Why Worry?
Superbugs in NYS: Multidrug-Resistant Organisms of Concern

October 26, 2018
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New York State Department of Health
Disclosures

Speaker has no disclosures to report.
Objectives

- Multidrug-Resistant Bacteria of Concern
- Multidrug-Resistant Fungus of Concern
  - *C. auris* epidemiology in New York State
    - Patient characteristics
    - Environmental findings
    - Laboratory Findings
- *Why Worry?*
CDC’s New Antibiotic Resistance Laboratory Network
## Lab Capacity Supported by the AR Solutions Initiative: Regional Labs

<table>
<thead>
<tr>
<th>Healthcare Labs</th>
<th>State/Local Labs</th>
<th>Regional Labs</th>
<th>CDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Washington State Public Health Laboratories</td>
<td>Wisconsin State Laboratory of Hygiene</td>
<td>Michigan Department of Health and Human Services</td>
<td>CDC</td>
</tr>
<tr>
<td>CENTRAL</td>
<td>Minnesota Department of Health Public Health Laboratory</td>
<td>NATIONAL TUBERCULOSIS MOLECULAR SURVEILLANCE CENTER</td>
<td>CDC</td>
</tr>
<tr>
<td>MOUNTAIN</td>
<td>Texas Department of State Health Services Laboratory</td>
<td>NORTHEAST</td>
<td>Wadsworth Center Laboratories</td>
</tr>
<tr>
<td>MIDWEST</td>
<td>Wisconsin State Laboratory of Hygiene</td>
<td>MID-ATLANTIC</td>
<td>Maryland Public Health Laboratory</td>
</tr>
<tr>
<td></td>
<td>Michigan State Department of Health</td>
<td>SOUTHEAST</td>
<td>Tennessee State Public Health Laboratory</td>
</tr>
</tbody>
</table>

- **WEST**
  - Washington State Public Health Laboratories
  - Core Testing
  - *N. gonorrhoeae*

- **CENTRAL**
  - Minnesota Department of Health Public Health Laboratory
  - Core Testing
  - *C. difficile*
  - *S. pneumoniae*

- **MOUNTAIN**
  - Texas Department of State Health Services Laboratory
  - Core Testing
  - *N. gonorrhoeae*
Bacteria: Why Worry?
KPC-CRE found in the US spread from 2 states in 2001 to 49 states, DC, and PR in 16 years.

States with *Klebsiella pneumoniae* carbapenemase (KPC)-producing Carbapenem-resistant Enterobacteriaceae (CRE) confirmed by CDC.
Mechanisms of Carbapenem Resistance in US

Reported to the Centers for Disease Control and Prevention (CDC), by State

**KPC-producing CRE**

Prior to January 2017

December 2017
Mechanisms of Carbapenem Resistance in US
Reported to the Centers for Disease Control and Prevention (CDC) 2017, by state

NDM-producing CRE

Prior to January 2017
Total NDM-producing CRE = 175

December 2017
Total NDM-producing CRE = 379
Mechanisms of Carbapenem Resistance in US
Reported to the Centers for Disease Control and Prevention (CDC), by state

OXA-48-Type-producing CRE

Prior to January 2017
Total OXA-48-producing CRE = 73

December 2017
Total OXA-48-producing CRE = 146
Mechanisms of Carbapenem Resistance in US

Reported to the Centers for Disease Control and Prevention (CDC), by state

VIM-producing CRE

Prior to January 2017

Total VIM-producing CRE = 27

December 2017

Total VIM-producing CRE = 57

* Jan 2018 1 VIM identified
Overall Patient Prevalence Rate: Number of first LabID events per patient per month (e.g., admission prevalent or hospital onset)/ Number of patient admissions to the hospital x 1000
Wadsworth Center Isolate Testing for Novel Resistance Mechanism

72 ALERTS
(July 2017 - March 2018)

- NYS (34)
- NJ (19)
- MA (6)
- NYC (4)

2018 Testing (Jan-Mar) (NY, NJ, CT, MA, ME, NH, NYC)
- 164 isolates or specimens received!

February alone
- 33 CRE
- 17 CRPA
- 19 MDR Acinetobacter
- 59 ESBLs
- 17 CRE Colonization

