**Session:** 201. The World Around Us: Reducing Exposures to Pathogens in the Healthcare Environment

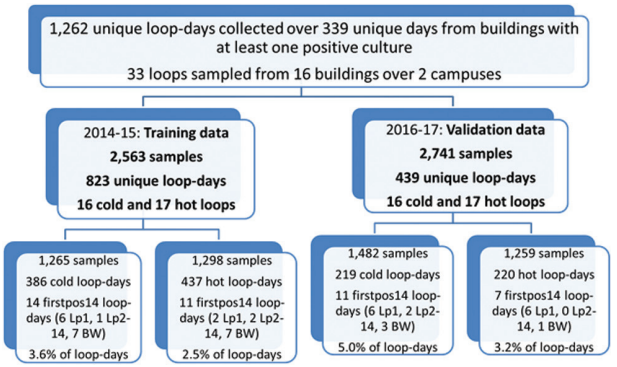
*Saturday, October 6, 2018: 8:45 AM*

***Background.*** Hospitals devote considerable resources to water distribution system (WS) surveillance and remediation for Legionella in an effort to reduce risk of transmitting Legionnaires disease (LD). There are no models that accurately predict periods of greatest risk for Legionella culture positivity (cx +) within a WS. Our goal was to build and validate a model based on weather and water parameters that predicted Legionella cx+ in our hospital WS.

***Methods.*** One liter water samples from fixtures at 2 campuses were cultured for Legionella on BCYE plates with cysteine as part of infection prevention protocols. Logistic regression (LR) and random forest (RF) models included daily hospital WS measurements and Pittsburgh FAA weather observation station data. Training and validation used 2014–2015 and 2016–2017 data, respectively. Models predicted a first +cx within 14 day windows.

***Results.*** Cxs were defined as + by loop-day, if any cx from within a unique WS loop was + for Legionella on a given day. Of the 7,272 water samples, 5,304 were collected from 16 buildings on 2 campuses in which ≥1 cx + was obtained. A total of 1,262 WS loop-days were collected over 339 unique days from these buildings. Details on training and validation data sets appear in figure. Overall, water was Legionella cx + on 3% of loop-days. Models predicted positivity if risk was >6%. The LR model comprised of independent predictors of cx + had sensitivity/specificity of 44%/80% (AUC: 0.715; misclassification error: 0.21), and PPV/NPV of 9%/97% in the validation data set. The RF model comprised of the same predictors had sensitivity/specificity of 100%/98% (AUC: 1.0; misclassification error: 0.02), and PPV/NPV of 67%/100%. The most important RF variables in the validation data set were WS temperature and minimum pH over the 7 days prior to cx.

***Conclusion.*** An RF model using water and weather data was validated as an accurate predictor of new Legionella cx+ within a hospital WS. Most importantly, NPV for the model was 100%, meaning that no positive Legionella cxs were recovered during periods identified as low-risk. The RF model is a powerful tool for most efficiently directing resources to Legionella surveillance and LD prevention.




***Disclosures.*** **All authors:** No reported disclosures.

**1727. Sustained Antimicrobial Activity of a Novel Disinfectant Against Healthcare Pathogens**

William Rutala, BS, MS, PhD, MPH[1]; Maria Gergen, MT (ASCP)[2]; Emily Sickbert-Bennett, PhD, MS[2,3]; Deverick J. Anderson, MD, MPH, FIDSA, FSHEA[4] and David Weber, MD, MPH[5], [1]Department of Medicine, University of North Carolina, Chapel Hill, North Carolina, [2]Department of Hospital Epidemiology, University of North Carolina Health Care, Chapel Hill, North Carolina, [3]UNC Hospitals, Chapel Hill, North Carolina, [4]Duke Center for Antimicrobial Stewardship and Infection Prevention, Durham, North Carolina and [5]Department of Medicine and Pediatrics, University of North Carolina School of Medicine, Chapel Hill, North Carolina

**Session:** 201. The World Around Us: Reducing Exposures to Pathogens in the Healthcare Environment

*Saturday, October 6, 2018: 8:45 AM*

***Background.*** Environmental contamination plays an important role in the transmission of MRSA, VRE, and *C. difficile*. Suboptimal compliance with hand hygiene or inappropriate glove use can result in indirect transfer of these pathogens to patients. This study evaluates a novel disinfectant that claims to kill microbes on surfaces for ≥24 hours.

