Junior Science Communications
Faculty of Applied Sciences, UiTM Shah Alam
https://journal.uitm.edu.my/ojs/index.php/JSC

E-ISSN 2637-0689
Vol 67 2026

Colloquium on Applied Sciences 1 2026
19-22 January 2026, Faculty of Applied Sciences, UiTM Shah Alam, Malaysia

The Role of Hospital Wastewater as a Vector for the Environmental Dissemination of *Escherichia coli* and *Klebsiella pneumoniae*

Nur Alissa Nabihah Muhammad Zaki[a], Siti Hajar Sadiran[a,b*]

Structured Abstract

Background: Hospital wastewater (HWW) includes disinfectants, pathogenic microorganisms, and pharmaceutical residues, which can pose a potential environmental risk. *Escherichia coli* and *Klebsiella pneumoniae* are prevalent multidrug-resistant (MDR) bacteria that play a major role in the worldwide issue of antimicrobial resistance (AMR). These bacteria can originate from various sources within hospitals, infiltrate wastewater systems, survive standard treatment processes, and ultimately be discharged into the environment, including rivers and soil. This review looks into how hospital wastewater contributes to the dissemination of *E. coli* and *K. pneumoniae*. It addresses their occurrence in hospital wastewater, the environmental hazards linked to their discharge, and determining whether current wastewater treatment methods can work effectively.

Methods: Relevant scientific articles were systematically retrieved from Scopus, PubMed, and ScienceDirect using keywords related to hospital wastewater, *Escherichia coli*, *Klebsiella pneumoniae*, antimicrobial resistance, and multidrug-resistant bacteria. Articles were screened for relevance and critically analyzed to synthesized key findings and identify research gaps.

Results: Hospital wastewater frequently contains *Escherichia coli* and *Klebsiella pneumoniae*, including multidrug-resistant bacteria, according to the evaluated research' findings. The majority of research found that hospital effluents had a higher amount of these bacteria than domestic wastewater, indicating that hospitals are a significant source of microorganisms resistant to antibiotics. Conventional wastewater treatment methods can reduce total bacterial loads but often fail to fully remove resistant bacteria before disposal. As a result, treated hospital wastewater may still represent a risk to public health and contribute to environmental degradation.

Conclusion: In conclusion, hospital wastewater contributes significantly to the environmental spread of multidrug-resistant *Escherichia coli* and *Klebsiella pneumoniae* since traditional treatment methods frequently fail to completely remove these bacteria. Therefore, wastewater treatment methods, monitoring systems, and regulatory frameworks must be strengthened to reduce antimicrobial resistance and protect public and environmental health.

Keywords: Antimicrobial resistance, *Escherichia coli*, hospital wastewater, *Klebsiella pneumoniae*, multidrug-resistance.

*Correspondence: hajarsadiran@uitm.edu.my

[a] School of Biology, Faculty of Applied Sciences, Universiti Teknologi MARA, Shah Alam, Malaysia

[b] Atta-ur-Rahman Institute for Natural Product Discovery, Universiti Teknologi MARA Selangor, Puncak Alam, Malaysia.