

Microorganism Movers: Mobile Equipment and Implications for Infection Prevention

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Introduction

Numerous studies have shown that hospital surfaces and frequently used medical equipment become contaminated by a variety of pathogenic and nonpathogenic organisms. This white paper is intended to provide guidance on what can be done to mitigate cross contamination of noncritical patient care items in order to help reduce and prevent HAIs.

Mobile Equipment in Healthcare

Mobile equipment in healthcare is any type of device that is transported and used in the delivery of care for more than one patient, equipment that is used to transport patients, or the transport itself. This can include wheelchairs, computers on wheels (COWs), workstations on wheels (WOWs), IV poles, glucometers, blood pressure cuffs and any other patient equipment at the bedside that is moveable or portable. According to the Centers for Disease Control and Prevention's (CDC) 2008 guidelines for Disinfection and Sterilization in Healthcare Facilities, mobile equipment largely consists of "noncritical items" under the Spaulding system of classification, or ones that comes in contact with intact skin, but not mucous membranes. These noncritical items are further divided into patient care items and environmental surfaces.¹

There are thousands of interactions and touch points that can occur between equipment healthcare staff and patients every day. Most mobile equipment falls under the category of hard surfaces. Therefore regular cleaning and disinfection of the environment is critical to reduce the presence of harmful pathogens and prevent cross-transmission. The 2008 CDC guidelines states "Noncritical environmental surfaces

frequently touched by hand potentially could contribute to secondary transmission by contaminating hands of health-care workers or by contacting medical equipment that subsequently contacts patients."² Even though these points of contact are known to be potential areas for cross-contamination, most facilities do not have policies or best practice guidance to follow.

Contamination of Mobile Equipment: Clinical Evidence

Numerous studies have shown that hospital surfaces and frequently used medical equipment become contaminated by a variety of pathogenic and nonpathogenic organisms.^{1,2} Common human pathogens, such as methicillin-resistant *Staphylococcus aureus* (MRSA), vancomycin-resistant *Enterococcus* (VRE), *Clostridium difficile*, *Acinetobacter* species, and noroviruses can survive for prolonged periods on hospital.² In the September 2012 issue of *Infection Control and Hospital Epidemiology*, researchers observed that only 50 percent of high-touch surfaces in the operating rooms at a 1,500-bed teaching hospital were cleaned properly. Some of the surfaces sampled were "anesthesia-related equipment — keyboards, knobs, switches, oxygen reservoir bags and adjacent medication drawers — bed control panels, Mayo stands, intravenous poles, intravenous pumps, OR entry doors, overhead lamps and the floor".³ It's been shown that computer keyboards are reservoirs for bacteria, but a 2009 study of computer stations on wheels revealed that daily cleaning of the keyboard was at zero percent over a baseline evaluation period of several weeks.⁴ In 2013, researchers in Israel identified that "wheelchairs are contaminated by several pathogenic bacteria, among them antibiotic resistant strains."⁵

Elements of a mobile disinfection protocol

Based on these studies conducted to date, it is important that best practices, evidence-based guidelines and standard written procedures need to be implemented for how to disinfect mobile equipment. The literature data that has documented contamination of mobile equipment coupled with the frequency of interaction and use by healthcare staff and patients presents many opportunities for cross-contamination to occur. Therefore meticulous attention to cleaning and disinfection is necessary to prevent cross-contamination.

The use of an EPA-registered disinfectant that has broad efficacy against bacteria, viruses and fungi is ideal for cleaning and disinfecting mobile equipment. CDC guidelines recommend the use of a low-level disinfectant for noncritical items, unless they are visibly soiled with blood or bodily fluids.⁶ Best practices support the need for, patient care items to be disinfected between each use. It is important that directions of the disinfectant be followed and that the longest contact time on the product label should be used to ensure full efficacy against the labeled microorganisms listed. To meet regulatory requirements and prepare for surveys from regulatory bodies such as The Joint Commission, ensure that staff responsible for cleaning mobile equipment are educated and understand the indications and proper use of the product, including contact time.

When creating best practices and SOPs the following critical components need to be included:

- Selection and placement of disinfection products
- Collaboration and clear communication of roles and responsibilities among various departments and staff.
- Instruction on the use of the disinfectant chosen
- Ongoing staff education and compliance monitoring

Product Selection and Placement

Use an EPA-registered disinfectant that has microbicidal activity against pathogens most likely to colonize or infect patients in accordance with manufacturers' instructions. Accessibility of the product is also important especially for portable equipment. It is essential to place disinfection solutions in multiple areas where equipment may be used, stored or moved to. Ideally products should be placed on or connected directly to the equipment so the ease of access and use is continuous. This will ensure and improve compliance by serving as a constant reminder to disinfect. Studies have

shown that compliance increases with increased accessibility to disinfectants. A proactive environmental and hand hygiene initiative at a 137-bed long-term care facility identified a lack of convenient and accessible solutions for disinfection. In response, a greater number of products were installed and strategically placed on medication, treatment and housekeeping carts as well as in all nursing stations, dining, therapy and activity rooms, and public lounge areas. Staff input was solicited to determine optimal placement. This, coupled with intensive staff education for all shifts, resulted in a dramatic reduction of hospital transfers due to healthcare associated infections, reduced employee absenteeism and reduction in cost association with antibiotic use.⁹

Roles and Responsibilities

Due to the types and numbers of different mobile equipment, and the different disciplines of healthcare providers (nurses, physicians, environmental services, central processing or transport personnel) who use the equipment can create challenges and obstacles to ensure compliance. In some cases, such as with wheelchairs or IV poles, patients and families are involved. In addition, equipment transferred through multiple hands has a greater chance of not being returned to its proper place. Therefore it is important to clearly define who is responsible for ensuring that cleaning and disinfecting has occurred. Havill et al. used a multi-disciplinary committee spanning many departments to identify and assign certain areas and equipment to be disinfected by either nursing staff or housekeeping staff.⁷ Develop and implement policies and procedures to ensure that reusable patient care and non-critical equipment surfaces is cleaned and reprocessed appropriately before use on another patient.