***Methods.*** We investigated the persistent antimicrobial activity of a novel disinfectant using an EPA protocol for sustained disinfecting activity. In brief, surfaces are inoculated, treated with the novel disinfectant, allowed to dry, and then abraded using a standardized abrasion machine under multiple alternating wet and dry wipe conditions ($N = 12$) interspersed with 6 re-inoculations. After 24 hours, the surface was re-inoculated a final time and ability of the disinfectant to kill ≥99.9% of 9 test microbes within 5 minutes was measured on 3 test surfaces (glass, formica, and stainless steel).

***Results.*** The novel disinfectant demonstrated a 3–5 $\log_{10}$ reduction in 5 minutes when testing *S. aureus,* VRE, *C. auris*, CRE *E. coli* and antibiotic-sensitive strains of *E. coli,* and *Enterobacter* sp. (table). The disinfectant demonstrated lower killing for CRE isolates of *Enterobacter* sp. and *K. pneumoniae,* and for antibiotic-sensitive *K. pneumoniae* (~2 $\log_{10}$ reduction in 5 minutes). When the novel disinfectant was compared with 3 other commonly used disinfectants using the same methodology with *S. aureus*, the mean $\log_{10}$ reductions were: 4.4 (novel disinfectant); 0.9 (quat-alcohol); 0.2 (improved hydrogen peroxide); and 0.1 (chlorine).

***Conclusion.*** Persistent disinfectants may reduce or eliminate the problem of recontamination and minimize the role of environmental surfaces in transmission of healthcare pathogens.

**Table:** $\log_{10}$ Reduction of a Novel Disinfectant with Persistent Antimicrobial Activity

| | Test Pathogen | Mean $\log_{10}$ Reduction, 95% CI, $n = 4$ |
|---|---|---|
| A | *S. aureus** | 4.4 (3.9, 5.0) |
| B | *S. aureus* (formica) | 4.1 (3.8, 4.4) |
| C | *S. aureus* (stainless steel) | 5.5 (5.2, 5.9) |
| D | Vancomycin-resistant *Enterococcus* | ≥4.5 |
| E | *E. coli* | 4.8 (4.6, 5.0) |
| F | *Enterobacter* sp. | 4.1 (3.5, 4.6) |
| G | *Candida auris* | ≥5.0 |
| H | *K. pneumoniae* | 1.5 (1.4, 1.6) |
| I | CRE *E. coli* | 3.0 (2.6, 3.4) |
| J | CRE *Enterobacter* | 2.0 (1.6, 2.4) |
| K | CRE *K. pneumoniae* | 2.1 (1.8, 2.4) |

*Test surface is glass unless otherwise specified.

***Disclosures.*** **W. Rutala**, PDI: Consultant and Speaker's Bureau, Consulting fee and Speaker honorarium. **D. Weber**, PDI: Consultant, Consulting fee

**1728. Effectiveness and Healthcare Personnel (HCP) Perceptions of a Multi-Site Personal Protective Equipment (PPE) Free Zone Intervention**

Lindsay Visnovsky, PhD, MS[1,2]; Diane Mulvey, BSN, RN[1,2]; Yue Zhang, PhD[2,3]; Molly Leecaster, PhD[1,2]; Curtis J. Donskey, MD[4,5]; Sarah L. Krein, PhD[6,7]; Nasia Safdar, MD, PhD[8,9]; Heba Alhmidi, MD[10]; Lauren Barko, BS[11]; Candace Haroldsen, MSPH[2]; Emma Ide, BS[11]; McKenna Nevers, MSPH[2]; Catherine Shaughnessy, BS[11]; Kristina Stratford, B.S., CCRP[1,2]; Frank Drews, PhD, MS[2]; Matthew Samore, MD, FSHEA[1,2] and Jeanmarie Mayer, MD[1,2], [1]Division of Epidemiology, University of Utah School of Medicine, Salt Lake City, Utah, [2]IDEAS Center, Salt Lake City VA Health Care System, Salt Lake City, Utah, [3]Division of Epidemiology, Department of Internal Medicine, University of Utah, Salt Lake City, Utah, [4]Louis Stokes Cleveland VA Medical Center, Cleveland, Ohio, [5]Case Western Reserve University, Cleveland, Ohio, [6]Hospital Outcomes Program of Excellence (HOPE), VA Ann Arbor Healthcare System, Ann Arbor, Michigan, [7]Department of Internal Medicine, University of Michigan Medical School, Ann Arbor, Michigan, [8]William S Middleton Memorial Veterans Hospital, Madison, Wisconsin, [9]Division of Infectious Diseases, School of Medicine and Public Health, University of Wisconsin – Madison, Madison, Wisconsin, [10]Research Service, Louis Stokes Cleveland VA Medical Center, Cleveland, Ohio and [11]University of Wisconsin, Madison, Wisconsin

