Lessons Learned for Recovery and Management of MDROs

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Speaker Disclosures

- No conflicts to disclose
- The content of this presentation reflects my opinion and does not necessarily reflect the official position of the CDC or NYSDOH

- Many of you were there through this period as well

Objectives

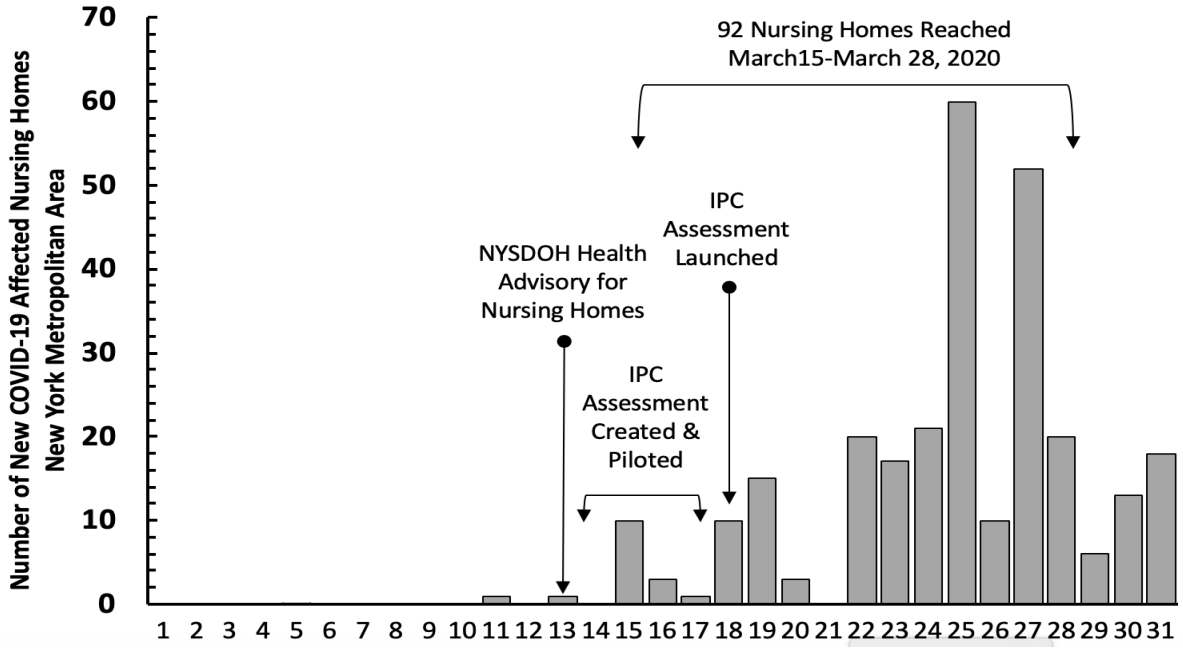
- Review use of novel virtual IPC assessments
- Review newer challenges in Multi-Drug Resistant Organisms (MDROs)
- Review newer challenges in *Candida auris*

Virtual Infection Prevention & Control (IPC)

- Setting: Long term care facilities (LTCF) in MARO (NYC/9 counties)
- Timing: Pilot 2 weeks March 2020
- Activities:
  - Screening tool
  - IPC checklist
  - COVID-19 video IPC assessment ("COVIDeo")
- Results:
  - 92 tele IPC (52 outbreak investigations/ 40 proactive)
  - 26 video IPC

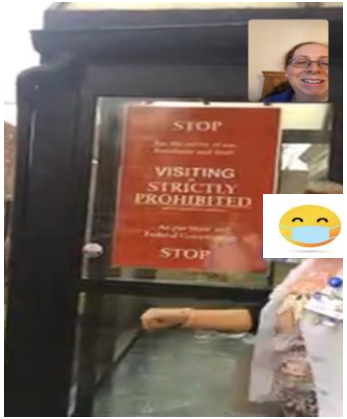
Ostrowsky et al. Real-time virtual infection prevention and control assessments in skilled nursing homes, New York, March 2020-A pilot project. Infect Control Hosp Epidemiol. 2021 Mar 19:1-7. doi: 10.1017/ice.2021.100.

We Needed To Do Things Differently/Adapt



Ostrowsky et al. Real-time virtual infection prevention and control assessments in skilled nursing homes, New York, March 2020-A pilot project. Infect Control Hosp Epidemiol. 2021 Mar 19:1-7. doi: 10.1017/ice.2021.100.

How does it work?



- Simple technology
- “Walk” the areas together
  - Starts from entrance
  - Includes units
  - May include other clinical and non-clinical spaces
- Can be tailored to facility and cluster
- Evolved over time based on the guidelines & the COVID-19 activity

Ostrowsky et al. Real-time virtual infection prevention and control assessments in skilled nursing homes, New York, March 2020-A pilot project. Infect Control Hosp Epidemiol. 2021 Mar 19:1-7. doi: 10.1017/ice.2021.100.

Lessons Learned

- Many LTCF had unrecognized cases
- Reach 4X as many LTCF (complemented usual investigation & onsite visits)
- Convey evolving info & guidelines quickly (2-way communication)
- Able to see IPC, identify issues, and make real time suggestions

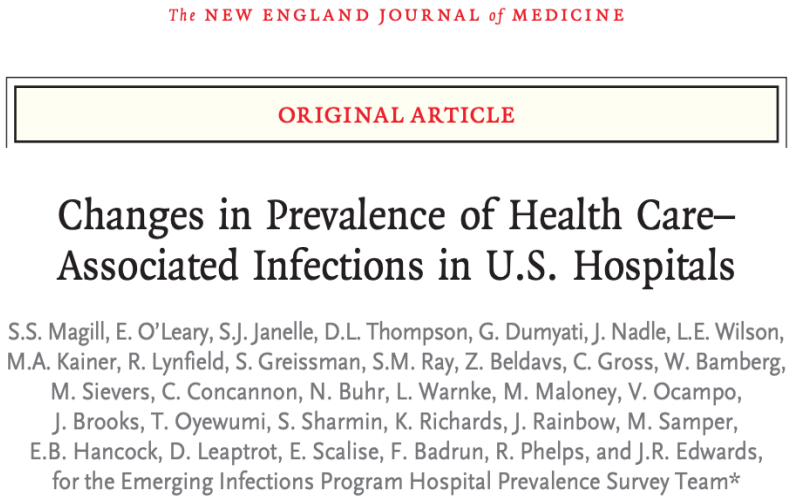
Ostrowsky et al. Real-time virtual infection prevention and control assessments in skilled nursing homes, New York, March 2020-A pilot project. Infect Control Hosp Epidemiol. 2021 Mar 19:1-7. doi: 10.1017/ice.2021.100.

