Table 1.

Years	Total HAI Rates	CAUTI Rates	CLABSI Rates	VAP Rates	HH Observations/ Compliance Rate (%)	CVC Care Observations /Compliance Rate (%)	Oral Care Observations/ Compliance Rate (%)
1997–2000	39	22.3	ND	47	ND	ND	ND
2001–2009	33.8	12.7	6.16	21.21	ND	ND	ND
2010–2014	15.48	7.6	6.4	6.56	3,882 (52)	NA	ND
2015–2019	11.54	3.38	1.01	6	10,687 (86)	5,636 (92)	6,412 (80)

Background: Healthcare-associated infection (HAI) control programs have improved patient care all over the world. Our program was implemented in 1997 in a general intensive care unit (ICU) based upon surveillance of HAI with regular infection rates feedback to the ICU team and implementation of best practices such as hand hygiene (HH) and oral care for ventilated patients, optimal care, and early removal of invasive devices. **Objective:** To report our decreasing HAI rates in the past 22 years. **Methods:** Hospital Sao Francisco 20-bed ICU admits 120–140 surgical and clinical patients monthly, with 90% occupancy. The HAI infection control team implemented HAI surveillance and developed several protocols for HAI prevention. In the past 5 years, ICU personnel initiated the collection of several indicators using random direct observations of HH compliance, central venous catheter correct care, and appropriated oral care, among others. HAI definitions followed Brazilian Health Ministry HAI definitions and were expressed as infections per 1,000 patient days (total HAI rate) and device-related infections per 1,000 device days. Catheter-associated urinary tract infection (CAUTI), central-line–associated blood stream infection (CLABSI) and ventilator-associated pneumonia (VAP) rates are reported here. The study period spanned January 1997 to August 2019. Measurement of antibiotic utilization (ie, meropenem, vancomycin, and piperacillin-tazobactam) was calculated by dividing the of antibiotic consumed vials by the daily defined dose and patient days. **Results:** The total HAI, CAUTI, CLABSI, and VAP rates dropped 70%, 85%, 84%, and 87%, respectively, from 1997 to 2019 (Table 1). From 2009 to 2019, we detected decreases in hospital use of meropenem from 52 to 38, in vancomycin from 50 to 40, and in piperacillin-tazobactam from 144 to 88. **Conclusions:** HAI control programs can be effective in ICUs, with impressive results, but it requires time and considerable effort. Data on compliance with basic infection control measures should accompany HAI data and should be shared with the ICU team because ICU team participation is essential to keeping the program alive. Broad-spectrum antibiotics use also decreased, with potential benefits to the hospital flora.
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100% Single-Patient Rooms and Environmental Contamination With Highly Resistant Microorganisms: The MOVE Study

Adriënne S. van der Schoor, Department of Medical Microbiology and Infectious Diseases, Erasmus MC University Medical Centre; Anne F. Voor in 't holt, Department of Medical Microbiology and Infectious Diseases, Erasmus MC University Medical Centre; Juliëtte A. Severin, Department of Medical Microbiology and Infectious Diseases, Erasmus MC University Medical Centre; Diederik Gommers, Department of Adult Intensive Care, Erasmus MC University Medical Centre, Rotterdam, The Netherlands; Marco J. Bruno, Department of Gastroenterology and Hepatology, Erasmus MC University Medical Centre; Joke M. Hendriks, Department of Surgery, Erasmus MC University Medical Centre, Rotterdam, The Netherlands; Margreet C. Vos, Department of Medical Microbiology and Infectious Diseases, Erasmus MC University Medical Centre

Background: Studies have shown that patients colonized with highly resistant microorganisms (HRMO) contaminate the hospital environment, and that transmission from contaminated environments to patients occurs. In May 2018, the Erasmus MC University Medical Center, Rotterdam, moved from a hospital with mostly multiple-occupancy rooms to a new hospital with 100% single-patient rooms with private bathrooms. This move provided the unique opportunity to determine environmental contamination before the new hospital was open for admissions and thereafter and to compare the environmental contamination to the number of patients colonized with HRMO. **Method:** Environmental sampling took place twice in the old building and 12 times in the new building, from 2 weeks before to 15 months after relocating patients. At each moment, ~306 samples were taken from 13 locations (eg, nightstands, sinks) in 40 patient rooms. Samples were screened for *Staphylococcus aureus* (methicillin-susceptible [MSSA] and methicillin resistant [MRSA]) and highly resistant *Pseudomonas aeruginosa, Acinetobacter baumannii, Enterococcus faecium*, and Enterobacteriales. During the study period, January 1, 2018, until August 31, 2019, all clinical samples positive for HRMO were included. **Results:** Environmental sampling revealed that 29 of 724 (4.0%) locations were positive for HRMO in the old building, whereas 4 of 3,358 (0.1%) samples in the new building were positive for HRMO ($P < .001$). In the old building, 14 of 29 locations were positive for extended-spectrum β-lactamase (ESBL)–producing bacteria and 15 were positive for carbapenemase-producing bacteria. In the new building, 3 of 4 positive samples were positive for vancomycin-resistant *E. faecium* (VRE), 1 was positive for ESBL-producing *K. pneumoniae*. For both HRMO, no carriers were detected. In the old building, 145 of 12,256 adult patients (1.2%) had clinical samples positive for HRMO, compared to 561 of 38,397 (1.5%) in the new building, a small but significant increase ($P = .02$).

