

ANTIBIOTIC RESISTANT ORGANISMS IN DIALYSIS UNITS

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The prevalence of antimicrobial-resistant microorganisms such as vancomycin-resistant enterococci (VRE), methicillin-resistant *Staphylococcus aureus* (MRSA), and gram-negative bacilli resistant to third-generation cephalosporins in various health care settings, including outpatient dialysis facilities, has increased dramatically in the last decade. This rapid increase is largely due to antimicrobial use and patient-to-patient transmission of resistant strains.

The dialysis unit is an ideal setting for cross-transmission of antibiotic resistant organisms (AROs). In hemodialysis (HD) units, HD patients are confined in a closed environment for long periods of time in close proximity to other patients. In addition, dialysis personnel are in frequent contact with multiple patients. Each of these factors facilitates cross-transmission of AROs between HD patients. Nevertheless, an organized approach to prevention of transmission can be successful in limiting transmission and reducing patient morbidity. Advocacy and modelling of appropriate behaviours by clinical leadership are keys to success.

Environmental Contamination and Spread of AROs

- Environmental contamination by VRE/MRSA readily demonstrated, but not clear evidence of risk for transmission.
- Huang *et al.* demonstrated a risk of ICU acquisition based on status of prior occupant of room.¹
 - Accounting for 5% of new MRSA and 7% of VRE
- Green *et al.* could not demonstrate any association between overall hospital cleanliness and rate of MRSA bacteremia.²

Predictors of Methicillin-Resistant *Staphylococcus aureus* (MRSA) and Vancomycin-Resistant Enterococci (VRE) Acquisition

Model	Odds Ratio (95% Confidence Interval)	P-Value
MRSA		
Prior occupant MRSA-positive	1.4 (1.0-1.8)	0.04
Age, in decades	1.1 (1.0-1.2)	0.02
Pre-ICU LOS	1.2 (1.1-1.4)	<0.001
Leukemia	0.4 (0.2-0.9)	0.02
VRE		
Prior occupant VRE-positive	1.4 (1.0-1.9)	0.02
Age, in decades	1.2 (1.1-1.3)	<0.001
Pre-ICU LOS	1.4 (1.3-1.6)	<0.001

Infection control measures to reduce AOR transmission include hand washing and donning gloves and gowns before entering the room of a colonized or infected patient.

In the hospital setting, it has been shown that the risk for acquiring MRSA or VRE correlates positively with the MRSA or VRE status of the prior occupant of the room, as shown in the table below.¹ Early detection of carrier states, contact barrier precautions, and prompt therapy of infection with judicious use of antimicrobials are important in limiting the spread of AROs.

Infection control measures aimed at limiting the dissemination of AROs include routine hand hygiene with alcohol-based agents and donning gloves and gowns before entering the room of a colonized or infected patient. Adequate patient-to-staff ratios are an important factor in reducing unit-based transmission.

Evolving strategies supported in the literature but still requiring further investigation prior to widespread adoption include antimicrobial decolonization of MRSA carriers and use of topical chlorhexidine to reduce cutaneous bioburden and shedding of resistant strains.

Other efforts to decrease the rate of ARO colonization and infection focus on limiting the use of antibiotics. Vancomycin, third-generation cephalosporins, and antibiotics with anaerobic coverage, as well as the total number of antibiotics and duration of their use, have been consistently associated with an increased risk of ARO colonization or infection.

¹Huang, SS, Datta R, Platt R. Risk of Acquiring Antibiotic-Resistant Bacteria from Prior Room Occupants. Arch Intern Med. 2006;166:1945-1951.

²Green D, Wigglesworth N, Keegan T, Wilcox MH. Does hospital cleanliness correlate with meticillin-resistant Staphylococcus aureus bacteraemia rates? J Hosp Inf. 2006;64:184-186.