Lessons Learned

- Saw basic IPC issues (saw more on camera)
- Saw unique IPC challenges (widespread PPE, shortages, challenging units)
- Since…
  - Used in NY (updated guidelines, made more systematic, tracking)
  - National Model [CDC's Tele and remote Infection Control Assessment and Response (ICAR) tools]

Ostrowsky et al. Real-time virtual infection prevention and control assessments in skilled nursing homes, New York, March 2020-A pilot project. Infect Control Hosp Epidemiol. 2021 Mar 19:1-7. doi: 10.1017/ice.2021.100.
CDC ICAR https://www.cdc.gov/coronavirus/2019-ncov/hcp/assessment-tool-for-nursing-homes.html

Just Pre-COVID-19
-Substantial Decreases in HAI rates



The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Changes in Prevalence of Health Care–Associated Infections in U.S. Hospitals

S.S. Magill, E. O'Leary, S.J. Janelle, D.L. Thompson, G. Dumyati, J. Nadle, L.E. Wilson, M.A. Kainer, R. Lynfield, S. Greissman, S.M. Ray, Z. Beldavs, C. Gross, W. Bamberg, M. Sievers, C. Concannon, N. Buhr, L. Warnke, M. Maloney, V. Ocampo, J. Brooks, T. Oyewumi, S. Sharmin, K. Richards, J. Rainbow, M. Samper, E.B. Hancock, D. Leaptrot, E. Scalise, F. Badrun, R. Phelps, and J.R. Edwards, for the Emerging Infections Program Hospital Prevalence Survey Team*

- 16 % reduction
- Most reductions in:
  - Catheter associated urinary track infections (CA-UTI)
  - Surgical site infections (SSI)
  - Still challenges *C. difficile*, Candida

McGill et al. Changes in Prevalence of Health Care–Associated Infections in U.S. Hospitals. NEJM. 2018; 379:1732-1744. DOI: 10.1056/NEJMoa1801550

Pre-COVID-19
MDROs Decreases also Seen

The NEW ENGLAND JOURNAL of MEDICINE

ORIGINAL ARTICLE

Multidrug-Resistant Bacterial Infections in U.S. Hospitalized Patients, 2012–2017

John A. Jernigan, M.D., Kelly M. Hatfield, M.S.P.H., Hannah Wolford, M.S.P.H., Richard E. Nelson, Ph.D., Babatunde Olubajo, Ph.D., Sujan C. Reddy, M.D., Natalie McCarthy, M.P.H., Prabasaj Paul, Ph.D., L. Clifford McDonald, M.D., Alex Kallen, M.D., Anthony Fiore, M.D., Michael Craig, M.P.P., and James Baggs, Ph.D.

- Cohort study 890 hospitals
- > 20% hospitalizations
- 2012-2017
- In 2017:
  - 83% Community
  - 17% Healthcare Acquired

Jernigan et al. Changes in Prevalence of Health Care–Associated Infections in U.S. Hospitals. NEJM. 2018; 379:1732-1744. DOI: 10.1056/NEJMoa1801550

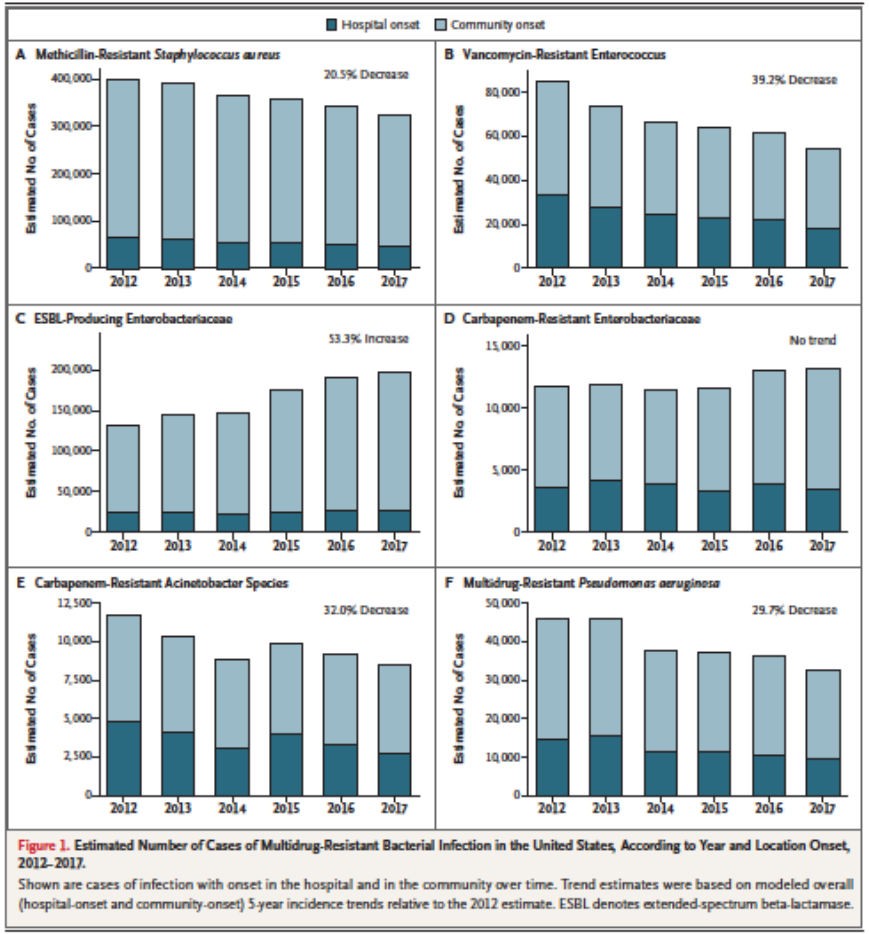


Figure 1. Estimated Number of Cases of Multidrug-Resistant Bacterial Infection in the United States, According to Year and Location Onset, 2012–2017.