*NYS Findings
- NDM, OXA-48, VIM, IMP, OXA-23 (CRPA)
Fungi: Why Worry?
Candida auris sp. nov., a novel ascomycetous yeast isolated from the external ear canal of an inpatient in a Japanese hospital

Kazuo Satoh\textsuperscript{1,2}, Koichi Makimura\textsuperscript{1,3}, Yayoi Hasumi\textsuperscript{1}, Yayoi Nishiyama\textsuperscript{1}, Katsuhisa Uchida\textsuperscript{1} and Hideyo Yamaguchi\textsuperscript{1}

\textsuperscript{1}Teikyo University Institute of Medical Mycology, 359 Otsuka, Hachioji, Tokyo 192-0395, \textsuperscript{2}Japan Health Sciences Foundation, 13-4 Nihonbashi-Kodenmacho, Chuo-ku, Tokyo 103-0001 and \textsuperscript{3}Genome Research Center, Graduate School of Medicine and Faculty of Medicine, Teikyo University, Otsuka 359, Hachioji, Tokyo 192-0395, Japan

Global *C. auris* Emergence: Rapid Emergence Since 2009

- 2009: Japan
- 2010: South Korea
- 2011: India
- 2012: S. Africa
- 2013: Kenya
- 2014: Kuwait
- 2015: Pakistan
- 2016: Venezuela
- 2016: Israel
- 2016: United Kingdom
Global *C. auris* Emergence

EDITOR'S CHOICE

**Simultaneous Emergence of Multidrug-Resistant *Candida auris* on 3 Continents Confirmed by Whole-Genome Sequencing and Epidemiological Analyses**

Shawn R. Lockhart, Kizee A. Etienne, Snigdha Vallabhaneni, Jovelia Farooqi, Anuradha Chowdhary, Nelesh P. Govender, Arnaldo Lopes Colombo, Belinda Calvo, Christina A. Cuomo, Christopher A. Desjardins, ...

*Clinical Infectious Diseases*, Volume 64, Issue 2, 15 January 2017, Pages 134–140,

https://doi.org/10.1093/cid/ciw691

Published: 16 December 2016  Article history  

https://academic.oup.com/cid/article/64/2/134/2706620
Global *C. auris* Emergence

Countries from which *Candida auris* cases have been reported, as of July 31, 2018

C. auris in U.S.

C. auris in U.S.

U.S. Clinical Cases of *Candida auris* Reported by State, United States, as of July 31, 2018

C. auris in U.S.

U.S. Clinical Cases of *Candida auris* Reported by State, United States, as of July 31, 2018

Why Worry?
**Why Worry? C. auris in New York**

June 2016: CDC Clinical Alert

Case Count: 9

End of 1st CDC Epi Aid

Learned about a retrospective case from 2013

Learned about a retrospective case from April 2016

NYS Facilities & Lab Alert

Case Count: 7

Beginning of 1st CDC Epi Aid

Case Count: 19
Why Worry? C. auris in New York

Spread in Healthcare Facilities
**Why Worry? Spread in Healthcare Facilities**

*Candida auris* Clinical Cases in New York State May 2013 - August 20, 2018

**Month of First Clinical Culture of Candida auris**
Why Worry? Spread in Healthcare Facilities

Cumulative number of Candida auris clinical cases

---2016Q4
Why Worry? Spread in Healthcare Facilities

Cumulative number of Candida auris clinical cases

---2017Q1
Why Worry? Spread in Healthcare Facilities

Cumulative number of Candida auris clinical cases

Number of cases in ZIP code group

- 0
- 1-5
- 6-10
- 11-15
- 16-20
- 21-25
- 26-30

----------2017Q2
Why Worry? Spread in Healthcare Facilities

Cumulative number of Candida auris clinical cases

Number of cases in ZIP code group:
- 0
- 1-5
- 6-10
- 11-15
- 16-20
- 21-25
- 26-28

