Barley Chironda

IDWeek 2020 Conference Share

November 24, 2020
Conference overview

Latest research in diagnostics, therapeutics, vaccines and pharmaceuticals, infection transmission, and infection control and prevention

CHASING THE SUN

What is 24 hours of COVID-19 Chasing the Sun?

Kick off IDWeek with 24 hours of COVID-19 during Chasing the Sun. This global event will begin on Wednesday, Oct. 21 at 10 a.m. ET and conclude on Thursday, Oct. 22 at 10 a.m. ET. IDWeek and its partners are joining forces with recognized scientific agencies, non-governmental agencies and infectious diseases organizations from around the world including the Centers for Disease Control and Prevention (CDC), the American Society of Microbiology, Asociación Panamericana de Infectología, the Chinese Society of Infectious Diseases, the European Society of Clinical Microbiology and Infectious Diseases, and the Japanese Association for Infectious Diseases each bringing unique global perspectives and data to cover various aspects of COVID-19 including clinical presentation, treatments, diagnostics, vaccine development, infection control and mitigation strategies and other late breaking issues. Closed captioning in English will be available for this program.
IDWeek 2020 Word Cloud
“Assume everyone is positive [for COVID-19]”
--Morgan Katz, MD
*Johns Hopkins University*

“Assisted Living Facilities rarely have a Medical Director...I’m afraid that nursing homes will collapse and discharge everyone to the hospital”
--Dallas Nelson, MD
*University of Rochester*

COVID-19 is “the most disastrous pandemic that we have experienced in our civilization, in over 102 years back to the 1918 now infamous so-called Spanish flu.”
--Anthony Fauci, MD
*National Institute of Allergy and Infectious Diseases*

“The true impact of COVID-19 has yet to be seen.”
--Julie Trivedi, MD
*UT Southwestern Medical Center*

“When this is all over, and we are back to normal...it won’t be normal.”
--Mark Rupp, MD
*University of Nebraska Medical Center*
Conference Themes

- Diplomacy / Policy
- Politicization of Public Health
- Collaboration
- Continual Learning & Change
- Vaccine hesitancy
- COVID transmission
- COVID impact on HAIs
- Inequality
MARY-CLAIRE’S REVIEW OF INFECTION PREVENTION RESEARCH GAPS

**LESS**
- Pre-/post- new IP interventions in acute care setting
- Short follow-ups of interventions

**MORE**
- Structural interventions
- Incorporation of other HCP (e.g. teams)
- Outpatient populations
- Patient oriented outcome measures
- Replication of interventions elsewhere
- Coordination across Healthcare Systems
Kick-off session: Dr. Anthony Fauci

Anthony S. Fauci, MD
Director
National Institute of Allergy and Infectious Diseases
Bethesda, Maryland

COVID-19 U.S. Overview

COVID-19 U.S. Overview

Expert U.S. Panel Develops NIH Treatment Guidelines for COVID-19

“Living document” expected to be updated often as new clinical data accrue

Covid19treatmentguidelines.nih.gov

Manifestations of Severe COVID-19

Neurological disorders
Hyperinflammation
Acute respiratory distress syndrome (ARDS)
Cardiac dysfunction
Hypercoagulability
Acute kidney injury
Multisystem inflammatory syndrome in children (MIS-C)

A Strategic Approach to COVID-19 Vaccine R&D

Unprecedented collaboration and resources will be required to research and develop safe and effective vaccines for COVID-19 that can be manufactured and delivered in the scale of billions of doses to people globally.
Kick-off session: Dr. Anthony Fauci

Why did the US not experience a drop in cases in April, as Europe did?
1. **Fundamental inequalities**
   - Racial disparities have been exposed during the pandemic

2. **Everyone is not an expert – Nature (and the media abhors a vacuum)**
   - Science of persuasion

3. **Social Media is a double-edged sword**
   - Use it better; use the right (and local) experts; train on its use

4. **Epidemic of information**
   - Rush to information leads to misinformation; e.g. hydroxychloroquine “pushing”

5. ** Politicization of public health**
   - Interferes with agency function, undermines public trust

6. **Changes in normal healthcare behaviors**
   - Avoidance/delay of care, decreased vaccination, HAI changes, increased antibiotic use, increased substance and alcohol abuse and drug overdoses

7. **COVID-19 testing**
   - Every system is perfectly designed to get the results it gets
8. **PPE problems**  
   • Supply chain gaps, stockpile inadequacy, need for better products

9. **Aerosol vs Droplet**  
   • Assume both could happen; practical approaches to minimizing risk, better data  
   • Better design of building and air handling – energy efficiency vs safety

10. **Aerosol-generating procedures**  
    • What are they, how best to mitigate risk.