Shown are cases of infection with onset in the hospital and in the community over time. Trend estimates were based on modeled overall (hospital-onset and community-onset) 5-year incidence trends relative to the 2012 estimate. ESBL denotes extended-spectrum beta-lactamase.

Pre-COVID-19

- Decreases:
  - MRSA
  - VRE
  - CRAB
  - MDR *P. aeruginosa*
- No trend:
  - CRE
- Increases:
  - ESBL (largely community)

Jernigan et al. Changes in Prevalence of Health Care–Associated Infections in U.S. Hospitals. NEJM. 2018; 379:1732-1744. DOI: 10.1056/NEJMoa1801550

Sudden HAI increase During/Post COVID-19 Waves -NHSN Rates, by Quarter

	2020 Q1	2020 Q2	2020 Q3	2020 Q4
CLABSI	↓ −11.8%	↑ 27.9%	↑ 46.4%	↑ 47.0%
CAUTI	↓ −21.3%	No Change[1]	↑ 12.7%	↑ 18.8%
VAE	↑ 11.3%	↑ 33.7%	↑ 29.0%	↑ 44.8%
SSI: Colon surgery	↓ −9.1%	No Change[1]	↓ −6.9%	↓ −8.3%
SSI: Abdominal hysterectomy	↓ −16.0%	No Change[1]	No Change[1]	↓ −13.1%
Laboratory-identified MRSA bacteremia	↓ −7.2%	↑ 12.2%	↑ 22.5%	↑ 33.8%
Laboratory-identified CDI	↓ −17.5%	↓ −10.3%	↓ −8.8%	↓ −5.5%

Weiner-Lastinger et al. The impact of coronavirus disease 2019 (COVID-19) on healthcare-associated infections in 2020: A summary of data reported to the National Healthcare Safety Network. ICHE (2021), 1–14 doi:10.1017/ice.2021.362

Accompanying Editorial

- “Infection control practices in COVID-19 wards often adapted to shortages of personal protective equipment, responded to fear of healthcare personnel, and did not always lend themselves to better infection prevention.”

- “Basic infection control practices must be hardwired into practice so that they are less vulnerable when the health care system is stressed.”

- “One approach might be to designate clinical staff to be added to the hospital epidemiology team to allow for rapid expansion of effort to support a pandemic response.”

Weiner-Lastinger et al. The impact of coronavirus disease 2019 (COVID-19) on healthcare-associated infections in 2020: A summary of data reported to the National Healthcare Safety Network. ICHE (2021), 1–14 doi:10.1017/ice.2021.362
Palmore & Henderson. Healthcare-Associated Infections in the Time of Pandemic COVID-19.” *Infection Control & Hospital Epidemiology.* ICHE (2021.

Antimicrobial Prescribing during COVID-19

Setting	Prescribing	Reactions/ Intervention
Hospitals	○ Variable ○ Early wave- more use especially azithromycin	○ WHO, IDSA guidelines no need antibiotics from milder disease ○ Series of ASP Successful Interventions ○ Challenges that ASP team diverted to COVID-19 (ID, novel treatment, testing & vaccines)
Outpatient	○ Less use (probably less patients/ less URI)	
LTCF	○ Increased use during early pandemic (went done later)	○ Harder to address ○ Challenges team diverted to COVID activities

A. Srinivasan. The Intersection of AR, AU and COVID-19 . for the Presidential Advisory Council on Combating Antibiotic-Resistant Bacteria. 2/10/21.

AR Threat Report (Update 2019)

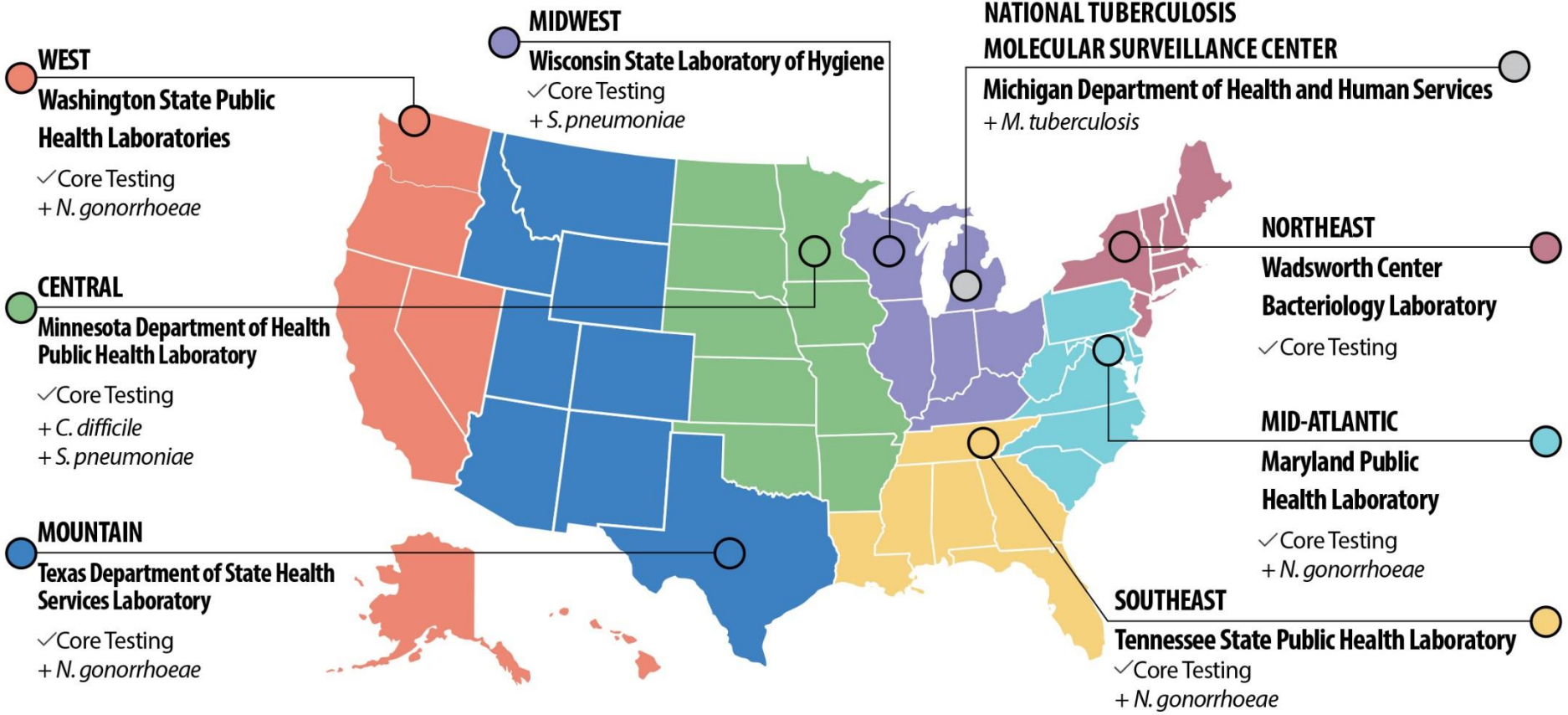
- 21 pathogens
  - Urgent
    - Carbapenem-resistant *Acinetobacter*
    - *Candida auris*
    - *Clostridioides difficile*
    - Carbapenem-resistant Enterobacterales
    - Drug-resistant *Neisseria gonorrhoeae*
  - Serious
  - Concerning
  - Watch list