**Session:** 201. The World Around Us: Reducing Exposures to Pathogens in the Healthcare Environment

*Saturday, October 6, 2018: 8:45 AM*

***Background.*** CDC provides guidelines for using contact precautions (CP) when caring for patients with antibiotic-resistant bacteria or *Clostridium difficile*. However, HCP frequently report discomfort, difficulty of use, and interrupted workflow with CP. Modifying CP guidelines to balance these issues requires testing to assess benefits and maintenance of safe practices. A promising approach using a "PPE Free Zone" strategy within rooms of patients in CP has not been well-studied.

***Methods.*** The PPE Free Zone comprised a 3–6 foot area inside door thresholds of CP patient rooms denoted by red tape placed on the floor. Within the zone, HCP were not required to don PPE. HCP were considered compliant if they performed hand hygiene (HH) and donned appropriate PPE before crossing the zone. Observers at 6 acute care facilities (ACF) were trained on observing HCP HH and use of PPE with CP. Observations were made before and after implementation of a PPE Free Zone. Intervention ACF conducted observations on 8 intervention units and 6 nonintervention units. Models of overall compliance and entry HH compliance were constructed using a generalized linear-mixed effects model with a logistic link function. Pre-intervention observations from all 6 ACF and intervention phase observations from the 3 intervention ACF were used in models.

***Results.*** We observed 4,510 room entries. HH adherence declined over time in both intervention and control units but declined less among intervention units from pre to post intervention (β: 0.71, $P = 0.007$, Figure 1). Stratified by precautions type, the effect of the PPE Free Zone on HH was only significant for rooms in enteric precautions ($P < 0.001$). Compliance with PPE use was not significantly different pre- versus postintervention ($P = 0.133$). When surveyed, HCP had positive views of the PPE Free Zone: 65% ($n = 172$) agreed or strongly agreed the zone facilitates communication with patients, permits checking on patients more frequently, and saves time [$n = 169$] (Figure 2).

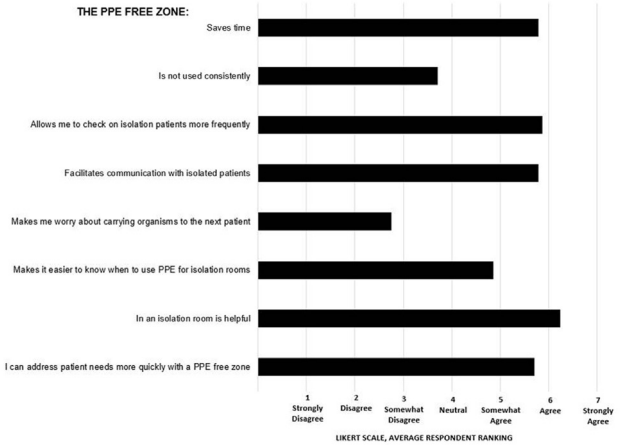
***Conclusion.*** Although HCP viewed the zone positively and it had a significant effect on HH in enteric precautions rooms, the zone did not improve PPE compliance. Future interventions in the ACF setting should consider the complex sociotechnical system factors influencing behavior change.

**Figure 1: Effect of the PPE Free Zone Intervention on Hand Hygiene (HH) and Glove and Gown Use**

| | β Estimate | 95% Confidence Interval | p value |
|---|---|---|---|
| **Model 1: Entry Hand Hygiene Compliance, N= 2,444** | | | |
| Intervention effect | 0.71 | (0.19, 1.23) | **0.007** |
| **Model 2: Entry Hand Hygiene Compliance, stratified by precautions type** | | | |
| *Model 2a:* MRSA precautions (n=1,433) | 0.31 | (-0.31, 0.94) | 0.328 |
| *Model 2b:* Enteric precautions (n=855) | 1.47 | (0.78, 2.18) | **<0.001** |
| **Model 3: Overall PPE Compliance (glove and/or gown, as indicated), N= 3,126** | | | |
| Intervention effect | 0.39 | (-0.12, 0.91) | 0.133 |

NOTE: estimates have a reference point of *zero*: + values indicate greater compliance among intervention units compared to control. β estimates = a difference of differences: [intervention compliance – pre-intervention compliance *among intervention units*] – [intervention compliance – pre-intervention compliance *among control units*].
Models 1 & 2 are adjusted for facility, unit, calendar month, and glove use. Model 3 is adjusted for facility, unit, and calendar month of observation.