11. **I knew sports were important...**  
    • Heart risks with mild disease  
    • Money better diverted to public health

12. **The value and importance of the IP community has never better been demonstrated**

   “When the facts change, I change my mind - what do you do, sir?”
   — John Maynard Keynes
COVID-19 Dashboard

Session: COVID-19 The US Experience--Following the Epi Curve to Resilience and Recovery

Behind the Dashboard- aggregating Large Data for Realtime Public Health Practice and Change

Wednesday, October 21, 2020  10:30am – 11:45am EDT  Location: Chasing the Sun

Speaker(s)
Lauren Gardner, PhD
Associate Professor
Johns Hopkins University
Baltimore, Maryland
bioinformaticsdata.org

TRACKING
Follow global cases and trends. Updated daily.

JHU CSSE COVID-19 Dashboard Users

https://coronavirus.jhu.edu/
COVID: Hierarchy of Controls

Interventions to Reduce Transmission of SARS-CoV-2 in Community Congregate Settings

Elimination
- Stay home, work remotely, avoid public areas
- Avoid shared equipment/spaces

Engineering Controls
- Ensure ventilation & water systems operate properly
- Physical barriers (plexiglass partitions), rearrange furniture, work or living spaces; build in space
- Verbal announcements, signage, visual cues to promote social distancing

Administrative Controls
- Encourage sick workers to stay home; remind staff of available support services
- Daily symptom, exposure, temperature screening
- Encourage social distancing and use of face coverings
- Communicate policies clearly to partners, suppliers, contractors, etc.
- Clean and disinfect frequently touched surfaces (CDC guidance)

PPE
- Conduct workplace / facility hazard assessment
- Provide appropriate PPE to workers / at-risk-persons at no cost

Food Production Outbreaks

Distribution of Food Production Workers by Industry, 2018

- Animal Production and Processing: 38%
- Other Food Manufacturing: 25%
- Crop Production: 30%
- Seafood: 7%
- Total Food Production Workers: 3.4 Million

Notes: Animal processing and production includes animal food, great, and oilseed milling; animal production and aquaculture; animal slaughtering and processing; and dairy product manufacturing. Seafood includes other miscellaneous foods. Other Food Manufacturing includes bakeries and tortilla manufacturing, except retail bakers; beverage manufacturing; fruit and vegetable preserving and specialty food manufacturing; sugar and confectionary products; and not specified food industries.


Operational

- Maintaining physical distancing on production line
  - Reduce rate of animal processing

- Adhering to face covering recommendations
  - Require universal face covering and ensure face coverings conformed to CDC guidance
  - Provide training on donning and doffing

- Adhering to heightened cleaning and disinfection guidelines
  - Assign additional staff to sanitize “high touch” areas (e.g., handles, buttons, railings) more frequently
  - Add several hand sanitizer dispensers and handwashing stations
  - Implement touch-free time clocks

Transmission Risk Factors in Food Production

- Prolonged closeness to other workers for long shifts of up to 12h
- Exposure to potentially contaminated shared surfaces or objects
- Noisy machinery (may require people to talk more loudly or shout)
- Environmental conditions (factories may be cold and damp)
- Physical exertion with work (heavy breathing)
- Close contact during transportation to and from work (such as in ride-share vans, carpools, or public transportation)
- Location in rural areas (may have lack of reliable access to healthcare)

https://jamanetwork.com/channels/health-forum/fullarticle/2761667
Factors affecting acquisition of a viral respiratory infection:
1. Virus must survive drying and UV
2. To cause infection, virus must be delivered in infectious dose (i.e., survive dispersal/dilution)

Risk reduced by:
1. Physical distancing
2. Infected persons wearing a mask
3. Non-infected persons wearing a mask
4. Hand hygiene
5. Surface disinfection
SARS-CoV-2 Airborne vs Transmission