Ongoing Staff Education

Referring back to Havill et al., the subsequent analysis of rolling blood pressure units and compliance by nursing staff found that the equipment was not being sufficiently disinfected, despite the development of written procedures. The researchers recommended periodic education and monitoring to ensure compliance.⁷ An earlier program focusing on the environmental services staff showed success utilizing a combination of lecture materials, in-person demonstrations, live Q&A sessions and scripted responses for interaction with patients during cleaning procedures.¹⁰ Munoz-Price et al. increased cleaning rates in the operating room from 50 to 82 percent through education of environmental services staff coupled with feedback using ultraviolet markers.³

It is important to measure adherence to the policies and procedures developed and provide personnel with information on their performance. Ongoing training combined with monitoring the cleaning practices to the staff has been shown to improve compliance and effectiveness.

Putting a Protocol in Place

To begin, establish the “status quo” or baseline for mobile equipment disinfection and review/record any current cleaning procedures across departments and equipment. Consider creating an interdepartmental committee to take on this charge. Assess current cleaning procedures through environmental contamination testing. These initial measures will establish a baseline for evaluating program progress and successes. Next, determine high-risk areas or equipment (i.e. items used in critical care units with higher-risk patients or ones that are passed between patients most frequently). As the number of equipment types can be quite large, starting with the highest-risk may be more manageable — and has the potential for the greatest impact on positive patient outcomes.

Answers to the following questions should be considered and incorporated as elements in your standard procedure.

- **Staff responsibility and chain of possession**
It will be important to clearly identify roles and responsibilities, most likely across departments.
 - Who will be responsible for cleaning the equipment?
 - When should they be disinfecting the equipment?
 - How will staff identify what is clean?
- **Monitoring and reporting procedures**
Compliance is greatly increased when someone is paying attention and holding staff accountable.
 - How will you monitor compliance?
 - How frequently will this be done?
 - Who is responsible tracking mobile equipment disinfection?
- **Staff education and re-education**
Staff should be trained on the proper use of the disinfectant and adhere to the overall contact time. They should also be frequently reminded of the importance and empowered to do their part.
 - How will you keep the program top-of-mind?
 - What tools and resources are available to educate staff on proper disinfection procedures?

- **Placement of surface and hand hygiene products**
Greater accessibility, usability and convenience of surface disinfection products will increase compliance. Soliciting input from the staff responsible for cleaning may be helpful.
 - Where disinfection products should be placed?
 - Does the product manufacturer offer any compliance tools or accessories?

Also reiterate that hand hygiene remains paramount. Reminders about the importance of hand hygiene as the first line of defense against the spread of infection should be included in any program and/or staff education piece.

Conclusion

Addressing all aspects of the facility through infection prevention is paramount, given recent legislation and the changing healthcare landscape. The current healthcare system looks to accomplish The Triple Aim, developed by the Institute for Healthcare Improvement (IHI). The goals of the Triple Aim are to improve the patient experience and improve the health of the overall population, while simultaneously reducing healthcare costs.¹¹ At the same time, the Centers for Medicare and Medicaid (CMS) have instituted a value-based purchasing program and are decreasing reimbursements and assessing penalties if facilities don't meet certain requirements. These include positive patient satisfaction scores, reductions in hospital-acquired conditions, and reductions in readmission rates.¹² In light of this transformation of healthcare delivery, health systems will be looking for ways to create cost efficiencies to remain economically viable.

Infection prevention programs can help support and address all aspects of the Triple Aim. It has been proven that healthcare-associated infections (HAI) increase length of hospital stays and increase patient costs. Conversely, it has also been shown that infection prevention initiatives have directly led to decreased infection rates, reduced costs and positive patient outcomes. In addition, certain HCAHPS (Hospital Consumer Assessment of Healthcare Providers and Systems) scores relate to the cleanliness of the environment, connecting environmental hygiene directly to patient satisfaction with hospital performance.

While there is abundant evidence supporting the contamination of mobile equipment as well as the potential patient and cost benefits of frequent and proper disinfection, facility policies vary widely, are not evidence-based and in some cases do not even exist. Therefore the infection prevention department can be a champion for creating a disinfectant mobile equipment procedure as well as a process for assigning roles and responsibilities, frequency of cleaning, product placement and monitoring.

Education is an integral component of any infection prevention and control program. Therefore a comprehensive program for mobile equipment disinfecting will not only improve patient outcomes but also improve mobile asset management and hospital efficiency, which in turn will provide additional cost savings to both the patient and the institution.

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Elizabeth Ernst has more than twenty years of experience in healthcare including regulatory, clinical trials, drug safety, risk evaluation, quality, compliance and labeling. Her clinical nursing experience spans pediatric, medical-surgical and cardiac intensive care settings. She is an active Industry member of the Regulatory Affairs Professional Society (RAPS), American Association of Pharmaceutical Scientists (AAPS), Drug Information Association (DIA) and American College of Clinical Pharmacology (ACCP). She received her Bachelors of Science in Nursing from Wright State University and is currently completing her Masters of Science in Quality and Regulatory from Temple University.