

# Microbiology Laboratory Role in an Outbreak with a Multi-drug Resistant *Enterobacter cloacae* (MDRE) in a Neonatal Intensive Care Unit (NICU)

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## Introduction

Hospital-acquired infections (HAI), are nosocomially acquired infections that are typically not present or might be incubating at the time of admission. These infections are usually acquired after hospitalization and manifest 48 hours after admission to the hospital. Hospital-acquired infection of antibiotic resistant organisms (AROs) increase morbidity, and healthcare costs. Early recognition of outbreaks of AROs is essential to minimize harm and reduce ongoing transmission.

### Objective:

This study illustrates the importance of the microbiology laboratory as part of a multidisciplinary healthcare team in outbreak investigation of a novel multidrug resistant *Enterobacter* (MDRE) in an NICU.



Figure 1: Neonatal ICU

## Material/methods

In May 2019, 3 neonates at McMaster Children's Hospital developed septicemia with a novel MDRE. An outbreak was declared and rectal surveillance of all infants and hypothesized environmental sources (e.g. sink drains) was organized by a multidisciplinary team. Innovative methods were developed to detect MDRE from swabs in the most efficient way without screening through normal flora and contaminants. The microbiology laboratory began using a urine chromogenic agar with a gentamicin disk as the suspected MDRE was resistant to gentamicin. A second method was developed using Colorex™ C3GR (CHROMagar™) processed on the WASPLab™ system. The Vitek2 GNI and AST N390 cards were used for identification and susceptibility of suspected isolates.

## Results

Over 1,000 swabs were tested from May to August 2019. The Colorex C3GR media improved detection and eased workflow as the media inhibits a great number of bacteria while allowing the detection of gram negative bacteria producing beta-lactamase such as ESBL and AmpC. WASP/WASPLab™ system was used for processing and digital analysis of the swabs. In total, 92 MDRE isolates were detected (from 2 sink drains, and 12 rectal swabs). Susceptibility pattern showed resistance to Gentamicin, Tobramycin and Septra. During the outbreak, 8 infections were identified (6 bacteremias, 1 UTI, 1 endotracheal aspirate). The molecular laboratory performed 10 Pulse-field gel electrophoresis runs. An additional 40 shifts for Medical Laboratory Technologists were added and 500 Vitek IDS cards were set up. Weekly point prevalence, NICU closure, cohorted nursing and pump rooms, extra cleaning and facilitated weekly meetings and communications occurred throughout the outbreak.

## Conclusion

This case study of a novel MDRE outbreak in an NICU illustrates key aspects of outbreak management and highlights the significant increased workload and costs to the microbiology lab to efficiently assist in outbreak management. It is crucial to ensure that proper surveillance is in place to help establish appropriate guidelines and policies for infection control. Rapid detection of bacteria producing these enzymes also allows for de-escalation to more targeted therapy, to conserve carbapenem antibiotics for more serious infections. The microbiology laboratory is an essential member of the outbreak management team and plays a critical role in identifying and understanding the transmission dynamics of ARO outbreaks. The collaboration with Infectious Disease and Infection Prevention Control cannot be overstated.