**COMMENTS ON THE DATA USED TO SUPPORT “AIRBORNE” TRANSMISSION**

- Survival of SARS-CoV-2 in a rotating drum is consistent with aerosol transmission but does NOT demonstrate airborne transmission.
- Demonstration of SARS-CoV-2 RNA outside patient rooms does NOT mean that viable virus was present or that there was an infectious dose of virus in the air.
- Outbreak in a restaurant more consistent with droplet than airborne transmission.
- Outbreak in a choir more consistent with a superspreader – high attack rate can be explained by droplet transmission, and direct and indirect contact.
- Demonstration that physical distancing of <1m provides substantial protection against acquisition of COVID-19 suggests that short distance spread is the most important mechanism of transmission.
- Recommendations for room air disinfection systems should NOT be implemented until studies demonstrate efficacy.
**Salmonella Newport**, June-Aug 2020 (onions)
1000 cases US (ca. 45 states); 500 cases Canada
3rd largest outbreak since 1980’s; Extensive recalls

**Cyclospora cayatanensis**, May-July 2020
700 cases, upper mid-west

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End of Ebola Outbreak in Eastern Democratic Republic of Congo

- 2nd largest Ebola outbreak ever
- 3481 cases reported, 2299 deaths
- July 2018 through June 2020
- First large-scale use of Ebola vaccines and treatments

But...new outbreak in Western DRC
Unrelated; >35,000 vaccinated

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**Outbreaks not seen...**

**Acute Flaccid Myelitis**

National increase in AFM cases every 2 years since 2014

**Influenza**

Australia, Chile, South Africa:
- Very few cases
- No real flu “season”
- Respiratory precautions work

In the US  

Single COVID/flu test

# COVID Vaccines

## Vaccine Trials Overview

**Session:** COVID-19 Vaccines  
**Wednesday, October 21, 2020**  
**5:30pm – 5:45pm EDT**  
**Mary Marovich | Director Of Vaccine Research Program**  
**NIAID, NIH**

## Overview of CoVID-19 Vaccine Candidates

<table>
<thead>
<tr>
<th>Company</th>
<th>Platform</th>
<th>Product</th>
<th>Dose, schedule (d)</th>
<th>Phase 3 Start</th>
</tr>
</thead>
<tbody>
<tr>
<td>Moderna</td>
<td>mRNA</td>
<td>2P-stabilized Spike, TM, Fl</td>
<td>2 doses (0, 28)</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Biontech/Pfizer</td>
<td>mRNA</td>
<td>Stabilized SARS-CoV-2 Spike</td>
<td>2 doses (0, 21)</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Oxford/AstraZeneca</td>
<td>Ad Vector</td>
<td>ChAdOx1 wild type Spike; 4F; TM</td>
<td>2 doses (0, 28)</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Janssen</td>
<td>Ad Vector</td>
<td>Ad26; stabilized Spike; 4F; TM</td>
<td>1 dose</td>
<td>Ongoing</td>
</tr>
<tr>
<td>Novavax</td>
<td>Recombinant protein</td>
<td>Stabilized trimer Spike, 4F; TM; Matrix M Adjuvant</td>
<td>2 doses (0, 21)</td>
<td>Fall 2020</td>
</tr>
<tr>
<td>GSK/Sanofi</td>
<td>Recombinant protein</td>
<td>Stabilized Trimer Spike, 4F; TM AS03 Adjuvant</td>
<td>2 doses (0, 21)</td>
<td>Fall 2020</td>
</tr>
</tbody>
</table>
Julie Trivedi, MDR Gram negatives: For better or for worse

COVID-19 and MDR Gram negative outbreaks

- UK: Klebsiella BSI
- Spain: ESBL, CPE, MDR/XDR PsA & AcB
- US: Acinetobacter

Lapses in IC practices
Due to high risk clones

COVID-19 & MDRO INFECTIONS

**INCREASED TRANSMISSION**
- PPE shortage, modified IP protocols
- Crowded facilities
- Shortages of HCWs \(\rightarrow\) higher patient ratio
- Elderly, vulnerable patients with prolonged hospitalizations & significant antibiotic exposure

**DECREASED TRANSMISSION**
- Enhanced precautions, hand hygiene, environmental disinfection
- Visitor restrictions
- Dedicated HCWs to COVID units
- Fewer non-COVID admissions from LTCF