---------------2017Q3
Why Worry? Spread in Healthcare Facilities

Cumulative number of Candida auris clinical cases

Number of cases in ZIP code group:
- 0
- 1-5
- 6-10
- 11-15
- 16-20
- 21-25
- 26-26

------------------------2017Q4
Why Worry? Spread in Healthcare Facilities

Cumulative number of Candida auris clinical cases

Number of cases in ZIP code group
- 0
- 1-5
- 6-10
- 11-15
- 16-20
- 21-25
- 26-28

———2018Q1———
Why Worry? Spread in Healthcare Facilities

Cumulative number of Candida auris clinical cases

Number of cases in ZIP code group

- 0
- 1-5
- 6-10
- 11-15
- 16-20
- 21-25
- 26+
**Why Worry? Spread in Healthcare Facilities**

- Data from first 51 clinical cases in NYS
  - 31 (61%) in Long Term Care Facility (LTCF) immediately before hospital admission
  - 19 of 31 (61%) in LTCFs with ventilator beds

### Data from first 212 Clinical Cases

<table>
<thead>
<tr>
<th>Healthcare Exposure Prior to Current Admission, Prior 90 Days</th>
<th>Number of Cases (n)</th>
<th>Percentage (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acute Care Hospital</td>
<td>185</td>
<td>79%</td>
</tr>
<tr>
<td>Long Term Care Facility (Nursing Home)</td>
<td>74</td>
<td>31%</td>
</tr>
<tr>
<td>None</td>
<td>32</td>
<td>15%</td>
</tr>
<tr>
<td>Community</td>
<td>14</td>
<td>6%</td>
</tr>
<tr>
<td>Long Term Acute Care Hospital</td>
<td>6</td>
<td>3%</td>
</tr>
<tr>
<td>Other</td>
<td>3</td>
<td>1%</td>
</tr>
</tbody>
</table>
Why Worry? Spread in Healthcare Facilities


Why Worry? Spread in Healthcare Facilities

Intense NYS Efforts

• Incident Management System activation
• Case finding
• Hired additional staff
• Roundtable with healthcare leadership
• Required webinar for NYC hospitals and nursing homes
• Required infection control self-assessment survey for all NYC hospitals and nursing homes
• On-site reviews of all hospitals and nursing homes in Brooklyn and Queens to assess compliance with infection control requirements
• Point prevalence studies, environmental surveys & educational infection control assessments
Why Worry? Spread in Healthcare Facilities

Point Prevalence Surveys (PPS) in New York State

- As of March 25, 2018, 81 point prevalence surveys & environmental surveys had been conducted at 55 healthcare facilities
  - PPS:
    - 4268 samples were collected from 2344 individuals
    - 144 (6.1%) individuals had a positive *C. auris* culture
    - 125 (5.3%) individuals had a positive *C. auris* PCR test
Why Worry? Spread in Healthcare Facilities

<table>
<thead>
<tr>
<th>Facility Type</th>
<th># Patients C. auris Positive</th>
<th># Total Patients Tested</th>
<th>% Positive for C. auris</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospitals (N=22)</td>
<td>36</td>
<td>767</td>
<td>5.0</td>
</tr>
<tr>
<td>LTACHs* (N=1)</td>
<td>1</td>
<td>35</td>
<td>2.9</td>
</tr>
<tr>
<td>LTCFs** (N=30)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ventilator LTCFs (N=16)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Non-Ventilator LTCFs (N=14)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Co-located Hospital &amp; LTCF*** (N=2)</td>
<td>17</td>
<td>138</td>
<td>12.3</td>
</tr>
</tbody>
</table>
### Why Worry? Spread in Healthcare Facilities

<table>
<thead>
<tr>
<th>Facility Type (n=55)</th>
<th># Patients C. auris</th>
<th># Total Patients Tested</th>
<th>% Positive for C. auris</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hospitals</strong> (N=22)</td>
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<td></td>
<td></td>
</tr>
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</table>

- **LTCFs** (N=30)
  - Ventilator LTCFs (N=16)
  - Non-Ventilator LTCFs (N=14)