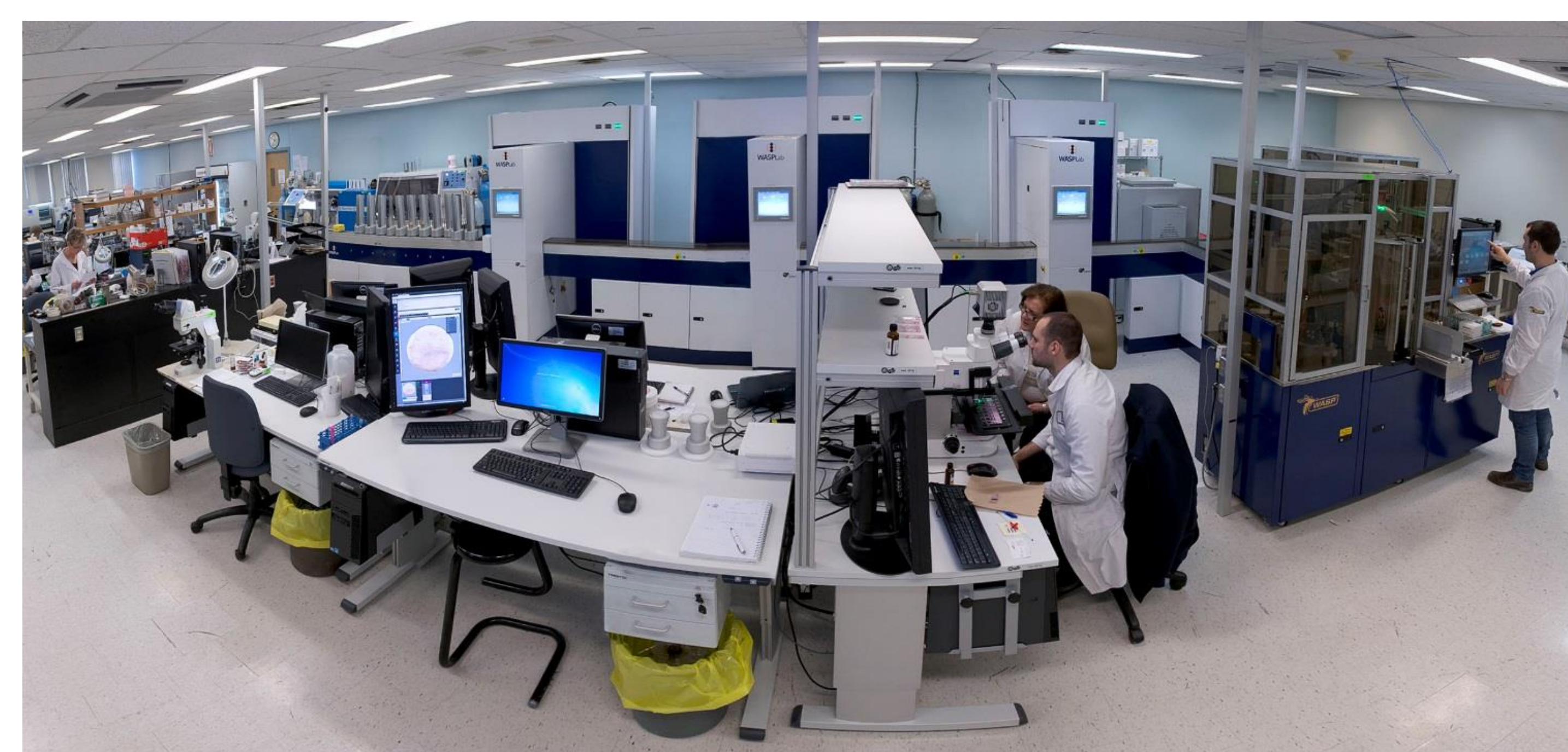


Figure 2: WASPLab system

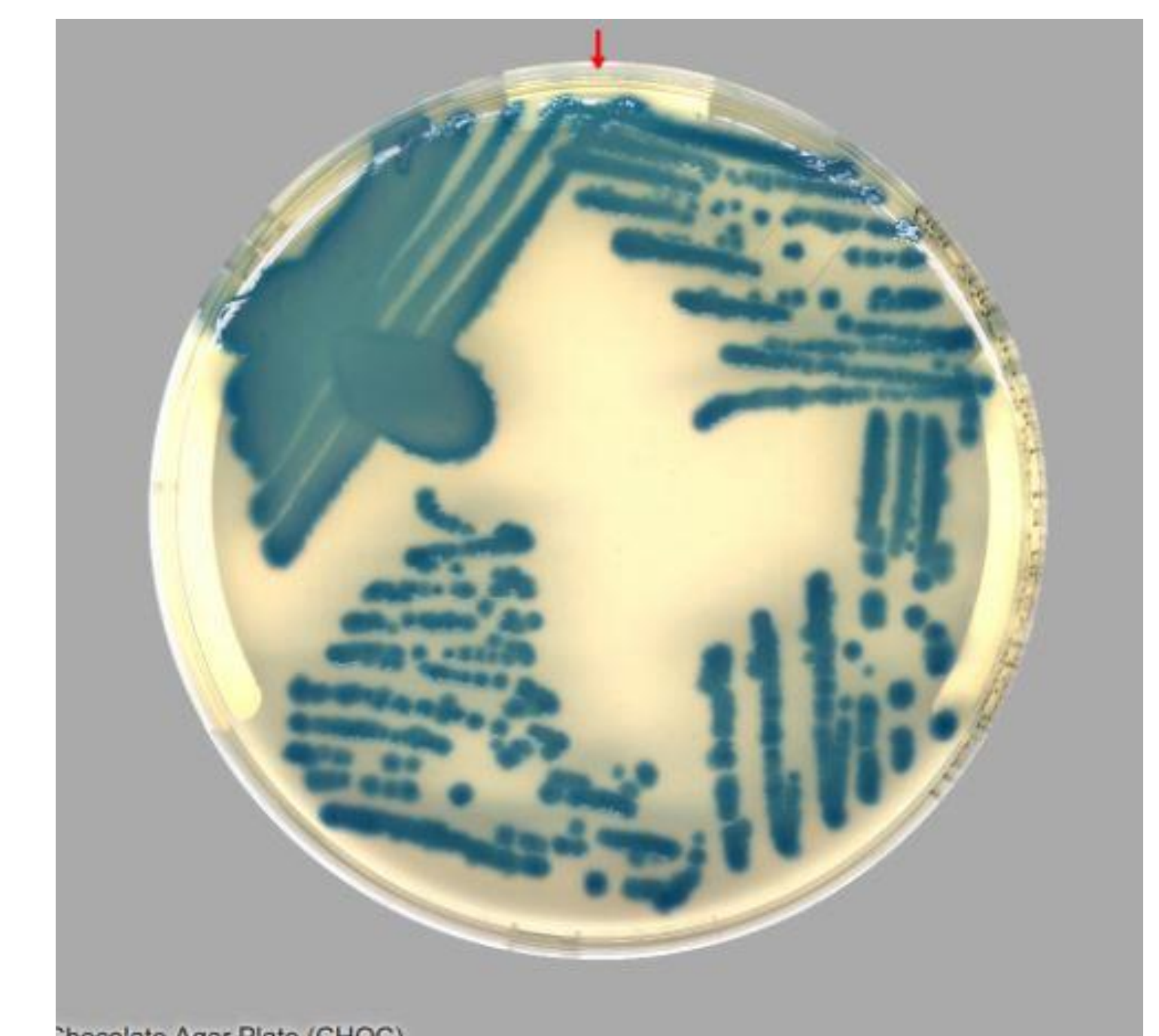


Figure 3: Colorex C3GR agar