Many of these reasons could apply to other HAIs – *C. difficile*, *C. auris*

Future data will tell us a lot
Let’s not forget about other pathogens…

99 - Big Beasts of Infectious Diseases: A Tale of 3 Respiratory Pathogens

Friday, October 23, 2020  4:15pm – 5:30pm EDT
Looking for bugs in all the wrong places. Ultrasound probes (Ruth Carrico)

**Ensuring consistent and reliable practice**
1. Standardize
2. Simplify
3. Reduce autonomy
4. Highlight deviation from practice

**Practice improvement**
- Risk assessment
- Existing cand processes
- ID gaps between existing and ideal
- Workflow
- Improvement plan
- Metrics for success

**STORY**
- Ultrasound probe use is more common than anticipated
- High risk of contact between probe and needle in 90% of cases (contact or <10mm between)
- Probes considered “non-invasive” were actually used in invasive procedures
- Outcome
  - Many invasive probes only underwent low level, intermediate level or no disinfection.

**ISSUES**
- Sheaths and probe covers are not a substitute for reprocessing
- Do not use covers that are not FDA-approved
- Confusion as to what is an intermediate disinfectant with regards to Spaulding
- Ultrasound use expanding - outpatient settings
- New devices

**SOLUTIONS**
- Standardized guidance – reduces confusion globally
- Simplify and clarify – many policies not enabling staff to identify when probes are semi-critical and how to reprocess

Standardized practice and guidance essential to ensure “continuous readiness” of devices

Carrico R et al. Ultrasound probe use and reprocessing: Results from a national survey among U.S. infection preventionists. AJIC 2018; 46 (8)8; 913-920
Sustainability and Infection Prevention

73 - It's Not Easy Being Green: Infection Prevention Meets Environmental Sustainability: Making Sense of Now and the Future

Shanda Demorest, DNP, RN-BC, PHN
Member Engagement Manager
Practice Greenhealth
La Crescent, Minnesota

Reusable vs. single use devices and equipment

Preeti Mehrotra, MD MPH
Associate Hospital Epidemiologist, Medical Director Infection Prevention and Control
Beth Israel Deaconess Medical Center
Boston, Massachusetts

Food, furniture, disinfectants, supplies
Katie Wickman, MS, RN, CIC
Sustainability Manager
Advocate Aurora Health
Disclosure: I do not have any relevant financial relationship with any commercial interests.

FORGING UNDERSTANDING AND COLLABORATION

Company Highlights

CONSIDERATIONS FOR CLEANING & DISINFECTING
- Where are disinfectants necessary? Where are they not necessary?
- Are there ‘safer’ disinfectants available?
- Product selection and life of furniture, finishes, equipment
- Span of control in your organization – owned versus leased spaces
- Are third-party certified green cleaners available?
- Emerging technologies
Change Management Session

TRANSFORMING AN INFECTION PREVENTION AND CONTROL DEPARTMENT: A REAL WORLD APPLICATION OF CHANGE MANAGEMENT

Theresa Madalone, MD CPHQ
Chief Quality Officer
NYC HHH Coney Island Hospital
10/7/2020

STAKEHOLDER ENGAGEMENT & COLLABORATION

- OHS
  - Monthly meetings
  - OSHA Module built including HH and PPE
  - Exposure template
  - Flu vaccination plan

- EVS
  - Monthly meetings
  - EOC rounds coordination
  - Standardize practices
  - Competencies/training
  - New policy development

- Operative Services
  - EOC rounds
  - Surgical Attire

EHS and EM
- Emergency and Outbreak Preparedness
- Initiate HICS for outbreaks
- Measles protocol
- Microbiology
  - Diagnostic Stewardship
- Nursing
  - Complete policy overhaul
  - Cabinet
  - Monthly meetings
- External Development
  - Quality Collaborative
  - Regional Epi Forum
  - SHEA/APIC

ACCELERATION

- Environmental Safety
  - EVS training and competency
  - UV reports and increased use
  - ATP monitoring

- Monthly IPC-EVS meetings and engineering meetings
- Epic fix for room swapping: major impediment to cleaning
- IPC oversight of PICRA process and standardization of ICRA process

INCORPORATE INTO THE CULTURE

- Repeated discussion about progress towards goals
- Regular bi-directional feedback
- IPC leadership meetings weekly
- Standardized data reporting and language around IPC
- Monthly IPC meetings with departmental and hospital leaders
- Monthly IPC report at Quality Council
- Daily Safety Huddles
- Annual report to senior leaders
- IPC integral part of every PI team
- Never events reporting for HAIs
- IPC as part of the system’s HRO Journey
- Addition of HAI measures to quality collaborative
- System IPC Council
- Scholarly work
- Professional development
Clostridioides difficile environmental contamination in hospitalized patients with diarrhea: a pilot study

Abstract

Background: The relative contribution of Clostridioides difficile colonization or infection to contamination of the hospital environment is poorly understood.

