Objection Handling Transmission Proof

Objection

“There is no proof stethoscopes transmit pathogens between patients.”

Example Conversation

Clinician: There's no proof stethoscopes transmit pathogens between patients.
Rep: Several studies simulation and in-unit observational show transfer from contaminated diaphragms to subsequent patients, even after routine cleaning.
Clinician: Can you share that evidence?
Rep: Absolutely. We can provide the studies and a one-page summary with the key outcomes and methods. The takeaway is simple: a touch-free barrier at the diaphragm stops the transfer route that cleaning alone doesn't fully address.
Clinician: What's the workflow impact?
Rep: Staff wave, apply, examine. It's faster than timing a wipe, and it's consistent every exam, every patient.

Objection 3:

- **"There is no proof that stethoscopes transmit pathogens between patients"**

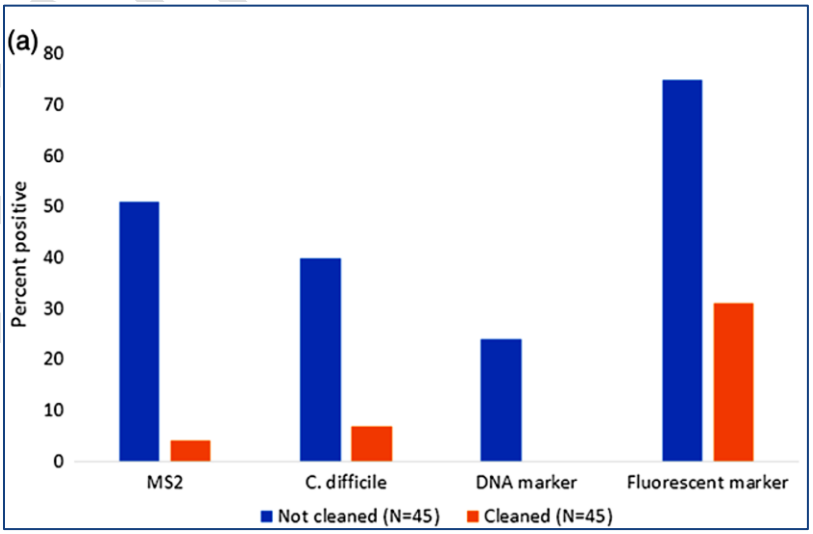
Refutation:

Data Point 1:

In a study, pathogen surrogate markers (cauliflower viral DNA in a bacteriophage) were applied to a mannequin. The mannequin was auscultated with an unprotected stethoscope, then the same stethoscope was used to auscultate a second, clean mannequin, absent of the surrogate markers. The second mannequin was then cultured and the results are shown in the below graph.

Transmission of Bacteriophage MS2, *Clostridioides difficile* spores, and fluorescent marker were observed regardless of whether the stethoscope was cleaned between auscultation of the two mannequins or not.[1]

Transfer of pathogen surrogate markers from a contaminated to clean mannequin by stethoscopes[1]



Objection 3:

- **"There is no proof that stethoscopes transmit pathogens between patients"**

Refutation cont.:

Data Point 2:

The transfer of 31 benign surrogate patient and environment markers was observed within a hospital over 3 months. Of 145 observed contact interactions, 28.3% transferred to a second patient. **The stethoscope had the highest number of transfer events, even higher than the hands.**[2]

Data Point 3:

Non-toxigenic *C. diff* spores were inoculated onto disinfected stethoscope diaphragms and volunteer's forearms. A standard exam pressing the stethoscope diaphragm for 5 seconds in 12 locations (for heart, lung, and abdomen exams) was done on 35 known *C. diff* patients, and **an observed 14% of exams subsequently transferred *C. diff* spores.**[3]

Citations:

1. Alhmidi H, Li DF, Cadnum JL, et al. Use of simulations to evaluate the effectiveness of barrier precautions to prevent patient-to-patient transfer of healthcare-associated pathogens. Infect Control Hosp Epidemiol. 2021 Apr;42(4):425-430.
2. Thakur, Manish, et al. "Use of Viral DNA Surrogate Markers to Study Routes of Transmission of Healthcare-Associated Pathogens." *Infection Control & Hospital Epidemiology*, vol. 42, no. 3, 2020, pp. 274–279.
3. Vajravelu RK, Guerrero DM, Jury LA, et al. Evaluation of stethoscopes as vectors of Clostridium difficile and methicillin-resistant Staphylococcus aureus. Infect Control Hosp Epidemiol. 2012 Jan;33(1):96-8. doi: 10.1086/663338.

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Original Article

Use of simulations to evaluate the effectiveness of barrier precautions to prevent patient-to-patient transfer of healthcare-associated pathogens

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Abstract

Background: There is controversy regarding whether the addition of cover gowns offers a substantial benefit over gloves alone in reducing personnel contamination and preventing pathogen transmission.

Design: Simulated patient care interactions.

Objective: To evaluate the efficacy of different types of barrier precautions and to identify routes of transmission.

Methods: In randomly ordered sequence, 30 personnel each performed 3 standardized examinations of mannequins contaminated with pathogen surrogate markers (cauliflower mosaic virus DNA, bacteriophage MS2, nontoxigenic *Clostridioides difficile* spores, and fluorescent tracer) while wearing no barriers, gloves, or gloves plus gowns followed by examination of a noncontaminated mannequin. We compared the frequency and routes of transfer of the surrogate markers to the second mannequin or the environment.

