Epidemiologic Characteristics of Healthcare-Associated Outbreaks and Lessons Learned from Multiple Outbreak Investigations

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Methods

- Healthcare-associated outbreak investigations at an academic hospital during January 2012–December 2016 were retrospectively reviewed through institutional healthcare-associated infection (HAI) data.
- The data included comprehensive hospital-wide surveillance, monthly reports to the hospital infection control committee, and reports of pulsed-field gel electrophoresis (PFGE) analysis.
- Our outbreak investigations were triggered by an increase in number of infections or pathogens above baseline rate in a unit during a specified period of time.
- A healthcare-associated outbreak evaluated by molecular typing was defined as 1) cases overlapping in time and space and 2) identification of at least 2 isolates linked by PFGE.
- Contact tracing associated with exposure investigations with a focus on the usefulness of molecular analysis.

Results

- Fifty-one healthcare-associated outbreaks (annual rate 8-15), including 26 (51%) outbreaks in ICUs and 25 (49%) outbreaks in non-ICUs, and 263 infected/colonized patients (median 4 range 1-20) involved in these outbreaks were identified (Fig. 1, Table 1).
- The frequency of pathogens varied greatly by affected location, specifically multidrug-resistant organisms (MDROs) in ICUs and gastroenteritis in non-ICUs (Clostridium difficile, norovirus, adenovirus) (Fig. 2, 3).
- Outbreaks in ICUs significantly tended to recur more commonly than those in non-ICUs (P=0.0001, Table 1)
- All outbreaks were limited to approximately one-third of all units with some repeated instances of same pathogens.
- Of 16 outbreaks due to a bacterial pathogen (total 99 bacteria isolates, median 4.5, range 2-20) evaluated by PFGE, 12 (75%) included some indistinguishable strains, suggesting person-to-person transmission or a common source of infection.
- PFGE were more frequently performed in ICU outbreaks than in non-ICU outbreaks (P=0.0006).
- A majority of outbreaks were terminated rapidly by enhanced control measures.
- Seven (14%) outbreak investigations (four caused by norovirus) led to closure of the affected location.

Conclusions

- We characterized epidemiologically multiple outbreaks over time at a single academic hospital.
- This study demonstrated significant differences in epidemiologic characteristics of multiple healthcare-associated outbreaks between ICUs and non-ICUs.
- Our analysis provided insight into the usefulness of routine molecular analysis in assessing the transmission of MDROs and understanding the epidemiology of outbreaks.
- Our findings are important to implement appropriate infection prevention against healthcare-associated outbreaks and avoid repeated cases.