<table>
<thead>
<tr>
<th></th>
<th>88</th>
<th>1404</th>
<th>6.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>LTCFs**</td>
<td>86</td>
<td>1120</td>
<td>7.7</td>
</tr>
<tr>
<td>Co-located</td>
<td>2</td>
<td>284</td>
<td>0.7</td>
</tr>
<tr>
<td>Hospital &amp;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LTCF***</td>
<td></td>
<td></td>
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</tbody>
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<table>
<thead>
<tr>
<th></th>
<th>17</th>
<th>138</th>
<th>123</th>
</tr>
</thead>
<tbody>
<tr>
<td>Hospital</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LTACHs*</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>LTCF***</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Why Worry? *C. auris* in New York

Persistent Colonization
Why Worry? Persistent Colonization

Follow-up Cultures for Clinical *C. auris* Cases, by Case

- Data from first 43 clinical patients in NYS
  - 2 deemed to be “cleared”
  - 19/43 (44%) expired

Why Worry? *C. auris* in New York

Colonized Patients are Becoming Infected
Why Worry? Colonization to Infection

Candida auris Clinical Cases in New York State May 2013 - August 20, 2018

Month of First Clinical Culture of Candida auris

Number of

0 5 10 15 20 25


Surv to Clinical

Why Worry? *C. auris* in New York

Persistence in the Environment
Why Worry? Persistence in the Environment

Environmental Surveys (ES) in New York State

- As of March 2018, 81 point prevalence surveys & environmental surveys had been conducted at 55 healthcare facilities
  - ES:
    - 2896 environmental samples collected
    - 86 (3.0%) samples positive for *C. auris* by culture
    - 257 (8.9%) samples positive by PCR
    - Many were from surfaces or equipment deemed to be “clean”
Why Worry? Persistence in the Environment

- *C. auris* recovered from multiple sites within patient & procedure rooms:
  - Call bells
  - TV remotes, telephones
  - Window sills
  - Curtains
  - Light cords
  - Ventilators
  - Blood pressure cuffs
  - PPE carts
  - Medication carts
  - Clean supply carts
  - Housekeeping carts
  - IR suite equipment
  - OR equipment
Why Worry? Persistence in the Environment

Survival, Persistence, and Isolation of the Emerging Multidrug-Resistant Pathogenic Yeast *Candida auris* on a Plastic Healthcare Surface

Rory M. Welch, Meghan L. Bentz, Alicia Shams, Hollis Houston, Amanda Lyons, Laura J. Rose, Anastasia P. Litvintseva

DOI: 10.1128/JCM.00321-17

Why Worry? *C. auris* in New York

Vulnerable Hosts
Why Worry? Vulnerable Hosts

- Currently, 57% of clinical cases are males
- Clinical cases have multiple underlying conditions

<table>
<thead>
<tr>
<th>Age Range (Years)</th>
<th># Cases (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1</td>
<td>1 (0%)</td>
</tr>
<tr>
<td>1-18</td>
<td>0 (0%)</td>
</tr>
<tr>
<td>19-44</td>
<td>15 (12%)</td>
</tr>
<tr>
<td>45-64</td>
<td>67 (32%)</td>
</tr>
<tr>
<td>&gt;64</td>
<td>129 (61%)</td>
</tr>
</tbody>
</table>
**Why Worry? Vulnerable Hosts**

- Clinical cases through August 20, 2018
  - Blood and urine majority of first positive sites
  - Variety of sites

<table>
<thead>
<tr>
<th>First Positive Site</th>
<th>Count</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Blood</td>
<td>119</td>
<td>56</td>
</tr>
<tr>
<td>Urine</td>
<td>40</td>
<td>19</td>
</tr>
<tr>
<td>Wound/skin</td>
<td>18</td>
<td>8</td>
</tr>
<tr>
<td>Respiratory site</td>
<td>17</td>
<td>8</td>
</tr>
<tr>
<td>Other</td>
<td>9</td>
<td>4</td>
</tr>
<tr>
<td>Bile</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Catheter tip or segment</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Ear</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>212</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>
**Why Worry? Vulnerable Hosts**

