

## HEALTHYSOLE CLINICAL STUDIES

**Evaluation of a shoe sole UVC device to reduce pathogen colonization on floors, surfaces and patients**

T. Rashid, K. Poblete, J. Amadio, I. Hasan, K. Begum, M.J. Alam, K.W. Garey, University of Houston College of Pharmacy, Houston, Texas; University of Texas School of Public Health, Houston, Texas; University of Edinburgh, Edinburgh, Scotland

**Background:** An ultraviolet C (UVC) decontamination device that delivers germicidal UVC radiation to the soles of shoes has become available recently.

**Aim:** To demonstrate that shoe soles can be vectors for healthcare-associated infection, and to investigate if a UVC shoe sole decontamination device would decrease this risk effectively. **Methodology:** Three bacterial strains (Staphylococcus aureus, Enterococcus faecalis and Escherichia coli) and a non-toxicogenic strain of Clostridium difficile were spiked on to standardized rubber-soled shoe soles and then selected at random for UVC exposure or no UVC exposure. Experiments were performed to test the efficacy

of the UVC device to decontaminate shoe soles and flooring.

**Results:** The UVC device decreased shoe sole contamination significantly for all tested bacterial species, and decreased floor contamination significantly for all floor types and species tested ( $P < 0.01$  for all experiments). The log<sub>10</sub> reduction was the highest for E. coli (mean standard deviation 2.6 0.79), followed by E. faecalis (2.19 0.68), S. aureus (1.74 0.88) and C. difficile (0.42 0.54) ( $P < 0.0001$  for all analyses). Exposure of shoe soles to the UVC device decreased contamination significantly (mean log<sub>10</sub> reduction 2.79 1.25;  $P < 0.0001$ ). Proportions of samples from furniture,

bed and patient dummy samples decreased from 96-100% positive in controls to 5-8% positive in UVC device experiments ( $P < 0.0001$  for all analyses).

**Conclusion:** A UVC decontamination device was shown to reduce the colony-forming unit counts of relevant pathogenic organisms from shoe soles with subsequent decreased colonization of floors, healthcare equipment, furniture, beds and a patient dummy.

 <https://bit.ly/2Fvo2xl>

**Evaluation of Hospital Floors as a Potential Source of Pathogen Dissemination Using a Nonpathogenic Virus as a Surrogate Marker**

Sreelatha Koganti, Heba Alhmidi, Myreen E. Tomas, Jennifer L. Cadnum, Annette Jencson and Curtis J. Donskey Journal of Infection Control and Hospital Epidemiology

Hospital floors are frequently contaminated with pathogens, but it is not known whether floors are a potential source of transmission. We demonstrated that a nonpathogenic virus inoculated onto floors in hospital rooms disseminated readily to the hands of patients and to high-touch surfaces inside and outside the room.

 <https://bit.ly/2CFhjAl>

**Shoe Soles as a Potential Vector for Pathogen Transmission**

Rashid T, VonVille H, Hasan I, Garey KW Journal of Applied Microbiology

Shoe soles are possible vectors for infectious diseases. Although studies have been performed to assess the prevalence of infectious pathogens on shoe soles and decontamination techniques no systematic review has ever occurred. The aim of this study was to perform a systematic review of the literature to determine the prevalence of infectious agents on shoe bottoms and possible decontamination strategies. Thirteen studies were identified that supported the hypothesis that shoe soles are vectors for infectious pathogens. In conclusion, a high prevalence of microbiologic pathogens was identified from shoe soles studied in the healthcare, community, and animal worker setting. An effective decontamination strategy for shoe soles was not identified.

 <https://bit.ly/2OswKAR>

**Prevalence and Characteristics of Toxigenic Clostridium Difficile, C. Perfringens, and Enterococcus on Shoe-Bottoms from a Hospital System**

In: American Society for Microbiology (ASM) Texas Branch Fall Meeting, (poster presentation) Oct 29-31, 2015 (SAM HOUSTON STATE UNIVERSITY, HUNTSVILLE, TX) M. Jahangir Alam, Jacob K McPherson, Julie Miranda, Sangeetha S. Fernando, Lynn Le, Jonathan Amadio, Kevin W. Garey University of Houston College of Pharmacy

**ABSTRACT; Background:** Healthcare associated infections (HAI) are common everywhere in the world. Environmental surfaces are cleaned regularly, but can be re-contaminated from shoes. Shoe-bottom surfaces could be highly contaminated with pathogenic bacteria from diverse sources. Our recent studies on community house shoe-bottom surface swab samples were found to be frequently contaminated with toxigenic C. difficile. Our objectives of this pilot study were to investigate the prevalence C. difficile, C. perfringens, and

Enterococcus of shoe-bottom surface swab samples from a large hospital source.