https://www.cdc.gov/drugresistance/biggest-threats.html

How Do We Find Out About Outbreaks or Clusters?

- Notifiable diseases (laboratory and clinician/their surrogate reporting)
- Surveillance
  - Local/ State:
    - General: Influenza, Syndromic surveillance,
    - Specific: These are home gown, adapted for evolving situations
      - Nosocomial Occurrence Report Application (NORA)
      - Hospital Emergency Response Data System (**HERDS)**
  - National: Antimicrobial Resistance Laboratory Network (ARLN), National Healthcare Safety Network (NHSN; LTCF reporting)
- From local DOH (e.g., NYCDOHMH)
- Astute clinician or facility calls

ARLN Labs – *Candida auris* Identification Services Available



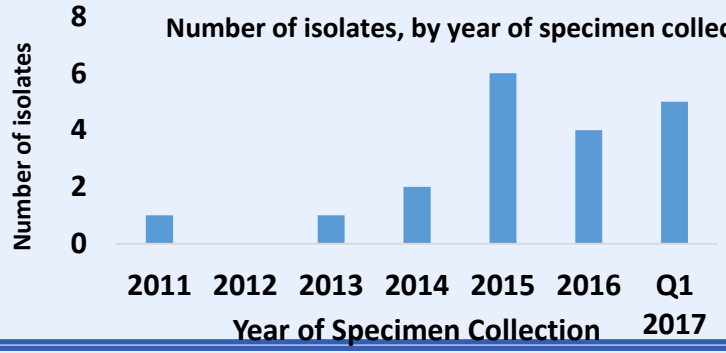
https://www.cdc.gov/drugresistance/laboratories.html

Carbapenem-resistant Enterobacteriaceae (CRE)

- Multiple different mechanisms can cause resistance
  - Carbapenemase-producing (CP-CRE)
    - **KPC** – *Klebsiella pneumoniae* carbapenemase (most common in U.S.)
    - **NDM** – New Delhi Metallo-β-lactamase
    - **VIM** – Verona Integron-encoded Metallo- β -lactamase
    - **OXA** – Oxacillinase-48-type carbapenemase
    - **IMP** – Imipenemase Metallo- β -lactamase
  - Non-carbapenemase-producing (non-CP-CRE)

Carbapenemases in other Gram negative bacteria

Proteus mirabilis, Providencia rettgeri, Citrobacter freundii



Pseudomonas aeruginosa

VIM: 86 patients, 12 states

Carbapenem-Producing Organisms (CPOs)

CR Acinetobacter baumannii (CRAB)

https://www.cdc.gov/drugresistance/biggest-threats.html

CPOs are a public health threat

1. They cause invasive infections associated with high mortality rates
2. Carry resistance genes on mobile genetic elements that confer high levels of resistance
3. CRE have spread throughout the United states and other countries and have the potential to spread more widely

CDC Containment Strategy

- Systematic approach to slow spread of novel or rare multidrug-resistant organisms or mechanisms through aggressive response to ≥1 case
  - Pan-resistant organisms
  - Carbapenemase-producing organisms
  - *mcr-1*
  - *Candida auris*
- Response based on pathogen/resistance mechanism

https://www.cdc.gov/hai/outbreaks/mdro/index.html

Risk Factors for colonization with MDROs

- Indwelling medical device (urinary catheter, PEG tube, trach, central line)
- Lower functional status
- Presence of wounds or decubitus ulcers
- Antibiotic use in prior 3 months
- Fluoroquinolone use
- History of hospitalization
- Older age
- Comorbid medical conditions

Mody et al, J Am Geriatr Soc, 2007
Cassone, Mody, Curr Geriatr Rep, 2015

From SHEA Poster 2019

Case 3 Pre-COVID-19

Index case: 90 year old male with respiratory failure and ESRD/HD admitted with sepsis (No foreign travel)

Pathogen: *K. pneumoniae* - NDM from blood and urine

Investigation Details:

ACF "3": 4 visits last several months

- Private room/CP for *C. difficile*

LTCF "C":

- 40 bed unit overflow care for ventilator/tracheostomy residents
- Not on CP (4 roommates)
- 5 Serial PPS (initial 3 as rings around index)
- Total 9 KP-NDMs identified & many KPC (through-out unit)

