

Antibiotic Resistance, Antibiotic Stewardship, and Infection Prevention

ACH IP Course, 2022

Infection Prevention Training for ACH
Healthcare-Associated Infections Program
Center for Health Care Quality California
Department of Public Health



Introduction to Antimicrobial Resistance

Objectives

- Discuss the problem of antimicrobial resistance
- Summarize background information on novel and emerging multidrug-resistant organisms (MDRO) in California
- Understand principles of MDRO containment
- Provide guidance to prevent MDRO transmission within a healthcare facility

CDC Antibiotic Resistance Threats Report, 2019

- 2.8 million antibiotic resistant (AR) infections per year in US
 - 35,000 AR-related deaths per year
- Urgent Threats
 - *Candida auris*
 - Carbapenem-resistant *Acinetobacter*
 - Carbapenem-resistant Enterobacterales (CRE)
 - *Clostridioides difficile* (*C. difficile*)
- Serious Threats
 - Multidrug-resistant *Pseudomonas aeruginosa*

[Antibiotic Resistance Threats in the United States 2019](#) (PDF)

(www.cdc.gov/drugresistance/pdf/threats-report/2019-ar-threats-report-508.pdf)

Recent California Health Alerts for MDRO

- *Candida auris*
 - Resurgence of *Candida auris* in Healthcare Facilities in the Setting of COVID-19, August 2020
 - Active Surveillance for *Candida auris* in Healthcare Facilities, March 2021
 - Further Emergence of *Candida auris* in Healthcare Facilities, February 2022
- VIM-producing *Pseudomonas aeruginosa*
 - Ongoing Risk of Highly Drug-Resistant Infection in Patients Following Hospitalization or Invasive Procedures in Mexico, February 2021
- NDM-producing *Acinetobacter baumannii*
 - Regional Outbreak of Highly Drug-resistant Carbapenemase-producing *Acinetobacter baumannii*, May 2021

[California Health Alert Network Antimicrobial Resistance Health Advisories](http://www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/CAHAN.aspx)
(www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/CAHAN.aspx)

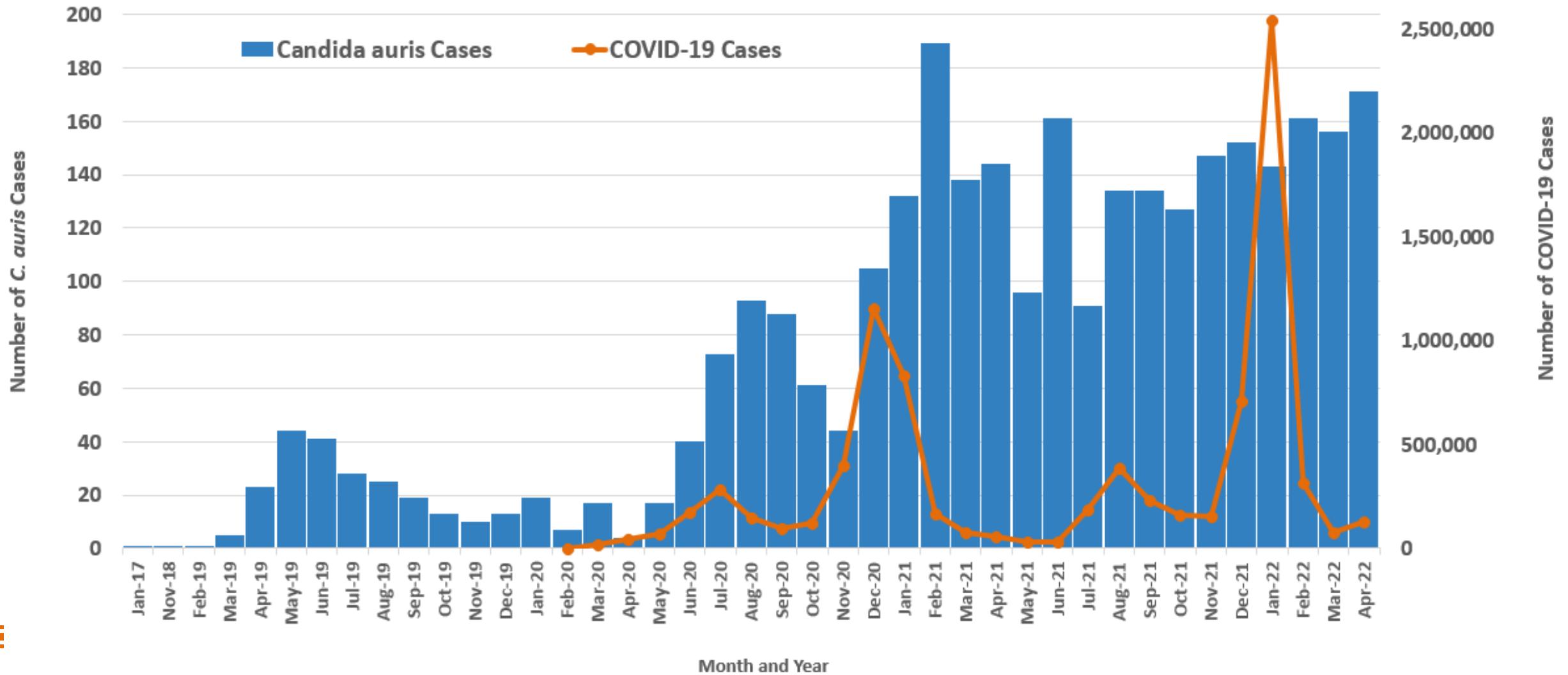
Emerging Healthcare-Associated MDRO

- MDRO are bacteria or fungi that are resistant to many or all drugs that are tested
 - Few treatment options, higher morbidity and mortality
 - More difficult and expensive to treat
- Highly transmissible within and between healthcare facilities
- Early and aggressive facility and public health containment efforts can limit spread
- However, COVID-19 might have contributed to MDRO spread in healthcare facilities...