<table>
<thead>
<tr>
<th>We ARE NOT seeing large numbers of patients with C. auris who:</th>
<th>We ARE seeing large numbers of patients with C. auris who:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Are neutropenic</td>
<td>Are on ventilators</td>
</tr>
<tr>
<td>Are children</td>
<td>Have wounds, lines or drains</td>
</tr>
<tr>
<td>Are in the community</td>
<td>Are over the age of 65</td>
</tr>
<tr>
<td>Do not have co-morbid medical conditions</td>
<td>Are nursing home residents with frequent hospitalizations</td>
</tr>
</tbody>
</table>
Why Worry? *C. auris* in New York

High Mortality
Why Worry? High Mortality

Probability of Survival, All Cases Combined

Probability of surviving past:
- 2 days = 96%
- 7 days = 89%
- 30 days = 66%
- 60 days = 54%
- 90 days = 44%
Why Worry? *C. auris* in New York

Antifungal Drug Resistance
Why Worry? Antifungal Drug Resistance

Cryptococcus neoformans
   Rhodotorula glutinis
      Candida rugosa
         Candida krusei
            Candida lusitaniae
               Candida auris
                  Candida haemulonii
                     Candida duobushaemulonii
                        Candida pseudohaemulonii

Saccharomyces cerevisiae
   Candida glabrata
      Candida bracarensis
         Candida nivariensis
            Candida catenulata
               Candida pelliculosa
                  Candida albicans
                     Candida dubliniensis
                        Candida tropicalis
                           Candida metapsilosis
                              Candida parapsilosis
                                 Candida orthopsilosis
                                    Candida famata
                                       Candida fermentati
                                          Candida guilliermondii

Antifungal resistant clade
Why Worry? Antifungal Drug Resistance

- Lockhart 2016: 54 isolates from Pakistan, India, South Africa, Venezuela, and Japan
  - Susceptibility testing
    - 93% resistant to fluconazole, 54% to voriconazole, 35% to amphotericin B, 7% to echinocandins, 6% to flucytosine
    - 41% resistant to ≥2 classes, 2 isolates resistant to 3 classes

Why Worry: Antifungal Drug Resistance

Antifungal susceptibility data for first *Candida auris* isolates from 51 clinical cases, New York, USA, 2013–2017

<table>
<thead>
<tr>
<th>Antifungal</th>
<th>Tentative resistance breakpoint</th>
<th>MIC$_{50}$</th>
<th>MIC range</th>
<th>No. (%) resistant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fluconazole</td>
<td>&gt;32</td>
<td>&gt;256</td>
<td>8.00 to &gt;256</td>
<td>50 (98)</td>
</tr>
<tr>
<td>Caspofungin</td>
<td>&gt;2</td>
<td>0.060</td>
<td>0.03–0.25</td>
<td>0</td>
</tr>
<tr>
<td>Micafungin</td>
<td>&gt;4</td>
<td>0.120</td>
<td>0.06–0.25</td>
<td>0</td>
</tr>
<tr>
<td>Anidulafungin</td>
<td>&gt;4</td>
<td>0.250</td>
<td>0.12–0.50</td>
<td>0</td>
</tr>
<tr>
<td>Amphotericin B</td>
<td>&gt;2</td>
<td>1.500</td>
<td>0.50–4.00</td>
<td>15 (29)</td>
</tr>
<tr>
<td>Flucytosine</td>
<td>NA</td>
<td>0.125</td>
<td>0.125–0.25</td>
<td>NA</td>
</tr>
</tbody>
</table>

But, Why Worry?
But, Why Worry?

Infection Prevention and Control Measures are Challenging…

But They Work!
## What Are The Recommendations?