Results: For a composite of all surrogate markers, transfer by hands occurred at significantly lower rates in the gloves-alone group (OR, 0.02; $P < .001$) and the gloves-plus-gown group (OR, 0.06; $P = .002$). Transfer by stethoscope diaphragms was common in all groups and was reduced by wiping the stethoscope between simulations (OR, 0.06; $P < .001$). Compared to the no-barriers group, wearing a cover gown and gloves resulted in reduced contamination of clothing (OR, 0.15; $P < .001$), but wearing gloves alone did not.

Conclusions: Wearing gloves alone or gloves plus gowns reduces hand transfer of pathogens but may not address transfer by devices such as stethoscopes. Cover gowns reduce the risk of contaminating the clothing of personnel.

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Healthcare personnel frequently acquire pathogens on their hands and clothing during patient care activities.[1] Such contamination places personnel at risk for colonization or infection with pathogens and contributes to transmission.[1,2] The use of gloves reduces the risk for hand contamination, including with *Clostridioides difficile* spores that are resistant to killing by alcohol hand sanitizer.[3-5] The addition of cover gowns to gloves has been shown to reduce contamination of the clothing of personnel.[6] However, there is controversy regarding whether the addition of gowns offers a substantial benefit in reducing the risk for pathogen transmission. Some studies have demonstrated reductions in pathogen transmission with the use of gloves and gowns,[7-9] but others have not.[10,11] Moreover, personnel often contaminate their skin and clothing during the removal of contaminated gloves and gowns.[1,12]

Simulations using benign surrogate markers can be useful in understanding the spread of pathogens and in testing interventions.[1,13-17] Commonly used benign surrogate markers include live viruses (eg, enveloped and nonenveloped bacteriophages), viral DNA, and fluorescent tracers.[13-18] The bacteriophages have characteristics similar to live pathogenic viruses (ie, susceptible to alcohol hand sanitizer and nonsporicidal disinfectants), whereas viral DNA is more similar to *C. difficile* spores (ie, not affected by alcohol or nonsporicidal disinfectants but denatured by bleach and reduced by mechanical washing or wiping).[18] In this study, we used simulated patient care interactions to compare the effectiveness of different levels of barrier precautions in reducing the transfer of multiple surrogate markers. We hypothesized that the use of gloves would reduce transfer of pathogens and that the addition of a cover gown would further reduce transfer.

Methods

Simulated patient care interactions

The study protocol was approved by the Institutional Review Board of the Louis Stokes Cleveland VA Medical Center. The study was conducted in 2 adjacent simulated patient rooms with life-sized mannequins in hospital beds. One mannequin was

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Original Article

Use of viral DNA surrogate markers to study routes of transmission of healthcare-associated pathogens

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Abstract

Background: The hands of healthcare personnel are the most important source for transmission of healthcare-associated pathogens. The role of contaminated fomites such as portable equipment, stethoscopes, and clothing of personnel in pathogen transmission is unclear.

Objective: To study routes of transmission of cauliflower mosaic virus DNA markers from 31 source patients and from environmental surfaces in their rooms.

Design: A 3-month observational cohort study.

Setting: A Veterans' Affairs hospital.

Methods: After providing care for source patients, healthcare personnel were observed during interactions with subsequent patients. Putative routes of transmission were identified based on recovery of DNA markers from sites of contact with the patient or environment. To assess plausibility of fomite-mediated transmission, we assessed the frequency of transfer of methicillin-resistant *Staphylococcus aureus* (MRSA) from the skin of 25 colonized patients via gloved hands versus fomites.

Results: Of 145 interactions involving contact with patients and/or the environment, 41 (28.3%) resulted in transfer of 1 or both DNA markers to the patient and/or the environment. The DNA marker applied to patients' skin and clothing was transferred most frequently by stethoscopes, hands, and portable equipment, whereas the marker applied to environmental surfaces was transferred only by hands and clothing. The percentages of MRSA transfer from the skin of colonized patients via gloved hands, stethoscope diaphragms, and clothing were 52%, 40%, and 48%, respectively.

Conclusions: Fomites such as stethoscopes, clothing, and portable equipment may be underappreciated sources of pathogen transmission. Simple interventions such as decontamination of fomites between patients could reduce the risk for transmission.

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Colonized or infected patients often contaminate their skin, clothing, and the environment with healthcare-associated pathogens.[1] Such contamination may serve as a source for transmission. The hands of healthcare personnel are generally considered the primary source for transfer of pathogens from patient to patient.[1] The clothing of personnel, portable equipment such as thermometers, and stethoscopes have also been implicated as potential sources of transmission.[2-9] However, although many studies have demonstrated frequent contamination of clothing and shared devices, there is uncertainty regarding the importance of these items in pathogen transmission. A better understanding of routes of transmission is needed to develop effective control strategies.

In several recent studies, cauliflower mosaic virus DNA markers have been used to as benign surrogate markers to study routes of pathogen transmission.[10-14] For example, in a medical and surgical intensive care unit, it was demonstrated that a viral DNA marker inoculated onto shared portable equipment disseminated widely to surfaces in patient rooms and provider work areas and to other types of portable equipment.[11] The viral DNA marker is like *C. difficile* spores in that it is not affected by alcohol hand sanitizer or quaternary ammonium disinfectants but is denatured by sodium hypochlorite and reduced by mechanical washing or wiping.[15] In simulations of patient care, a cauliflower mosaic virus DNA marker and *C. difficile* spores demonstrated similar dissemination to the environment, but the DNA marker was more frequently detected on skin and clothing of personnel after removal of personal protective equipment.[15] In the current study, we used cauliflower mosaic virus DNA markers to examine routes of transfer of pathogens from patient to patient. We hypothesized that personnel clothing,

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