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Letters to the editor

Disinfection of iPad to reduce contamination with *Clostridium difficile* and methicillin-resistant *Staphylococcus aureus*

To the Editor:

In recent years, there has been an accelerated use of electronic medical records resulting in a more efficient management of patient information.[1,2] Consequently, mobile technology devices including computer tablets such as iPad (Apple, Cupertino, CA) have been increasingly used to access information for patient care.[3] This observed trend raises questions on infection control measures to avoid transmission of pathogens through this new technology. The manufacturer recommends cleaning the device using a slightly damp, lint-free cloth.[4] We conducted a point prevalence survey to assess contamination of hospital iPads and evaluated methods to reduce contamination with *Clostridium difficile* and methicillin-resistant *Staphylococcus aureus* (MRSA).

Twenty hospital provided iPads were sampled by swabbing the screen, plating onto *C difficile* selective agar, and then incubating anaerobically. A separate swab was plated on blood agar and incubated in room air. Colonies with unique morphology were subjected to identification and susceptibility testing in accordance with Clinical Laboratories Standards Institute guidelines.[5] We then assessed the proportion of devices contaminated with *C difficile*, *S aureus*, and gram-negative microorganisms.

We also evaluated disinfection techniques of iPads by inoculating 10-μL aliquots of approximately 1.5×10^4 colony-forming units (CFU) of MRSA onto a bleach precleaned screen surface that was allowed to air-dry. The surface was wiped with 70% isopropyl alcohol pads (Medline Industries, Mundelein, IL), 0.6% hypochlorite bleach wipes (PDI Inc, Orangeburg, NY), or a 2 × 2-inch soft, lint-free microfiber lens cloth moistened with sterile water. The screen was then swabbed and plated on MRSA selective agar. The numbers of colonies were counted, and 10 replicates were done for each cleaning material. The experiment was repeated using approximately 1.5×10^4 spores of *C difficile* instead of MRSA. Data were collected for each cleaning agent, and control plates were used to ensure conditions for growth.

Of 20 iPads evaluated by culture, 3 (15%) grew *S aureus*. There was neither growth of *C difficile* cultures nor any gram-negative pathogens. Figure 1 shows results of the proportion of *C difficile* and MRSA recovered from iPad after inoculation followed by decontamination with different methods. These data clearly show that bleach wipes were able to remove the inoculated spores completely. The microfiber cloth was significantly more effective than alcohol wipes in removing *C difficile* spores from the screen surface ($P < .001$). There was only a mean of 0.93-$\log_{10}$ CFU left after wiping with moistened cloth versus 2.3-$\log_{10}$ CFU remaining after using the alcohol wipes. For iPads inoculated with MRSA, alcohol wipes, bleach, and moistened cloth each removed 100% of the pathogen.

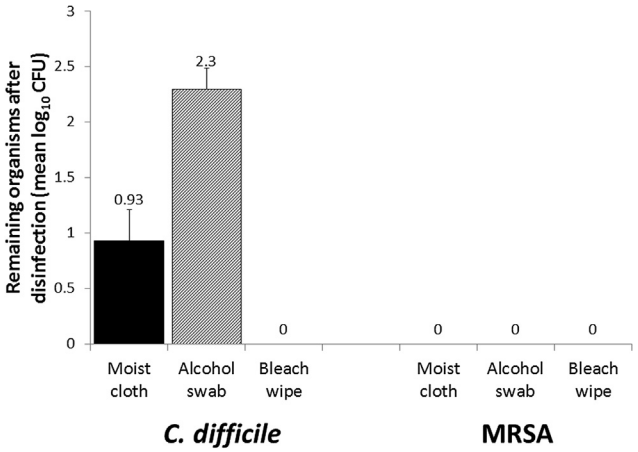

Fig 1. Effect of different agents on decontamination of iPad.

To our knowledge, this study is the first to assess the potential infection control implications of iPads and evaluate different methods for removing MRSA and *C difficile*. A total of 15% (3 out of 20) of iPads was contaminated with *S aureus*. The low rate of contamination in this study could possibly be due to the overall low incidence of resistant organisms in our facility, as well as other infection control measures including monitoring of housekeeping cleaning, an established antimicrobial stewardship program, and compliance with hand hygiene.