<table>
<thead>
<tr>
<th>Infection Control &amp; Prevention</th>
<th>Environmental Cleaning</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Hand Hygiene</strong></td>
<td><strong>Use EPA-Registered Hospital Grade Disinfectant Effective Against <em>C. difficile</em> spores (&quot;List K&quot;)</strong></td>
</tr>
</tbody>
</table>
| **Isolation/Cohorting**        | **- Attention to contact times**  
| - Contact Precautions         | **- Attention to high touch surfaces & moveable equipment**  
| - Dedicated Equipment         | **- Attention to high touch surfaces & moveable equipment**  
| - Attention to transporting   | **- Attention to high touch surfaces & moveable equipment**  |
| **Reporting & Interfacility Communication** | **Lab identification & Screen Contacts** |

Back to the Basics

- Hand Hygiene (HH) is Essential
  - Assure HH dispensers & sinks are available
  - Encourage use of alcohol based hand rub (ABHR) (when appropriate) and soap/water
  - Review indication for HH with healthcare workers
  - Have a system to educate and audit HH (optimally to address different areas, providers & shifts)
Myth Buster: What Do We Encounter at Real Facilities?

Facility
Nursing Homes:
- “This is their home…and we have them [alcohol based hand rub (ABHR) dispensers] inside of the rooms by the sink…”

Pertinent Factors/Data:
- Sinks are **INSIDE** room
- Does not promote HH on entrance and exit
- Some activities/equipment are in hallway
- Makes auditing challenging
Myth Buster: ABHRs

Facility
Nursing homes:

- “We will be out of compliance because of fire or regulatory codes…”

Pertinent Factors/Data:

- The NYC Fire Code allows the use and placement of ABHRs in resident corridors/hallways (NYC Fire Code 2014, Chapter 34, FC 3405)
Navigating the Codes

- Addresses:
- Definitions of alcohol based hand rubs
- Installation & volumes of product and placement

2014 NYC FIRE CODE
Chapter 34
FLAMMABLE AND COMBUSTIBLE LIQUIDS

SECTION FC 3405
HANDLING AND USE

3405.8 Alcohol-based hand rubs classified as Class I or Class II liquids.
The storage, handling and use of dispensers containing alcohol-based hand rubs classified as
Class I or Class II liquids shall be in compliance with the following requirements:
1. Dispensers shall be of the non- aerosol, disposable and refillable type.
2. The maximum capacity of each dispenser shall be 68 ounces (2 L).
3. The maximum alcohol content shall not exceed 95 percent by volume.
4. The minimum separation between dispensers shall be 48 inches (1219 mm).
5. Dispensers shall not be installed directly adjacent to, above or below any electrical
receptacle, switch, appliance, device or other ignition source. The wall space between
the dispenser and the floor shall remain clear and unobstructed.
6. Dispensers shall be wall mounted with the top of each dispenser a minimum of 42
inches (1067 mm) and a maximum of 48 inches (1219 mm) above the finished floor.
7. Dispensers shall not release their contents except when the dispenser is manually
activated.
8. The storage of dispensers shall be in compliance with the applicable requirements of
FC5404.
9. In occupancies with carpeted floors, dispensers may only be installed in smoke
compartments or fire areas protected throughout by a sprinkler system.

3405.8.1 Corridor installations. Dispensers installed in corridors shall additionally comply
with the following requirements:
1. The maximum capacity of each dispenser shall be 41 ounces (1.21 L).
2. The maximum quantity allowed in a corridor within a control area shall be 10 gallons
(38 L).
3. The minimum corridor width shall be 72 inches (1829 mm).
4. Projections into a corridor shall be in accordance with the construction codes,
including the Building Code.
5. The corridor shall be protected throughout by a sprinkler system or smoke detection
system.

https://www1.nyc.gov/site/tyb/about/resources/code-and-rules/nyc-fire-code.page

Summary Issue- from R. Giardina, NYSDOH
Myth Buster: HH

Healthcare Workers:
- “Real HH with soap and water is better than alcohol based gel“
- “I don’t like it (ABHR)"
- “I am wearing gloves”

Pertinent Factors/Data:
- “ABHR is the preferred method for cleaning your hands when they are not visibly dirty” (not \textit{C. difficile}; ok for \textit{C. auris}).
- More effective at killing potentially deadly germs on hands than soap
- Requires less time
- Is more accessible than handwashing sinks
- Produces reduced bacterial counts on hands
- Improves skin condition with less irritation and dryness than soap and water

\textit{CDC. Guidelines of HH in HC settings. MMWR. 2002:51 RR-16)}
Series tables with studies summarized log reductions (tables I-5 review log reductions)
CDC webpage: “Show me the science.”
Pearls for Practical Implementation

- Have a HH Policy (includes nails)

- Engage Staff in some of the decisions
  - Pilot the products
  - Walk through work flow: ensure enough ABHR, determine placements of ABHR dispensers

- Auditing: Simple, some covert (secret shopper/“in and out”), share the data
Myth Buster: It Fits Like a Glove...