NEW YORK STATE | Department of Health

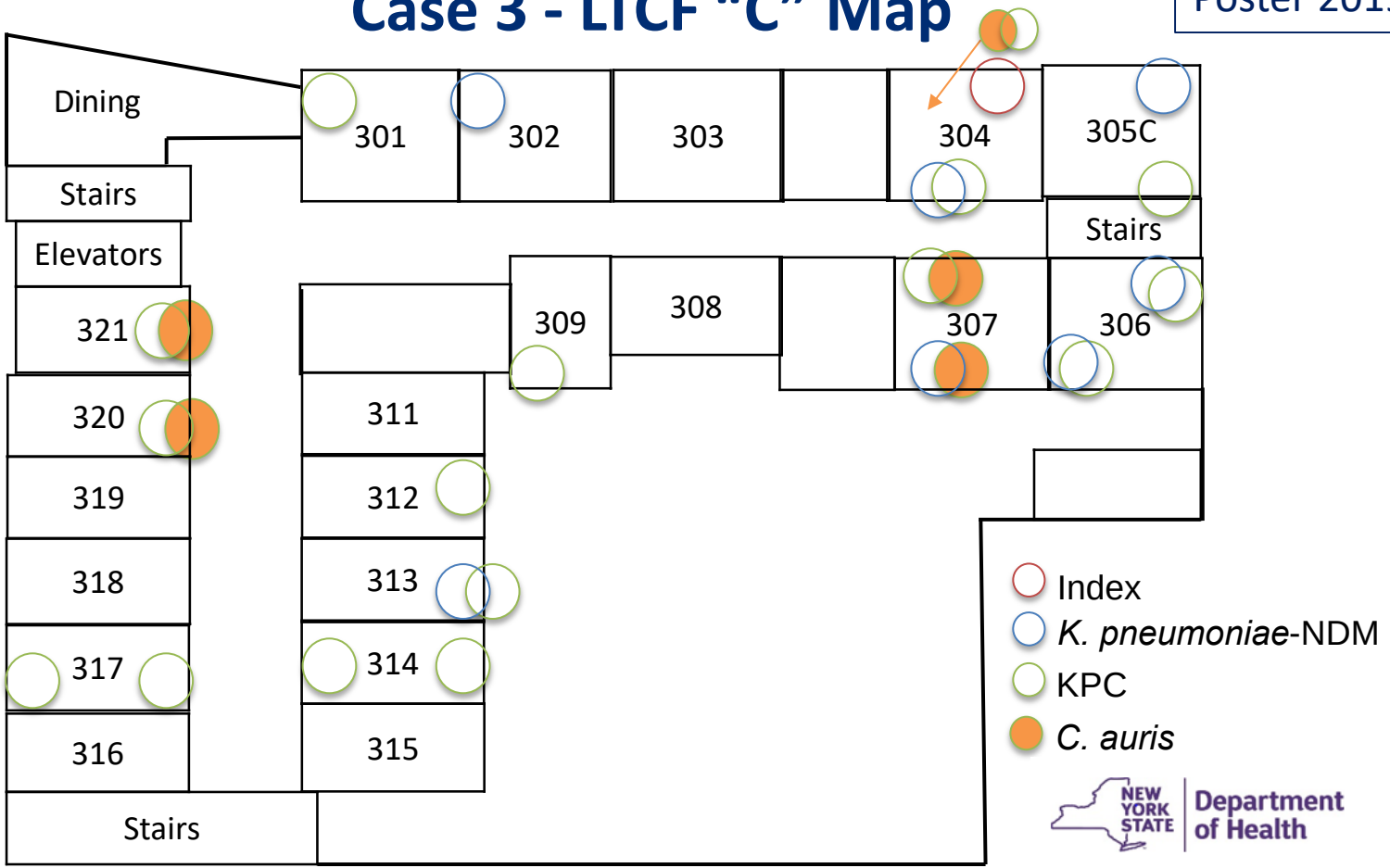
From SHEA Poster 2019

Case 3 - LTCF "C" Map

With PPS 3

It's Even More Complicated - Multiple Pathogens!

(n.b. this is a simplified version- patients move)



NEW YORK STATE Department of Health

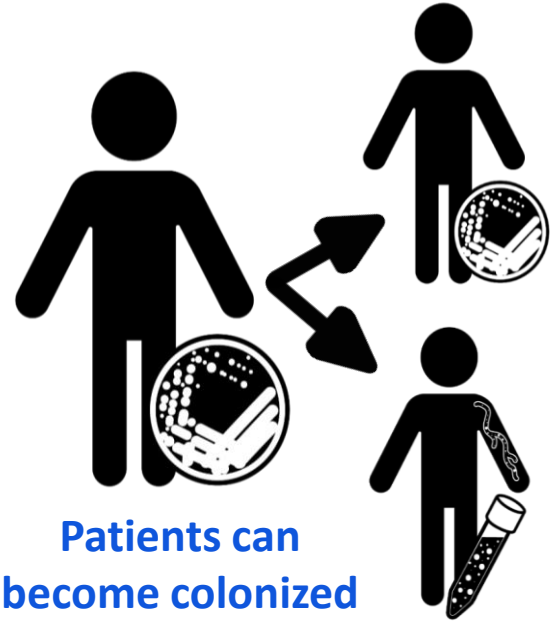
MDRO Observations During/Post COVID-19 Waves

- Nationally
  - Clusters MDROs
    - NJ: 34 cases of CRAB attributed to changes in IPC practices (MMWR)
    - CDC Initiative: Preliminary Info
      - 18 MDRO Cluster in COVID-19 units (series CPOs, *C. auris*)
      - From 11 States/ jurisdictions
      - Median 11 patients affected (largest 96)
      - Series IPC and EVS challenges
- Locally
  - More ARLN Alerts
  - Clusters

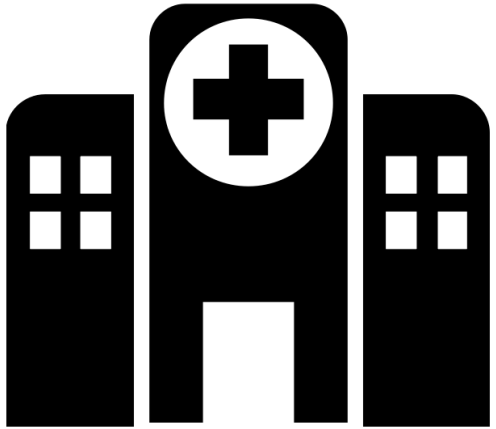
Perez S, et al. Increase in Hospital-Acquired CRAB Infection and Colonization in an Acute Care Hospital During a Surge in COVID-19 Admissions —NJ, February–July 2020. MMWR 2020;69:1827–1831.