Conclusions: The transition from mainly 2- and 4-person rooms to 100% single-patient rooms resulted in a significant decrease in environmental contamination, even though the number of patients colonized with HRMO slightly increased. No molecular typing to determine transfer from environment to patients and vice versa has yet been performed. Future sampling is needed to determine whether the low environmental contamination is a long-term effect of the transition to single rooms.
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A Bundled Approach to Reduce Delayed Testing and Hospital-Acquired Cases of *Clostridioides difficile* Infection

Ioana Chirca, University Hospital; Alan Sun, Dwight D Eisenhower Army Medical Center; Adrienne Wright Albrecht, University Hospital Sallie Jo Rivera, University Hospital; Kelly Henry, University Hospital Connie Faircloth, University Hospital

Background: *Clostridioides difficile* is a leading cause of nosocomial infectious diarrhea in developed countries, and it has a significant economic impact throughout the world. Early detection of the pathogen and its toxins is critical because early treatment significantly reduces infection-related morbidity, mortality, and medical cost. Surveillance of healthcare-associated infections (HAIs) is conducted using the NHSN standardized infection ratio (SIR). This metric allows comparison of a facility's observed infection rate to a national benchmark. The SIR can be elevated due to both a lack of institutional criteria for stool submission and the use of highly sensitive but poorly specific testing as a standalone test for diagnosis. The SIR can be artificially elevated by inclusion of *C difficile* carriers rather than infected patients due to inappropriate testing and overly sensitive methods. We aimed to determine the impact of an institutional nursing-driven protocol for stool submission as well as 2-step testing on the SIR. **Methods:** Starting from the fourth quarter of 2018, we instituted a nursing protocol for initiation of *C. difficile* testing. If the patient had ≥3 soft, loose, or liquid stools in 24 hours within the first 3 days of admission, they were placed on contact precautions and an unformed stool sample was submitted for *C. difficile* nucleic acid amplification testing (NAAT). A positive result prompted further evaluation with a stool enzyme immunoassay toxin test for confirmation of active infection. From hospital day 4 onward, stricter criteria were implemented for testing for *C. difficile* infection. Data were extrapolated for calculation of a quarterly SIR. This value was then compared to retrospective SIR data from the first quarter of 2016 to the third quarter of 2018. **Results:** The quarterly total of hospital-onset *C. difficile* infections from the first quarter of 2016 to the third quarter of 2018 ranged from 24 to 39 incidents per quarter. After implementing the nursing-driven protocol and 2-step testing, the quarterly total of hospital onset *C. difficile* infections decreased to 5–6 per quarter. The SIR prior to initiation ranged from 0.66 to 1.37 and decreased to 0.306–0.386 after the nursing-driven protocol and 2-step testing were implemented. **Conclusions:** Implementation of both an institutional nursing-driven protocol for stool submission and a 2-step testing protocol reduced the number of quarterly hospital-onset *C. difficile* events as well as our facility's quarterly SIR to below the national standard.

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A Clinical Decision Support Intervention to Improve Inpatient Pediatric Influenza Vaccination

Omar Elsayed-Ali, Emory Univeristy School of Medicine; Swaminathan Kandaswamy, Emory University School of Medicine; Andi Shane, Emory University School of Medicine; Stephanie Jernigan, Children's Healthcare of Atlanta; Patricia Lantis, Children's Healthcare of Atlanta; Erin Masterson, Children's Healthcare of Atlanta; Pareen Shah, Children's Healthcare of Atlanta Reena Blanco, Children's Healthcare of Atlanta; Srikant Iyer, Children's Healthcare of Atlanta; Evan Orenstein, Children's Healthcare of Atlanta

Background: Pediatric influenza vaccination rates remain <50% in the United States. Children with chronic medical conditions are at higher risk of morbidity and mortality from influenza, yet most experience missed opportunities for immunization in outpatient settings. In an adult cohort study, 74% of patients who had not received the influenza vaccine before or during hospitalization remained unvaccinated through the rest of the season. Thus, inpatient settings represent another important opportunity for vaccinating an especially susceptible population. In addition, 4 published studies have shown promise in improving inpatient pediatric influenza vaccination. However, these studies had limited effect sizes and included interventions requiring ongoing maintenance with dedicated staff. In this study, we hypothesized that a clinical decision support (CDS) intervention designed with user-centered design principles would increase inpatient influenza vaccine administration rates in the 2019–2020 influenza season. **Methods:** We performed a workflow analysis of different care settings to determine optimal timing of influenza vaccine decision support. Through formative usability testing with frontline clinicians, we developed electronic health record (EHR) prototypes of an order set module containing a default influenza vaccine order. This module was dynamically incorporated into order sets for patients meeting the following criteria: ≥6 months old, no prior influenza vaccine in the current season in our medical system or the state immunization registry, and no prior anaphylaxis to the vaccine. We implemented the CDS into select order sets based on operational leader support. We compared the proportion of eligible hospitalized patients in which the influenza vaccine was administered between our intervention period and the 2018–2019 season (historical controls). To account for secular trends, we also compared the vaccination rates for hospitalized patients exposed to our CDS to those that were not exposed to the CDS during the intervention period (concurrent controls). **Results:** During the intervention period (September 5, 2019–November 1, 2019), influenza vaccine was administered to 762 of 3,242 (24%) of eligible patients, compared to 360 of 2,875 (13%) among historical controls ($P < .0001$). Among the 42% of patients exposed to the CDS, vaccination rates were 33% compared to 9% for concurrent controls ($p < .0001$). Our intervention was limited by end-user uptake, with some physicians or nurses discontinuing the default vaccine order. In addition, early in the intervention, some vaccines were ordered but not administered, leading to vaccine waste. **Conclusions:** CDS targeting eligible hospitalized patients for influenza vaccination incorporated early into the workflow of nurses and ordering