Indications for, and limitations of, glove use:

- Hand contamination may occur as a result of small, undetected holes in examination gloves (Doebbeling 1988, McLane 1983)
- Contamination may occur during glove removal (Olsen 1993)
- Wearing gloves does not replace the need for hand hygiene (Tenorio 2001)
- Failure to remove gloves after caring for a patient may lead to transmission of micro-organizations from one patient to another (Patterson 1991).
Myth Buster: Transmission-Based Precautions Signage

Facility
Nursing homes & Hospitals:
- “We can’t have the diagnosis on the door...we can get cited.”
- Default signage: “See Nurse”

Pertinent Factors/ Data:
- CMS (42 C.F.R. section 483.10), signage restrictions do not apply to “the CDC isolation precaution transmission based signage for reasons of public health protection, as long as the sign does not reveal the type of infection” (CMS State Operations Manual, Appendix PP)*.

- Bottom line: Signs can be more informative

*Diagnosis, organism, or resident identifiers (e.g., name, bed number) should not be disclosed on for Transmission-Based Precautions Signs.
Table 1: Pros and Cons of Various Types of Transmission-based Precautions Signs*

<table>
<thead>
<tr>
<th>Description</th>
<th>Pros</th>
<th>Cons</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Signs stating the type of precautions (e.g. “Contact Precautions”)</td>
<td>Easily recognizable and meaningful for healthcare providers</td>
<td>Not meaningful for visitors – might need additional language such as “Visitors see nurse”</td>
<td></td>
</tr>
<tr>
<td>Signs stating the type of precautions but without the word “precautions” (e.g. “Contact”, “Isolation”)</td>
<td>Likely recognizable and meaningful for healthcare providers; might be less alarming to visitors than signs with the word “precautions”</td>
<td>Not meaningful for visitors – might need additional language such as “Visitors see nurse”</td>
<td></td>
</tr>
<tr>
<td>Signs stating the type of precautions and providing detailed information about what those precautions entail (e.g. pictures of PPE to be worn)</td>
<td>Easily recognizable and meaningful for healthcare providers what needs to be done while caring for the resident</td>
<td>Might be confusing or alarming for visitors and might need additional language such as “Visitors see nurse” might result in a large, obtrusive, and/or cluttered sign</td>
<td></td>
</tr>
<tr>
<td>Signs with language such as “See nurse before entering”</td>
<td>Useful for visitors, may be less alarming than signs that are more explicit about precautions</td>
<td>Might not be understood to indicate Transmission-based Precautions by healthcare providers</td>
<td>NYSDOH staff have witnessed healthcare providers entering rooms with these types of signs without using PPE because the signs were not recognized as indicating Transmission-based Precautions. If these types of signs are chosen, the facility should ensure that all healthcare providers and other staff receive effective, periodic training on the meaning of the signs. Regardless of sign type, adherence should be monitored.</td>
</tr>
<tr>
<td>Signs consisting of colored dots to indicate which type of precautions are required</td>
<td>Unobtrusive</td>
<td>Not meaningful for visitors – might need additional language such as “Visitors see nurse”, might not be understood to indicate Transmission-based Precautions by healthcare providers, not useful for healthcare providers who are color-blind</td>
<td></td>
</tr>
<tr>
<td>Signs consisting of symbols to indicate precaution types (e.g. a water drop to indicate Droplet Precautions)</td>
<td>Unobtrusive and relatively easy for healthcare providers to remember</td>
<td>Not meaningful for visitors – might need additional language such as “Visitors see nurse”, might not be understood to indicate Transmission-based Precautions by healthcare providers</td>
<td></td>
</tr>
</tbody>
</table>

* Legal questions regarding signage content and ensuring such signage complies with CMS and HIPAA requirements should be directed to facility counsel.