Why Are We Concerned About *Candida auris?*

Highly drug-resistant



Patients can become colonized and develop invasive infections



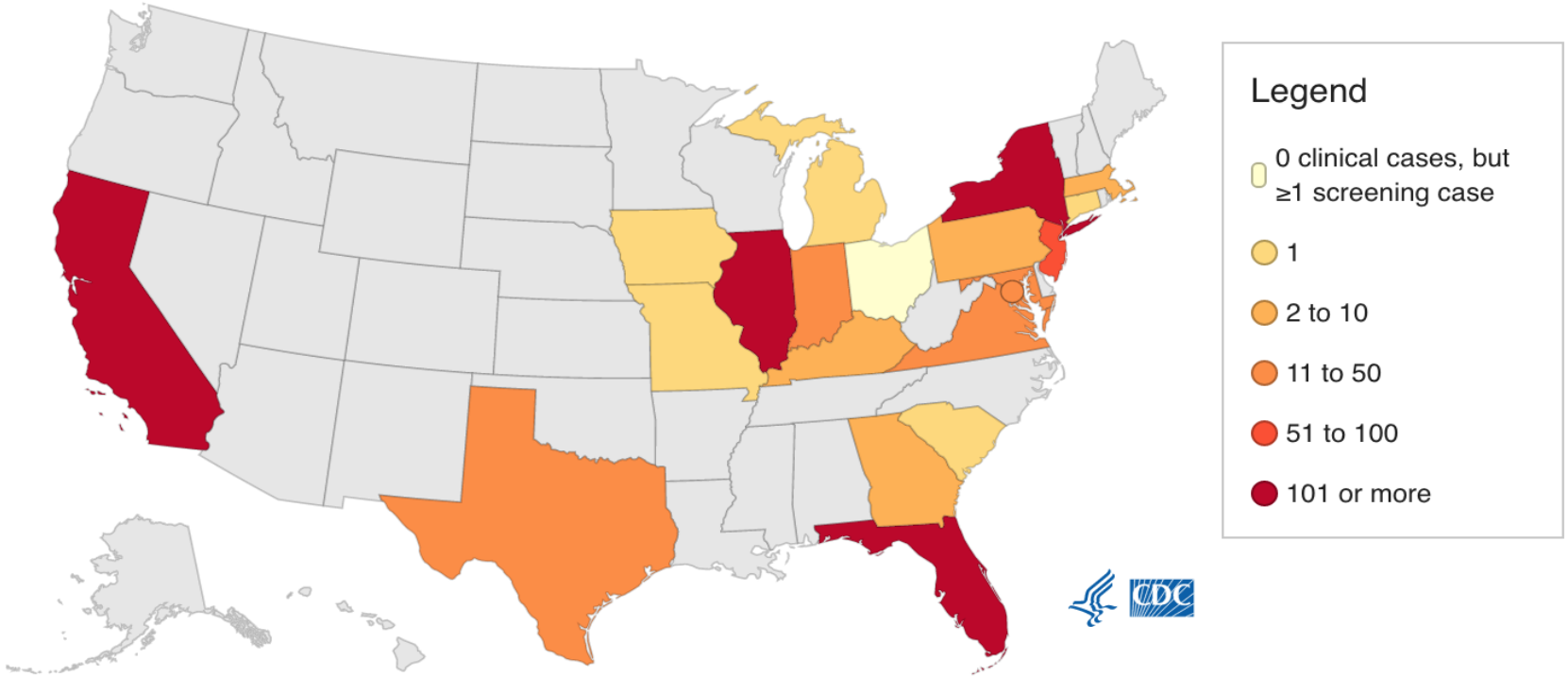
Spreads in healthcare settings

C. auris colonizes the environment

Welsh R, J Clin Micro. 2017;55(10):2996-3005
E. Adams et al. ID WeeK Poster, October 2018

