Management of a New Delhi metallo-β-lactamase (NDM)-producing *Escherichia coli* Outbreak and Large-Scale Exposure Event Associated with Endoscopes

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Background

- Carbapenem-resistant Enterobacterales (CRE) are multidrug-resistant organisms isolated predominantly from patients with exposures in health care facilities
  - New Delhi metallo-β-lactamase (NDM), a carbapenemase, has been increasingly reported in the United States and has the potential to add substantially to the total CRE burden
- Between July 2021-March 2023, 9 cases of genetically similar NDM-producing *Escherichia coli* were identified in our healthcare facility (HCF)
- Upon further investigation, it was discovered that these patients had procedures in the same Endoscopy procedural area using the same 5 endoscopes: 3 duodenoscopes and 2 gastroscopes
  - These scopes were also used in thousands of other procedures
- The scopes were sequestered immediately, and a multi-prong approach was taken to evaluate the situation and determine if other patients may have been exposed and prevent further transmission
- This approach include:
  - Establishing a case definition to determine exposure period
  - Offering screening to exposed patients
  - Auditing the affected procedural and reprocessing areas
  - Evaluating the maintenance of the implicated scopes
  - Having the scopes evaluated by an external third-party vendor

Exposure Definition

- We collaborated with the Michigan Department of Health and Human Services (MDHHS) to establish an exposure definition and timeline
- Patients who had a procedure with the implicated gastroscopes between May 2021-March 2023 were considered exposed
- The suspected index case had the initial procedure with implicated scopes in May 2021
  - Patients with duodenoscope exposure were previously screened
- The implicated gastroscopes were used for 1326 procedures within the exposure window
  - After removing duplicates and deceased patients, 1097 unique patients were considered exposed

Patient Notification & Screening

Patient Notification & Scheduling

- A letter was sent via mail and our electronic patient portal system to notify patients of the potential exposure and offer them free CRE screening via rectal swab
  - The letter included the implicated organism
  - The letter also included a dedicated phone number with voicemail to call if patients had questions
- Given the large volume of exposures, an electronic scheduling system was established for patients to self-schedule for specimen collection
  - 205 patients sought testing and 115 called with questions

Managing Patient Communication

- A dedicated call center of nurses was established to manage calls
- An in-service was held for these nurses prior to patient contact to provide them the information needed to answer potential patient questions
- A Frequently Asked Questions (FAQ) document was also developed to guide them in this work
- Daily huddles with the call center team were conducted
  - This allowed us to identify themes and patterns to calls, address issues quickly, and answer any additional questions

Screening

- The screening tests were ordered in bulk prior to patients being notified of the exposure
  - Since the testing was being offered at no cost, each patient's chart had to be flagged to ensure the charges were waived upon check-in
- The staff collecting specimens required education on swabbing technique, documentation, and specimen labeling

Other Noteworthy Information

- Overall, the self-scheduling process for testing was a success
- However, there were some deviations from the process
  - Although the notification letter outlined a clear process for patients to follow for testing, some did not follow the instructions and proceeded to an Emergency Department or their Primary Care Provider's office
  - In most of these cases, the providers collected the specimen, but some service recovery was required regarding the documentation that had to accompany the specimen to the MDHHS Laboratory
    - In these cases, patients were also charged for the test, and the charges had to be reversed once discovered
- It's important to notify ED, Primary Care, and Urgent Care providers of the situation before letters go out
  - A copy of the notification letter and outline of the process for screening were provided
- The electronic patient portal systems should be leveraged for notification
  - Only send paper letters if patients do not have an electronic account
  - Printing letters, stuffing envelopes, and mailing letters was very challenging

Scope & Environmental Evaluation

Procedural Area

Observation

- Observations were performed of scope use and procedural room set-up and turn-over between cases to evaluate handling, environmental cleaning, and hand hygiene

Findings

- It was discovered that the cleaning process of rooms between cases was inconsistent and varied by staff member due to lack of formal education or competency on room cleaning and turn-over
- This area also lacked the necessary housekeeping support due to being short staffed

Intervention

- Education and a competency on room cleaning was created and implemented

Reprocessing Area

Observation

- Enhanced audits in the scope reprocessing areas

Findings

- There were no gaps observed in endoscope reprocessing due to the robust reprocessing education and auditing program we established and have continued to refine since 2019

Intervention

- Protein testing was implemented for ALL scopes during reprocessing

Scopes

Observation

- The sequestered scopes were sent to a third-party vendor for testing and visual inspection
- Performed internal investigation of scope maintenance and repair

Findings

- The external vendor assessment of the scopes revealed significant internal damage within the channel of more than one scope, and all grew multiple organisms, but *E. coli* was not recovered
- Internal investigation revealed a lengthy history of repair and minimal preventative maintenance (e.g., borescope inspections)
- Additionally, it was discovered that more money had been spent repairing the scopes than it would have cost to replace them

Intervention

- Implicated scopes were retired and replaced with new scopes

Conclusion

- An incredible amount of resources and time were required to manage this outbreak and exposure event
  - 77 individuals participated in the planning, implementation, and management of this outbreak and exposure event
- Through proper planning, communication, and a clearly outlined process for patient screening, we were able to manage this exposure event relatively smoothly