computed $W(i, j)$ for all room pairs $i, j$ for parameters $t_1 = 30$ seconds and $t_2 = 1,800$ and 3,600 seconds. For nurses, there was a strong negative correlation of between pairwise room distance and the weights $W(i, j)$ ($-0.768$ for $t_2 = 1,800$; $-0.711$ for $t_2 = 3,600$). The more distant 2 rooms were, the less they shared nurse traffic. This was not true for physicians (correlation $= -0.027$ for $t_2 = 1,800$; $-0.014$ for $t_2 = 3,600$). Figure 1 shows a weight versus distance scatter plot for nurses for $t_1 = 30$ and $t_2 = 1,800$. This spatial correlation has positive implications for disease spread; the base simulation, which preserves these spatial correlations, has between 12% and 55% fewer mean infected patients ($> 100$ replicates) for different simulation parameters compared to the perturbed simulation. Conclusions: Our results, based on fine-grained data, show a "naturally emerging" cohorting behavior of nurses, where nurses are more likely to visit rooms close to each other within a 30–60 minute time window, than rooms further away. Through simulations, this behavior provides substantial protection against disease spread.

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New Approaches to Colonization Screening in Response to Emerging Antimicrobial Resistance

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Background: The capacity to monitor the emergence of carbapenemase-producing organisms (CPO) is critical in limiting transmission. CPO-colonized patients can be identified by screening rectal specimens for carbapenemase genes and the Cepheid GeneXpert Carba-R (XCX), the only FDA-approved test, is limited to 5 carbapenemase genes and cannot identify the bacterial species. Objective: We describe the development and validation of culture-based methods for the detection of CPO in rectal cultures (RCs) and nonrectal cultures (NRCs) of tracheal aspirate and axilla-groin swabs. Methods: Colonization screening was performed at 3 US healthcare facilities; specimens of RC swabs and NRC ESswabs were collected. Each specimen was inoculated to a MacConkey broth enrichment tube for overnight incubation then were subcultured to MacConkey agar with meropenem and ertapenem 10 μg disks (BEMA) and CHROMagar KPC (KCHR) or CHROMagar Acinetobacter (ACHR). All media were evaluated for the presence of carbapenem-resistant organisms; suspect colonies were screened by real-time PCR for the most common carbapenemase genes. MALDI-TOF was performed for species identification. BEMA, a previously validated method, was the comparator for 52 RCs; clinical culture (CC) served as the comparator method for 66 NRCs. Select CPO-positive and -negative specimens underwent reproducibility testing. Results: Among 56 patients undergoing colonization screening, 12 (21%) carried a CPO. Only 1 patient had CPO solely from RC. Also, 6 patients had both CPO-positive RC and NRC, and 5 patients only had a CPO-positive NRC. Of the latter, 4 had a CPO-positive tracheal specimen, and 1 had a positive culture from both tracheal and axilla-groin specimens. Sensitivity of BEMA (70%) for NRC was lower than for KCHR (96%) and ACHR (88 %) for all specimens. All methods showed a specificity of 100% and reproducibility of 92%. The detected CPO included OXA-23–positive Acinetobacter baumannii, NDM-positive Escherichia coli, KPC-positive Pseudomonas aeruginosa and 4 genera of KPC-positive Enterobacteriaceae. Conclusions: The addition of nonrectal specimens and use of selective media contributed to increased sensitivity and enhanced identification of CPO-colonized patients. Positive cultures were equally distributed among the 3 specimen types. The addition of the nonrectal specimens resulted in the identification of more colonized patients. The culture-based method was successful in detecting an array of different CPOs and target genes, including genes not detected by the Carba-R assay (eg, blaOXA-23-like). Enhanced isolation and characterization of CPOs will be key in aiding epidemiologic investigations and strengthening targeted guidance for containment strategies. Funding: None

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Nonsusceptibility to Ceftazidime or Ceftepime Can Predict Carbapenemase-Production Among Carbapenem-Resistant Pseudomonas aeruginosa

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Background: The United States, carbapenemases are rarely the cause of carbapenem resistance in Pseudomonas aeruginosa. Detection of carbapenemase production (CP) in carbapenem-resistant P. aeruginosa (CRPA) is critical for preventing its spread, but testing of many isolates is required to detect a single CP-CRPA. The CDC evaluates CRPA for CP through (1) the Antibiotic Resistance Laboratory Network (ARLN), in which CRPA are submitted from participating clinical laboratories to public health