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Publication Title/Journal/Conference:

A prospective study of transmission of Multidrug-Resistant Organisms (MDROs) between environmental sites and hospitalized patients—the TransFER study

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Methodology/Study Design:

- Prospective cohort study involving 2 academic medical centers.
- Study designed to characterize the baseline and temporal profile of microorganisms on environmental surfaces of acute-care hospital rooms and on patients admitted to these newly disinfected rooms.
- Study sought to characterize the nature of bacterial transfer events between patients and environmental surfaces using 4 'marker' MDROs: methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *enterococci* (VRE), *Clostridium difficile*, and multidrug-resistant (MDR) *Acinetobacter baumannii.*

Experiment:

- 80 patient–room admissions enrolled.
- 2 hospitals: Duke University Hospital and Duke Regional Hospital.
- Patients enrolled in study were preferred (1) to be admitted to rooms whose antecedent patient was placed on contact precautions for any reason and (2) patients with anticipated hospital stay of ≥48 hours.
- Environmental and patient microbiological samples were obtained on admission into a freshly disinfected inpatient room.

Results/Conclusions:

- There were 9 enrolled patients (11.3%) asymptomatically colonized with MDROs upon admission (study entry).
- Hospital room surfaces were contaminated with MDROs despite terminal disinfection in 44 out of the 80 rooms (55%).
- Microbiological Bacterial Transfer (MBT) events occurred in 12 patient encounters (18.5%) of the 65 patients in the microbiologically evaluable (ME) cohort.
    - 2 (16%) were associated with MRSA,
    - 5 (42%) were associated with VRE,
    - 5 (42%) were related to *C. difficile*
    - These MBT events were either from the patient, the environment, or both.
        - 4 MBT events (33%) occurred from patient to environment;
        - 4 events (33%) occurred from environment to patient;
            - 2 environment-to-patient transfer events (50%) were molecularly similar organisms to the hospital room surfaces at baseline.

Results/Conclusions cont.:

- Molecular testing of specimens showed the following:
  - 6 encounters (66.7% of the 9 microbiologically evaluable (ME) cohort with molecular data and 9.2% of the 65 evaluable patients) involved molecularly identical strains of MDRO.
  - 7.5% of all hospital-room encounters showed transfer of clonally identical MDROs.
  - 2 encounters (3%) from the patient acquired an MDRO present in the environment at the time of admission; both events were confirmed environment-to-patient transmissions involving *C. difficile*.
- Microbiological Bacterial Transfer events between patients and the environment were observed in 18.5% of patient encounters and occurred early in the admission.
- This study suggests that research on prevention methods beyond the standard practice of room disinfection at the end of a patient's stay is needed to better prevent acquisition of MDROs through the environment.

Limitations:

- Small sample size
- Study targeted rooms where patients were previously on contact isolation precautions, which may limit generalizable clinical application
- Microbiological sampling occurred at different times during the day & daily cleaning may have already occurred producing variability in results.
- Bias due to potential of other transmission vectors (healthcare staff or visitors).