Methods: We performed a prospective cohort study of patients with diarrhea who were tested for C. difficile infection using PCR and enzyme immunoassay (EIA) to determine C. difficile environmental contamination by both tests. Patients were stratified into one of three cohorts: PCR-POS/EIA-POS, PCR-NEG/EIA-NEG, or EIA-POS/PCR-NEG. Environmental microbiological samples were taken within 24 hours of C. difficile culture and again for two successive days for a total of three days. Patients were excluded if they had C. difficile infection on the last day of sampling. Microbiological samples of surfaces were obtained from three locations (bathroom, patient bed, and care area) and processed using the swabbing technique. Ribotyping was completed on a subset of stool and environmental samples to measure concordance of isolates. GFP and recovery rates between arm areas were compared with a good ANOVA followed by pairwise comparisons using a Bonferroni correction.

Results: We enrolled 41 patients between November 2019 and March 2020. Of patients tested for C. difficile infection using both tests, 18 were PCR-NEG/EIA-NEG, 20 were PCR-POS/EIA-POS, and 3 were PCR-NEG/EIA-POS. A total of 347 individual and 112 pooled samples were collected. PCR-NEG/EIA-POS patient rooms had a higher prevalence of C. difficile (35.6 vs 17.5%, p = 0.01) and PCR-POS/EIA-POS patients had a higher recovery rate (61% vs 39%, p = 0.02) compared to PCR-NEG/EIA-NEG patients. PCR-NEG/EIA-POS patients had a higher recovery rate (61% vs 39%, p = 0.02) compared to PCR-NEG/EIA-NET patients, although not statistically significant, and PCR-POS/EIA-POS patients had a similar recovery rate to PCR-POS/EIA-NET patients.

Concordance: The rooms of patients with both patient and environmental isolates, 79% of patient isolates had a concordant isolate recovered in the environment.

Background

- Healthcare environments are frequently contaminated with clinically important pathogens, such as C. difficile, that can cause healthcare-associated infections.
- The relative contribution of patient C. difficile colonization or infection to contamination of the hospital environment is not known.

Methods

- From November 2019 to March 2020, 41 patients with diarrhea and C. difficile diagnostic test results were enrolled at Duke University Hospital (Table 1).
- Patients were stratified into three cohorts based on combination of PCR and EIA results (PCR-POS/EIA-POS or PCR-NEG/EIA-NEG).
- Environmental microbiological samples were collected:
  - within 24 hours of C. difficile cultures and repeated for two successive days (Table 1).
  - from the bathroom, patient bed, and care area.
- Ribotyping was completed on a subset of stool and environmental samples to measure concordance of isolates (Table 1).

Results

- Room bioburden: PCR-POS/EIA-POS patient rooms had a higher average room burden (435.6 CFU (65%CI 173.0-694.0)) compared to PCR-NEG/EIA-NEG (35.5 (95% CI 17.5-71.5), p < 0.01) and PCR-POS/EIA-NEG (17.1 (95% CI 2.2-33.0), p < 0.01). PCR-POS/EIA and PCR average room burdens were similar (p = 0.83).
- Recovery rate: PCR-POS/EIA-POS patient rooms had a higher recovery rate (61%) compared to PCR-NEG/EIA-NEG (39%, p < 0.01), although not statistically significant, and PCR-POS/EIA-NEG and PCR-NEG/EIA-NEG rooms had a similar recovery rate to PCR-POS/EIA-NEG (p = 0.14).

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Concordance: Of the rooms with both patient and environmental isolates, 79% of patient isolates had a concordant isolate recovered in the environment.
Use of a Trained Canine to Detect *Clostridioides difficile* in the Hospital Environment

R Harrison, L Pittman, K Pittman, P Cook
Division of Infectious Diseases, Brody School of Medicine at East Carolina University, Greenville, NC

1. Introduction
*Clostridioides difficile* infection (CDI) is the most common nosocomial infection in this country. We know spores contribute to spread of infection. How do we know that all the *C. difficile* spores have been eradicated after a patient’s room is cleaned? Currently we have no validated method. Current literature has demonstrated that canines have high levels of sensitivity and specificity for detecting the odor produced by *C. difficile* and its spores.