**FIGURE 2: HEALTHCARE PERSONNEL AVERAGE LIKERT SCORE PERCEPTIONS OF THE PPE FREE ZONE**




***Disclosures.*** **All authors:** No reported disclosures.

### 1729. Effect of Glove Disinfection on Bacterial Contamination of Healthcare Worker Hands

Gwen Robinson, MPH[1]; Zegbeh Z. Kpadeh, PhD[1]; Haleema Alserehi, MD[1]; Daniel Morgan, MD, MS, FIDSA, FSHEA[2]; Anthony D. Harris, MD, MPH[3]; J. Kristie Johnson, PhD[4] and Surbhi Leekha, MBBS, MPH[5], [1]University of Maryland, Baltimore, Baltimore, Maryland, [2]Epidemiology and Public Health, University of Maryland School of Medicine, Baltimore, Maryland, [3]Department of Epidemiology and Public Health, University of Maryland School of Medicine, Baltimore, Maryland, [4]University of Maryland School of Medicine, Baltimore, Maryland and [5]Epidemiology and Public Health, University of Maryland School of Medicine, Baltimore, Maryland

**Session:** 201. The World Around Us: Reducing Exposures to Pathogens in the Healthcare Environment

*Saturday, October 6, 2018: 8:45 AM*

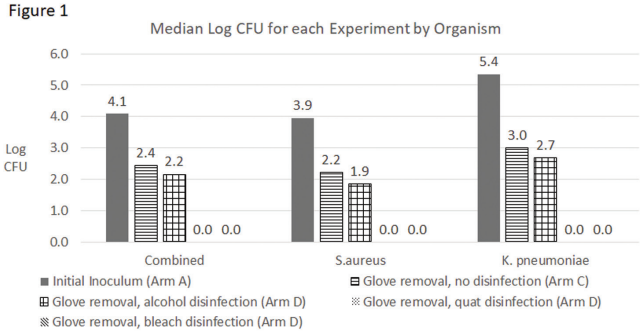
***Background.*** Disinfection of gloves and gowns was recommended to decrease healthcare worker (HCW) self-contamination during doffing of gloves and gowns in the Ebola epidemic. To understand the potential role of this practice in preventing bacterial transmission, we examined the effect of disinfectants on bacterial contamination of HCW hands following glove removal.

***Methods.*** A laboratory simulation study was conducted using methicillin-susceptible *Staphylococcus aureus* and antibiotic-sensitive *Klebsiella pneumoniae* among volunteer HCWs ($n$ = 10 per organism). For each experiment, the volunteer donned 2 pairs of gloves with the "under glove" simulating HCW hands and "top glove" simulating actual glove use in the clinical setting. The top-glove was inoculated with $10^8$ CFU bacteria for each step. Top gloves were sampled directly after inoculation (Arm A), and after disinfection with alcohol gel, bleach wipes, and quaternary ammonium (quat) wipes, in separate steps (Arm B). Under gloves were sampled after top glove removal without disinfection (Arm C), and top glove removal post disinfection (Arm D). Quantitative bacterial load reduction was compared for glove use (Arm C – Arm A), and for disinfectant use in addition to glove use (Arm D – Arm C). Qualitative detection of any bacterial load (present/absent) on under glove in the setting of disinfection prior to top glove removal was also assessed.

***Results.*** Of $10^8$ CFU inoculated, the median recovery was $1.2 \times 10^4$ CFU (both bacteria combined). After glove removal (no disinfection), the median recovery from the under glove was $2.7 \times 10^2$ CFU, for a reduction of 98% (1.6 log) in bacterial load. After top glove disinfection and removal, the median bacterial recovery from the under glove was $1.4 \times 10^2$, 0, and 0 CFU for alcohol, quat, and bleach (47% or 0.3 log reduction for alcohol; 99% or 2 log reduction for quat and bleach) (Figure 1). Regardless of quantity, bacteria were recovered from under gloves even after top glove disinfection in 70%, 40%, and 35% cases for alcohol, quat, and bleach, respectively (Figure 2).