There are no existing guidelines specific for iPads in relation to infection control. Apple recommends the use of a soft, slightly damp, lint-free cloth and that care must be observed to avoid exposing moisture in any openings. They do not recommend using chemicals or abrasives to clean the device. The unit has an oleophobic coating on the screen that allows it to repel oil or moisture.[4] We found that microfiber cloth is effective in removing MRSA. However, it will only reduce and not completely eliminate *C difficile*. This was only achieved by a sporocidal agent. The significant effectiveness of moistened cloth compared with the alcohol wipes suggests that, possibly, direct contact with friction alone is sufficient to remove a majority of spores. Similar findings were observed in the better decontamination efficacy of microfiber clothes compared with other materials as well as in the removal of *C difficile* spores from hands with soap and water as compared with alcohol-based hand rubs.[6,7]

Given the limitation of the damp cloth to eliminate all pathogens, especially *C difficile*, nonporous cases or covers for iPads and screen protectors may allow the use of disinfecting agents without directly exposing the device. There should also be emphasis on hand hygiene. We recommend avoiding iPad use in rooms on contact precautions. Our institution has provided white coats sewn with large-sized pockets (that we call *iPockets*) to accommodate the iPads and decrease the environmental contact of the tablets.

Our study has possible limitations. Our sample size is modest, and the study was conducted in a single medical center with a low incidence of infections with MRSA (0.18/1,000 patient-days) and *C difficile* (4.45/10,000 patient-days). We focused only on the iPad screen, although the whole unit including accessories has the potential for contamination. Physical effects of the cleaning agents on the device were also not considered.

In summary, contamination with pathogens such as *S aureus* occurs in iPads used for patient care. Current recommended cleaning procedures for the device are effective in removing MRSA but do not address pathogens such as *C difficile*. Further studies and definite guidelines are needed because we see its increased use in the health care setting.

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Clinical- and cost-ineffectiveness of targeted methicillin-resistant *Staphylococcus aureus* screening of high-risk patients admitted to a low-prevalence teaching hospital

To the Editor:

The clinical value of institutional methicillin-resistant *Staphylococcus aureus* (MRSA) screening practices in teaching hospitals remains controversial. MRSA screening has been implemented in both low-prevalence and high-prevalence hospitals. Screening policies vary from universal to targeted screening, according to the local prevalence of this bacterium.[1] Infection control experts disagree on the optimal approach to MRSA screening. Most hospitals maintain colonized patients on standard precautions and contact precautions are only for MRSA infections.[3-5]

Winthrop-University Hospital is a 600-bed, university-affiliated teaching hospital. We have a restricted antibiotic formulary that restricts the use of antibiotics associated with increased MRSA prevalence (eg, ciprofloxacin, ceftazidime, and imipenem).[2] As a result, MRSA prevalence in our hospital is exceedingly low. Because we are a low-prevalence hospital it was thought that targeted surveillance of MRSA in patients admitted from chronic care facilities/nursing homes or from other hospitals and hospital readmissions might predict subsequent MRSA infections in our hospital. Admitted patients are ordinarily put on standard precautions. Patients not colonized by MRSA and those subsequently found to be colonized by MRSA are placed on standard precautions.

From 2007-2012 our institution conducted targeted MRSA screening to determine if MRSA colonization rates from high-risk admitted patients (ie, patients admitted from other hospitals and nursing home/chronic care facilities and hospital readmissions) is clinically effective or cost-effective. Targeted MRSA screening in our institution is carried out by nasal swab cultures using standard microbiologic identification techniques; we do not utilize polymerase chain reaction (PCR) for MRSA nasal swabs, the cost of which is much higher for MRSA screening. We believe rapid reporting of MRSA via PCR is unnecessary.

During the targeted MRSA screening period, 35,022 MRSA nasal swabs were performed. Of these, only 2,478 (7.1%) were positive for MRSA and MRSA infection rates remained constant during this period (see Fig 1). For this reason, in 2013 targeted MRSA screening was discontinued.

Based on our recent experience we conclude that targeted MRSA surveillance is not effective at predicting or detecting subsequent