteria isolated from 1436 hospitalized patients. Overall, there are 1745 clinical specimens which isolated the targeted MDRO, those are ESBL-producing *Escherichia coli* (75.5%), Methicillin-resistant producing *Staphylococcus aureus* (73.4%), ESBL-producing *Klebsiella pneumoniae* (52.5%), and Carbapenem-resistant *Acinetobacter baumannii* (20.4%). Male (52.9%) and people aged-over-60 years (34.6%) were more prevalent to get infected by MDROs bacteria. Most of the patients were hospitalized for not more than 30 days (90.8%). The crosstabulation analysis of outcomes and MDROs frequencies indicated that there was no statistically significant difference ( $p=0.258$ ); however, the prevalence of infections leading to mortality caused by MDROs was greater (61.7%) compared to those caused by susceptible bacteria

Table. Frequencies of MDROs Bacteria

Characteristics	MDRO	%	Non-MDRO	%	Total	p-value
<b>Organisms</b>						
<i>Escherichia coli</i>	466	75.5	151	24.5	617	
<i>Acinetobacter baumannii</i>	71	20.5	277	79.5	348	
<i>Staphylococcus aureus</i>	246	73.4	89	26.6	335	
<i>Klebsiella pneumoniae</i>	234	52.5	211	47.5	445	
Overall	1017	58.3	728	41.7	1745	
<b>Patient's Age (years)</b>						
≤ 30	147	55.7	117	44.3	264	
31 – 45	115	53.7	99	46.3	214	
46 – 59	298	64.6	163	35.4	461	
≥ 60	300	60.4	197	39.6	497	
<b>Patient's Gender</b>						
Male	442	58.2	318	41.8	760	0.156
Female	418	61.8	258	38.2	676	
<b>Patient's Outcome</b>						
Recovered	521	58.7	366	41.3	887	0.258
Died	339	61.8	210	38.3	549	
<b>Patient's Length of Stay</b>						
≤ 30 days	786	60.2	519	39.8	1305	0.405
> 30 days	74	56.5	57	43.5	131	

## DISCUSSION

The consistent elevated prevalence rates of ESBL-producing organisms in hospital settings are indicating the significant challenges in managing infections due to their resistance to multiple  $\beta$ -lactam antibiotics. Furthermore, demographic analysis indicated that males and individuals over 60 years of age are commonly more susceptible to infections from these MDROs. This aligns with literature suggesting advanced age and male gender are significant risk factors for MDRO carriage and infection, likely due to factors such as comorbidities and physiological changes associated with aging<sup>1,2</sup>.

Despite noting a high mortality associated with infections caused by MDROs, the statistical analysis suggested no significant difference in outcomes compared to non-MDROs infections in this study. The complexity of treating these infections is compounded by factors such as inappropriate initial antimicrobial therapy, which is linked to increased hospital mortality and extended lengths of stay, further stressing healthcare resources might be the reason<sup>3,4</sup>.

## CONCLUSION

The emergence of these resistant strain bacteria leads to increasing mortality compared to susceptible strains

All authors declare that they have no conflict of interest

### References:

- Ntambi, S., Sutningsih, D., Hussein, M., & Laksono, B. (2023). Distribution and prevalence of multidrug-resistant organisms (mdros) among mdro-positive individuals at dr. kariadi hospital. *Jurnal Epidemiologi Kesehatan Komunitas*, 8(2), 103-109. <https://doi.org/10.14710/jekk.v8i2.18530>
- McKinnell, J., Singh, R., Miller, L., Kleinman, K., Gussin, G., He, J., dkk (2019). The shield orange county project: multidrug-resistant organism prevalence in 21 nursing homes and long-term acute care facilities in southern california. *Clinical Infectious Diseases*, 69(9), 1566-1573. <https://doi.org/10.1093/cid/ciz119>
- WP, S., Norhidayah, M., & AR, M. (2024). Factors associated with multidrug-resistant organism (mdro) mortality: an analysis from the national surveillance of multidrug-resistant organism, 2018-2022.. <https://doi.org/10.21203/rs.3.rs-5028553/v1>
- Aliyu, S., McGowan, K., Hussain, D., Kanawati, L., Ruiz, M., & Yohannes, S. (2021). Prevalence and outcomes of multi-drug resistant blood stream infections among nursing home residents admitted to an acute care hospital. *Journal of Intensive Care Medicine*, 37(4), 565-571. <https://doi.org/10.1177/08850666211014450>