**NYSDOH Resource: Transmission Based Precautions in Long Term Care Facilities Memo**

- Pros and Cons to different types signage
  - See the nurse
  - “Contact precautions”
  - Each precaution
  - Verbal description
  - PPE
  - Pictures of PPE
It’s Not What You Wear... It’s How You Wear It: Practical Implementation for PPE and isolation

- Understanding of standard and transmission based precautions -- Including isolation and who can be “cohort together”

- Having PPE accessible

- Training on When and How to Don and Doff PPE
  - Include environmental staff

- Engaging the Staff in some of the decisions
  - Piloting the products
  - Walk through of work flow

- Auditing: simple, some covert (secret shopper), share data
But...Why Worry?

Environmental Cleaning is Challenging…

*But it Works!*
It’s Not Just What You Clean... It’s How You Clean It: Practical Implementation for Cleaning & Disinfection

The “Right” Stuff:

- **Right Products:**
  - EPA Register hospital grade disinfectants
  - For C. auris **List K** - EPA Registered to be effective against C. difficile spores

- **Right Time:** Contact time

- **Right Surfaces:** Attention to highly touched

- **Right Training**

- **Right Quality**

http://www.cleanlink.com/hs/article/Identifying-And-Using-Hospital-Grade-Disinfectants--16318

So Much to Clean, So Little Time...

Myth Buster: “The housekeepers take care of cleaning so it isn’t my problem…”

- Many surfaces and equipment in the healthcare environment NOT cleaned by OR NOT ONLY by environmental services

- Address:
  - Detailed Cleaning Grid---“Who Cleans What List with What and When…?”
  - Multi-disciplinary rounds
## Quality is Not Expensive... It’s Priceless

<table>
<thead>
<tr>
<th>Method</th>
<th>Pro</th>
<th>Con</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervision/Visual Inspection</td>
<td>- Aids in training</td>
<td>- Labor Intensive</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Only when done</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- You can’t see microorganisms</td>
</tr>
<tr>
<td>Multi disciplinary Rounds</td>
<td>- Engages staff</td>
<td>- Requires buy-in</td>
</tr>
<tr>
<td></td>
<td>- Identifies issues that cross staff type</td>
<td></td>
</tr>
<tr>
<td>Check lists</td>
<td>- Cheap</td>
<td>- Can be cumbersome</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Subjective</td>
</tr>
<tr>
<td>Markers Tide Pen Glow Germ</td>
<td>- Aids in training</td>
<td>- Need to be planned</td>
</tr>
<tr>
<td></td>
<td>- Simple/ Cheap</td>
<td>- Can be “gamed”</td>
</tr>
<tr>
<td></td>
<td>- More objective (track trends)</td>
<td>- No quantitative measure</td>
</tr>
<tr>
<td>ATP</td>
<td>- Quantitative measure</td>
<td>- Expensive</td>
</tr>
<tr>
<td></td>
<td>- Realtime feedback</td>
<td></td>
</tr>
</tbody>
</table>
Why Worry: Summary

C. auris:

- Emerged independently multiple times
- Spread rapidly among healthcare facilities in NYC area
- Individuals can be colonized for many months
- Colonized individuals can develop infections
- It is affecting individuals who are vulnerable hosts
- High mortality rate among infected individuals
- Can persist in the healthcare environment
- Potential for antifungal drug resistance
But, Why Worry?

*C. auris*:

- We have learned how *C. auris* and is transmitted
- Extensive infection control efforts to identify cases and optimize infection control interventions do work
- Local health department staff, hospital and nursing home staff, and federal agency staff are wonderful partners who are willing to assist with NYS efforts
- The more we know, the better!
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- **NYCDOHMH**
References

2. Borman AM, Szekely A, Johnson EM. Comparative pathogenicity of United Kingdom isolates of the emerging pathogen *Candida auris* and other key pathogenic *Candida* species. mSphere. 2016;1:e00189–16.