2. Methods
Harley’s training:
- Included positive and negative culture plates containing *C. difficile*.
- When 2 years old she was taught by a professional trainer to sit when she detected *C. difficile* and to not sit when *C. difficile* was not found. She was rewarded with treats when *C. difficile* was found.
- She was able to identify positive stool samples with near 100% accuracy.

Harley in the hospital setting:
- Once proficient, Harley was used to sniff rooms at Vidant Medical Center occupied by, or previously occupied by, patients with CDI as well as cleaning carts.

Early intervention: October to January 2019
- Number of carts sniffed positive and negative by Harley were measured.
- The cleaning staff were instructed on how to clean their carts with bleach wipes.

Late intervention: February to March 2020
- Again, the number of carts sniffed positive and negative by Harley were measured.
- A Fisher’s exact test was used to determine differences between early and late testing.

The study was approved by the Animal use and Care Committee at ECU.

3. Results
- Harley detected *C. difficile* in 51% (24/45) of rooms inhabited with patients positive for CDI. Harley detected *C. difficile* (or its spores) in 46% (13/28) of rooms previously inhabited by patients with CDI.
- We observed a statistically significant decline in positive carts and an increase in negative carts during the late intervention period (p = 0.017).
- Harley did not detect *C. difficile* in any positive areas after they had been cleaned with bleach wipes.

4. Conclusions
- Hospital cleaning carts are commonly contaminated with *C. difficile* spores.
- Training a canine to detect *C. difficile* and its spores is an effective means of detecting the organism in the hospital environment.
- Use of a trained canine appears to be effective in validating the cleaning process of rooms that have been previously occupied by patients with CDI.

5. References
1. M Bones, M Agmael, H Luik, Mileen, C Vanderbroucke, Yreull, "Using a dog’s olfactory sensitivity to identify *C. difficile* in stools and patients: proof of concept study" BMJ 2011;345:e7306
2. CDC "C. diff Guidelines and Prevention Resources"  
3. "C. difficile Canine Scent Detection at Vancouver Coastal Health" – vch.ca/your-care/your-safety-privacy/infection-
Contamination of Hospital Drains by Carbapenemase-Producing Enterobacteriales (CPE) in Ontario, Canada

Toronto Invasive Bacterial Diseases Network, Ontario, Canada; *alainna.jamal@sinahealthsystem.ca

Introduction
- CPE outbreaks linked to hospital wastewater drainage systems
- Determined prevalence of CPE in hospital drains exposed to inpatients with CPE using whole-genome sequencing, and explored risk factors for drain contamination

Methods
- 10 hospitals → cultured hand hygiene sink, patient use sink, and shower drains exposed to inpatients with CPE from Oct. 2017 to Jan. 2018
- illumina and MinION sequencing to compare drain/room occupant CPE isolates and carbapenemase gene-containing plasmids
- Multi-level logistic regression model to explore risk factors for drain contamination

Results
- 1209 drains in 501 patient rooms and 71 communal shower rooms exposed to 310 inpatients with CPE
- 53 (4%) drains at 7 (70%) hospitals yielded 62 CPE isolates
- 49 patient room drain CPE isolates
- 13 communal shower room drain CPE isolates

Table. Unit- and room-level factors associated with drain contamination.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Unadjusted OR (95% CI)</th>
<th>Adjusted OR (95% CI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of drain (referent=patient use sink)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hand hygiene sink</td>
<td>3.60 (1.14-11.32)</td>
<td>3.75 (1.17-11.99)</td>
</tr>
<tr>
<td>Shower</td>
<td>13.84 (4.70-40.77)</td>
<td>12.95 (4.29-39.08)</td>
</tr>
<tr>
<td>Room type (referent=patient)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Communal shower</td>
<td>3.09 (1.44-6.60)</td>
<td>1.30 (0.55-3.07)</td>
</tr>
<tr>
<td>Unit type (referent=rehabilitation)</td>
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<td></td>
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<tr>
<td>Intensive care</td>
<td>0.96 (0.12-7.40)</td>
<td>1.40 (0.16-12.59)</td>
</tr>
<tr>
<td>Medical</td>
<td>2.73 (0.65-11.41)</td>
<td>2.66 (0.58-12.30)</td>
</tr>
<tr>
<td>Surgical</td>
<td>1.24 (0.23-6.62)</td>
<td>1.23 (0.21-7.33)</td>
</tr>
</tbody>
</table>

Conclusion: 4% of drains were CPE-contaminated. Drain CPE unrelated to patient exposure suggests contamination by undetected colonized patients or retrograde transmission. Drain types had different contamination risks.