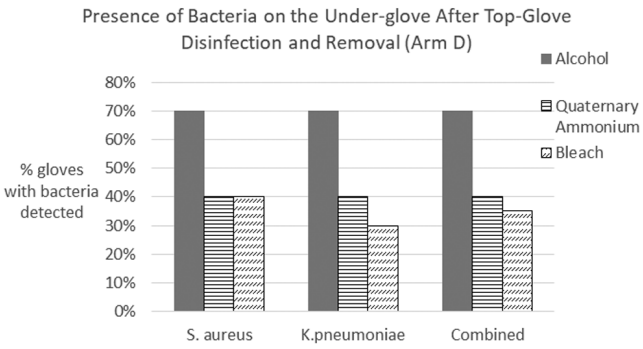
***Conclusion.*** Glove disinfection prior to glove removal is effective at reducing bacterial contamination of HCW hands. However, despite disinfection, some level of hand contamination occurs frequently.

Figure 1




| Reduction of bacterial load (median CFU) of *S. aureus* and *K. pneumoniae* combined (n=20) | | | | | |
|---|---|---|---|---|---|
| | Arm A (Initial Inoculum) | Arm C (Glove removal without prior disinfection) | Arm D (Glove removal after glove disinfection) | Percent reduction (Arm C - Arm D) | Log reduction (Arm C - Arm D) |
| **Alcohol** | $1.2 \times 10^4$ | $2.7 \times 10^2$ | $1.4 \times 10^2$ | 47% | 0.28 |
| **Quat** | $1.2 \times 10^4$ | $2.7 \times 10^2$ | 0 | 99% | 2.0 |
| **Bleach** | $1.2 \times 10^4$ | $2.7 \times 10^2$ | 0 | 99% | 2.0 |

Figure 2




| Presence of Bacteria on the Top Glove and Under Glove After Disinfection (n=20) | | |
|---|---|---|
| | % positive after disinfection – top glove (Arm B) | % positive after disinfection – under glove (Arm D) |
| Alcohol | (13/20) 65% | (14/20) 70% |
| Quat | (13/20) 65% | (8/20) 40% |
| Bleach | (13/20) 65% | (7/20) 35% |

***Disclosures.*** **J. K. Johnson**, Q-Linea: Investigator, Research grant. Applied Biocode: Investigator, Research grant

### 1730. Outcomes of Patients With Detectable Cytomegalovirus (CMV) DNA at Randomization in the Double-blind, Placebo-Controlled Phase 3 Trial of Letermovir (LET) Prophylaxis for CMV-Seropositive Allogeneic Hematopoietic-Cell Transplantation (HCT) Recipients

Francisco M Marty, MD[1]; Per Ljungman, MD, PhD[2]; Roy F Chemaly, MD, MPH, FIDSA, FACP[3]; Hong Wan, PhD[4]; Valerie L Teal, MS[4]; Joan Butterton, MD[4]; Wendy W Yeh, MD[4]; Randi Y Leavitt, MD, PhD[4] and Cyrus Badshah, MD, PhD[4], [1]Dana-Farber Cancer Institute and Brigham and Women's Hospital, Boston, Massachusetts, [2]Karolinska Institute, Stockholm, Sweden, [3]University of Texas M.D. Anderson Cancer Center, Houston, Texas and [4]Merck & Co., Inc., Kenilworth, New Jersey

**Session:** 202. Transplant and Immunocompromised Hosts: Emerging Issues

*Saturday, October 6, 2018: 8:45 AM*

***Background.*** LET prophylaxis through HCT Week 14 was highly effective in preventing clinically significant CMV infection (CS-CMVi), had a good safety profile, and was associated with lower all-cause mortality by HCT Week 24 compared with placebo (PBO). Patients with detectable CMV DNA at randomization were excluded from the trial's efficacy analyses (NCT02137772). Here we report the outcomes of these patients.

***Methods.*** We compared patients randomized 2:1 and treated with LET or PBO who had detectable CMV DNA at randomization ($n$ = 70) to those with undetectable CMV DNA ($n$ = 495; primary efficacy population, PEP). CS-CMVi was defined as CMV viremia requiring antiviral preemptive therapy (PET) or CMV disease; patients with missing data were imputed as events. PET was prescribed blinded to study drug. We analyzed CS-CMVi incidence, CMV viral load (VL) kinetics, and mortality using post study vital status. Detectable, nonquantifiable CMV VL (<151 c/mL) was imputed as 150 c/mL.