**Materials and Method:** We collected 20 shoe-bottom swab samples from a hospital system and cultured for the bacteria using standard methods. Isolates were characterized by molecular methods. C. difficile and C. perfringens were cultured anaerobically by enrichment and selective agar plates (CCFA and Perfringens agar). Enterococcus counts were determined by an Enterolert kit.

**Results:** All the samples (20/20; 100%) were positive for C. perfringens, and 9 (45%) for toxigenic C. difficile (tcdA and tcdB genes). Enterococcus counts were between 25 and >12000 cells/swab for all the samples. Vancomycin resistant Enterococcus species were recovered from 90% (18/20) the samples by selective culture using Enterococcus agar.

**Conclusion:** Overall, hospital shoe-bottom samples were highly contaminated with potential human pathogens.

 <https://bit.ly/2JT1ixc>



# HEALTHYSOLE CLINICAL STUDIES

## Physician as an Infective Vector at a Department of Surgery

Katarzyna Padaszynska, Ludmila Gagis, Monika Rucinska, Lech Pomorski

**ABSTRACT:** This study was designed to assess the degree of risk of bacterial transmission from physician to patient through hands, equipment and enclosing surfaces (shoe soles).

**Material and Methods:** The study was conducted in the Clinical Department of General and Oncological Surgery UM in Łódź. In days 16.10.2013, 17.10.2013, 18.10.2013 there were done swabs from hands, stethoscopes and soles of shoes from the same group of

physicians before and after doctor's rounds. The presence of alert-pathogens in swabs was regarded as positive result.

**Results:** Isolates included mostly aerobic saprophytic bacilli and Staphylococcus species coagulase-negative. There were detected a singly cases of Acinetobacter Baumannii and Escherichia coli. Alert-pathogens were found in 4 (16%) swabs taken from hand before doctor's rounds and in 7 (28%) swabs taken after rounds. Stethoscopes were contaminated

by alert-pathogens in 3 (12%) cases before doctor's rounds and in 3 (12%) cases taken after doctor's rounds. Soles of shoes were contaminated by alert-pathogens in 14 (56%) cases taken before and 16 (65%) cases taken after doctor's rounds.

**Conclusions:** 1. Physicians are important factor of bacterial transmission in hospital. 2. Hands, stethoscopes and particularly soles of shoes of medical staff is the source of infection



<https://bit.ly/2JLesfB>



## Theatre shoes – A Link in the Common Pathway of Postoperative Wound Infection?

Rouin Amirfeyz<sup>1</sup>, Andrew Tasker<sup>2</sup>, Sami Ali<sup>3</sup>, Karen Bowker<sup>4</sup>, Ashley Blom<sup>5</sup>

1. Department of Trauma and Orthopaedics, Musgrove Park Hospital, Taunton, UK 2. Department of Trauma and Orthopaedics, Cheltenham General Hospital, Cheltenham, UK 3. Department of Trauma and Orthopaedics, Southmead Hospital, Bristol, UK 4. Southmead Hospital, Bristol, UK 5. Avon Orthopaedic Centre, Bristol, UK

**ABSTRACT: Introduction:** Operating department staff are usually required to wear dedicated theatre shoes whilst in the theatre area but there is little evidence to support the beneficial use of theatre shoes.

**Patients and Methods:** We performed a study to assess the level of bacterial contamination of theatre shoes at the beginning and end of a working day, and compared the results with outdoor footwear.

**Results:** We found the presence of pathogenic bacterial species responsible for postoperative wound infection on all shoe groups, with outdoor shoes being the most heavily contaminated. Samples taken from theatre shoes at the end of duty were less contaminated than those taken at the beginning of the day with the greatest reduction being in the number of coagulase-negative staphylococcal species grown. Studies have demonstrated that floor bacteria may contribute up to 15% of airborne bacterial colony forming units in operating rooms. The pathogenic bacteria

we isolated have also been demonstrated as contaminants in water droplets spilled onto sterile gloves after surgical scrubbing.

**Conclusion:** Theatre shoes and floors present a potential source for postoperative infection. A combination of dedicated theatre shoe use and a good floor washing protocol controls the level of shoe contamination by coagulase-negative staphylococci in particular. This finding is significant given the importance of staphylococcal species in postoperative wound infection.



<https://bit.ly/2CDPmcr>



## Antibacterial Activity and Sanitizing Efficacy of HealthySole's Shoe UV Device (Kill Rate). Eight Second Activation Time

Microchem Laboratory B. Richard, B.S.

ORGANISMS TESTED:

**Clostridium difficile** (85.3%) ATCC 43598 (Endospores)

**Staphylococcus aureus** (99.98%) ATCC 33592 (MRSA)

**Streptococcus pyogenes A** (99.994%) ATCC 19615

**Enterococcus faecalis** (99.75%) ATCC 51575 (VRE)

**Escherichia coli** (99.87%) ATCC BAA-2469 (CRE)

**Pseudomonas aeruginosa** (99.2%) ATCC 15442



<https://bit.ly/2YtwmXy>