Figure. The distribution of CPE gene/species combinations of CPE in drains (n=55) (A) and room occupants (n=62) (B).

• 4/49 (8%) patient room drain CPE isolates could be linked by sequencing to a prior room occupant. Drain/room occupant linked pairs:
  • *Citrobacter freundii* ST18 isolates separated by 8 SNVs
  • Related *blaKPC*-containing IncN3-type plasmids (different species)
  • Related *blaKPC-3*-containing IncN-type plasmids (different species)
  • Related *blaVIM*-containing IncL/M-type plasmids (different species)

In all cases, patients were colonized prior to drain exposure and so likely contaminated drains (not acquired from drains).

• Matches among drain isolates (possible retrograde transmission):
  • 10 drain isolates on 2 units with related *blaNDM-1*-containing IncH1A2/A/H2-type plasmids (9 Enterobacter hormaechei ST66 separated by 0-6 SNVs, 1 Klebsiella oxytoca)
A Randomized Crossover Study to Evaluate Interventions to Reduce Contamination during Reuse of N95 Respirators

Introduction

- During the COVID-19 pandemic, shortages of personal protective equipment (PPE) have forced many health care facilities to require personnel to reuse N95 respirators.
- We hypothesized that the use of improved technique such as changing gloves after N95 contact or providing rapid decontamination between each use would reduce the risk for contamination.

Methods

- Twelve healthcare personnel each performed 4 standardized simulations of patient care interactions in a randomized order.
- N95 respirators exteriors were contaminated with bacteriophage MS2 with sampling recovery of ~10⁶ plaque forming units (PFU).
- Simulations involved:
  - Donning a N95 respirator (3M 8210) contaminated with bacteriophage MS2 and additional PPE (gloves, cover gown, face shield).
  - Maneuvering the patient’s bed and bed rail and auscultating the chest and palpating the abdomen.
  - Doffing PPE after examination and placing N95 respirator into paper bag for storage.
- Four simulation protocols were used:
  1. Control: Simulation without glove change except at completion of doffing after the examination.
  2. Change gloves: Glove change after any N95 contact.
  3. UV: Control + 1 minute UV-C light treatment of respirator prior to doffing.
  4. Steam: Control + 30 second steam treatment of respirator prior to doffing.
- A second trial was conducted with simulation protocols 1-3 using a 100-fold lower bacteriophage MS2 inoculum.
- Participant and environmental surfaces were sampled after each simulation and frequencies of contamination were compared.

Results

- Use of a highly contaminated N95 respirator resulted in frequent MS2 contamination in the Control, Glove change, and UV-C groups, but was dramatically reduced with steam treatment of the N95 (P<0.01) (Figure 1A).
- With the lower level of contamination, MS2 contamination occurred less frequently across all groups, and was significantly reduced in the UV group, compared to the Control (P<0.01) (Figure 1B).
- Common observed routes of contamination included:
  - Direct transfer from contaminated portion of N95 respirator to skin, face shield, and stethoscope.
  - Direct transfer to paper bag holding N95 respirator.

Conclusions

- Reuse of contaminated N95 respirators resulted in contamination of personnel and the environment even when correct technique was used.
- Rapid decontamination technologies can reduce the risk for transmission.

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Key Takeaways

- **Infection prevention is changing**
  - New practices and protocols (e.g., Hierarchy of Controls)
  - Big challenges and changes for LTC especially
  - More collaboration within facilities, between facilities and government, between governments, and globally

- **Infection transmission is different...for now**
  - Limited travel, work from home, cooking at home all change landscape of infections like flu, measles, foodborne illness

- **Long term impacts of COVID-19 are yet to be realized**
  - Impact on other HAIs unknown (“they didn’t take a vacation because of COVID”)
  - Reduced childhood vaccinations may have long lasting impact
THANK YOU!!