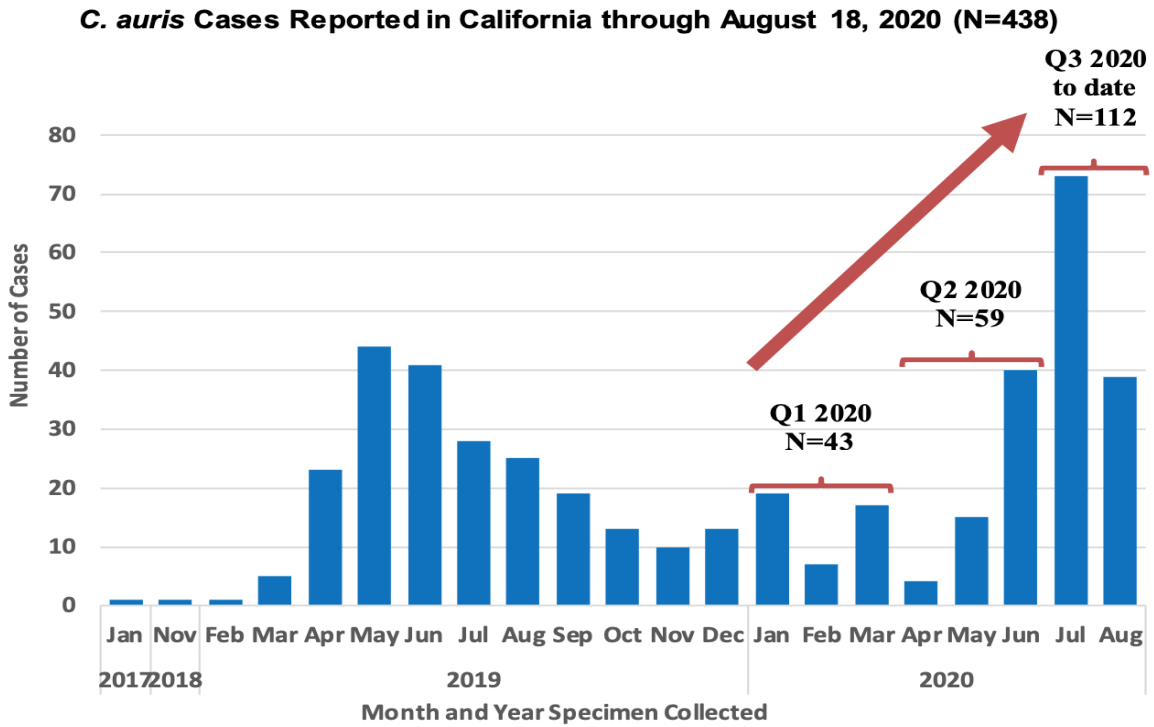
https://5.imimg.com

C. auris Cases in U.S.



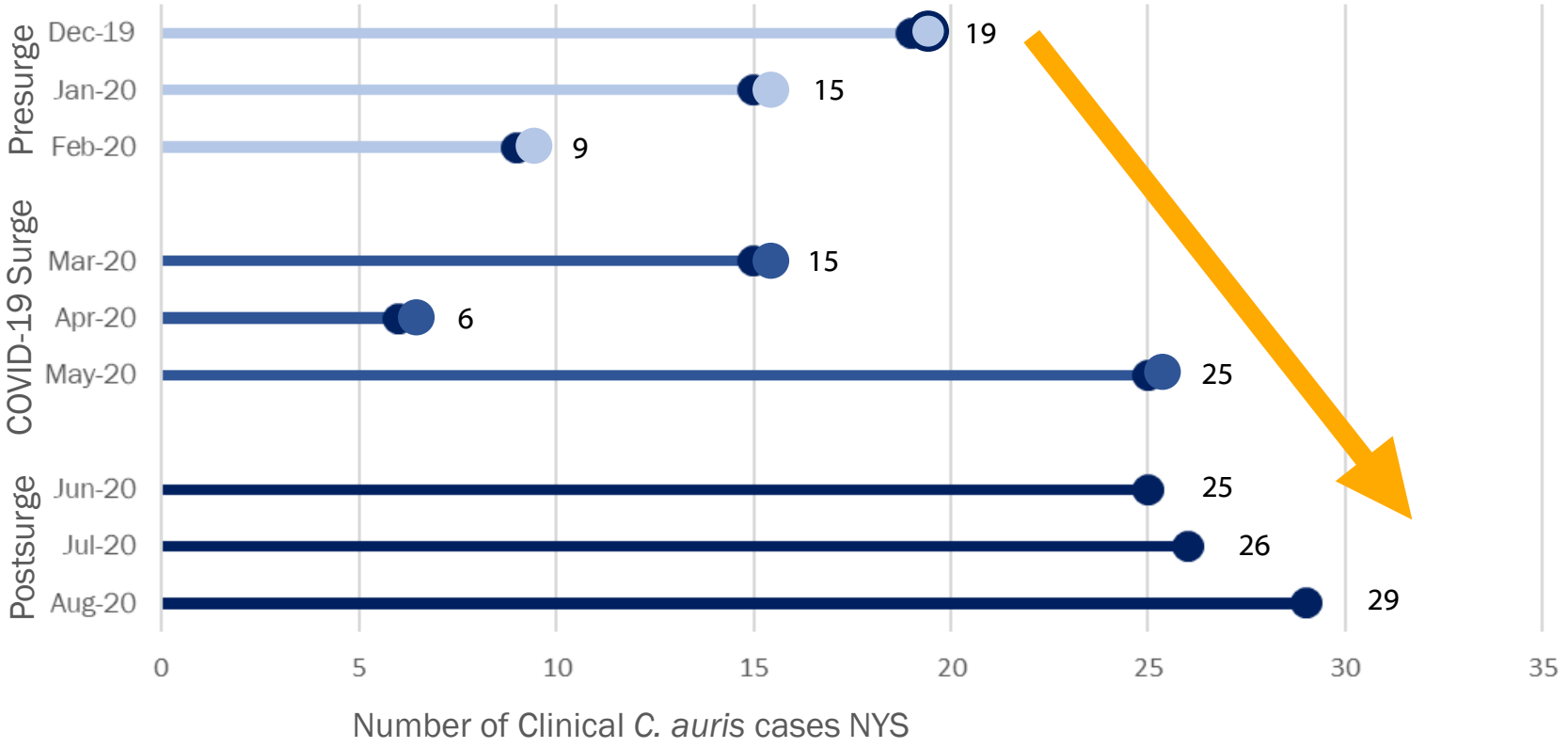
Reported clinical cases of *Candida auris*, July 1, 2020-June 30, 2021
https://www.cdc.gov/fungal/candida-auris/tracking-c-auris.html
Cited: October 18, 2021

C. auris in CA



CADPH Health Advisory: Resurgence of Candida auris in Healthcare Facilities in the Setting of COVID-19, August 2020
http://publichealth.lacounty.gov/eprp/lahan/alerts/CAHANCauris082020.pdf

Clinical *C. auris* cases increased post-COVID-19 surge (NY)



Courtesy S. Konkle and NYSDOH- CSTE 2021 Annual Virtual Presentation (6/21/21)

C. auris During/ After the COVID-19 Pandemic

- ***C. auris* in Florida since 2017:**
  - Hospital A had admission screening and dedicated *C. auris* unit
  - During COVID-19 series units for COVID-19
  - 4 clinical cases of *C. auris* identified, PPS:
    - 35 (52%) 67 COVID patients colonized with *C.auris*
    - Series of IPC practices noted in the COVID Units:
      - Multiple gown and glove layers in the COVID-19 unit
      - Extended use of the underlayer of PPE,
      - Lapses in cleaning and disinfection of shared medical equipment
      - Lapses in adherence to hand hygiene
- **LA County:**
  - Cluster *C. auris* related in COVID+
  - Use wgs: related clone moved through series LTACs (6 cases pasted thru 4 LTACS)

Prestel C, Anderson E, Forsberg K, et al. *Candida auris* Outbreak in a COVID-19 Specialty Care Unit — Florida, July–August 2020. MMWR 2021;70:56–57. DOI: http://dx.doi.org/10.15585/mmwr.mm7002e3external icon.

U.S. Resistance

1

85%

Azoles

2

33%

Polyenes

3

1%

Echinocandins

- 33% multidrug resistant

Pan-resistant *C. auris* (Pre- COVID-19)

- Pan-resistance has been reported from a few other countries

- First 3 CDC-confirmed pan-resistant *C. auris* cases found in NY
  - Cases were unrelated
  - Acquired resistance on echinocandin treatment; already resistant to fluconazole and amphotericin B
  - No transmission of resistance seen (contact/ unit testing at 4 facilities, 75 environmental and 100 patient/residents)

Ostrowsky B, Greenko J, Adams E, et al. Candida auris Isolates Resistant to Three Classes of Antifungal Medications - New York, 2019. *MMWR* 2020;69(1):6-9.

Pan-resistance (2 Clusters Jan-April 2021)

Location	Number Screening and clinical cases	Pan-resistant	Azol and Echinocandin Resistance only	Antifungal Prior	Investigation
TX	101	3	N/A	No	Same LTCF
DC	22	2	5	No	At 2 facilities in same city

No link between TX and DC
Concern might have been transmission

Lyman, et al. *Notes from the Field:* Transmission of Pan-Resistant and Echinocandin-Resistant *Candida auris* in Health Care Facilities — Texas and the District of Columbia, January–April 2021. MMWR Morb Mortal Wkly Rep 2021;70:1022–1023. DOI: http://dx.doi.org/10.15585/mmwr.mm7029a2external icon

G

American Rescue Plan (ARP) Funding for Healthcare Protections

- $2.1 billion dollar package announced by Dr. Walensky on Sept. 17[1]
- Improve healthcare infection prevention and control (IPC) activities across the U.S. public health and healthcare sectors
- Strengthen and equip health departments and other partner organizations to address SARS-CoV-2 and other infectious disease threats
- Over the next 3 years, CDC will issue $1.25 billion of this total to 64 health departments through the Epidemiology and Laboratory Capacity (ELC) Cooperative Agreement (CK19-1904)
  - $885 million is being made available in October 2021

1. CDC to Invest $2.1 Billion to Protect Patients and Healthcare Workers from COVID-19 and Future Infectious Diseases | CDC Online Newsroom | CDC

Y

Strengthening HAI/AR[1] Program Capacity (SHARP) Project ELC Supplement, October 2021

- The SHARP supplement totals $385 million and is available until the end of the current ELC cycle (July 2024)
- Purpose: build on and expand health department IPC activities (existing HAI/AR Programs and AR Lab Network) to better protect patients and healthcare workers from SARS-CoV-2 and other infectious disease threats
  1. Outbreak response, AR containment, and setting-specific prevention initiatives
  2. State/regional laboratory capacity to conduct surveillance for emerging pathogens
  3. Antibiotic prescribing and address disparities related to antibiotic use
  4. National Healthcare Safety Network (NHSN): surveillance, data, monitoring
  5. Project Firstline: IPC training and education for frontline healthcare staff

1. HAI/AR: healthcare-associated infections (HAI) and antibiotic resistance (AR)

Y

Nursing Home & Long-term Care Facility Strike Team and Infrastructure Project, October 2021

- The 'Nursing Home and LTC Strike team' supplement totals $500 million
- Funding will support clinical and infection control activities in nursing homes and other long term care facilities (e.g., strike teams)
  - Assist long-term care facilities during their response to SARS-CoV-2 infections
  - Build and maintain the infection prevention infrastructure necessary to support resident, visitor, and healthcare personnel safety
    - Examples: technology platforms, immunization services, N95 fit testing
  - Nursing homes (skilled nursing facilities and nursing facilities) with SARS-CoV-2 infections are the primary target for these funds
  - Other infectious diseases and conditions and long-term care settings may be addressed if they support or relate to controlling the spread of SARS-CoV-2

Y

Current Status & Next Steps: $885M ARP Funding for Healthcare IPC

- ELC Guidance for both the SHARP ($385) and Nursing Home and LTC Strike Team & Infrastructure ($500M) projects has been published[1]
  - Jurisdictions notified of funding amounts[2] with award date ~October 25
  - ELC recipients will have immediate access to funds post-award and 90 days to prepare and submit workplans and budgets
  - LTC Strike Team project-related communications
    - Public health partners (ASTHO, CSTE, NACCHO), LTC partner organizations, Centers for Medicare & Medicaid Services, as well as state immunization programs
  - Webinar series to review guidance with ELC recipients beginning Oct. 18
    - Health department partners including ELC Principal Investigators, Public Health Emergency Program (PHEP) directors, HAI/AR Program directors

1. https://www.cdc.gov/ncezid/dpei/elc/resources.html
2. https://www.cdc.gov/budget/fact-sheets/covid-19/funding/index.html

Lessons Learned
Challenges (not exhaustive)

- Surges of patients
- Shortages of PPE, supplies and staff
- Pathogen affected some of our most frail
- IPC, ASP, ID and public health (PH) professional were diverted
- There have been political challenges beyond the science
- The COVID has evolved (and likely will be here a while)
- COVID-19 affected HAI and MDRO (parallel/ twin epidemic--unclear long term affects beyond surge/ new baselines)
- Reteaching the basics IPC/breaking some habits
- Going to need to prioritize

Lessons Learned
Choose to Find the Glimmers of Hope

- Opportunity to pilot virtual technology
- Locally prioritizing back to basics and teaching IPC auditing
- Better data (LTCF on NHSN)
- Recognition of the importance of IPC, ASP and PH infrastructure (including personnel, training and data systems)
- National Priority & Funding for above

- We probably are not done yet….

Remember Why We Do This…