MDRO Spread in the Setting of COVID-19

- Personal protective equipment (PPE), cleaning and disinfection supply shortages, healthcare personnel concern for own safety
 - Extended use of gowns and gloves, double-gowning, double-gloving
 - Reduced time spent cleaning/disinfecting patient rooms
 - Cohorting and room placement by COVID-19 status only
 - Staffing shortages
 - Higher than normal census, patient movement
 - Reduced antimicrobial stewardship/Increased antibiotic prescribing
 - Lapses in infection control audits
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C. auris, COVID-19 Cases in CA through April 2022



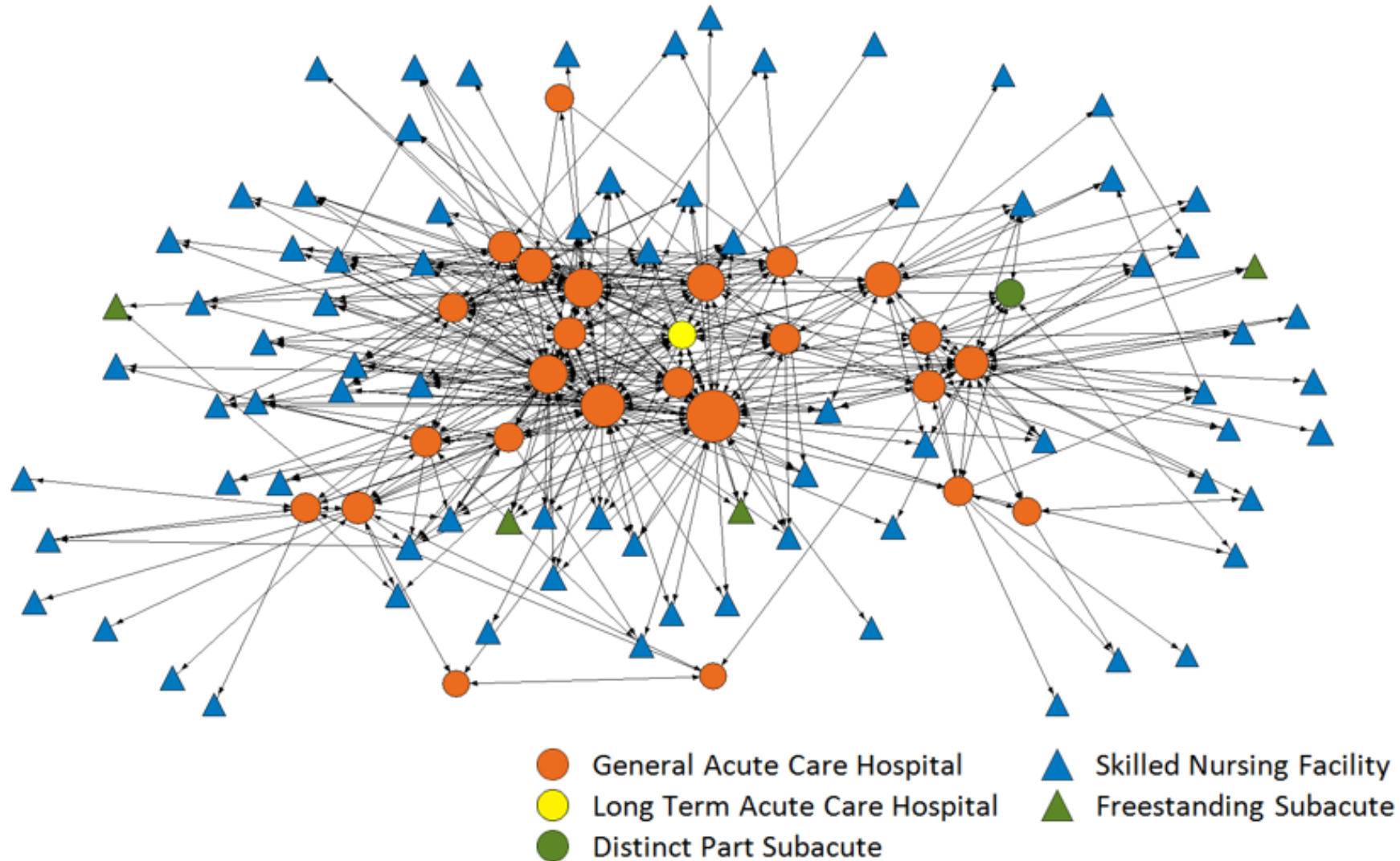
Risk Factors for MDRO

- Frequent healthcare exposure, especially in long-term acute care hospital (LTACH) or ventilator-equipped skilled nursing facility (vSNF) stay
- Presence of indwelling devices (e.g., urinary catheter)
- Mechanical ventilation
- Recent antimicrobial use (within 3-6 months)
- Overnight healthcare exposure outside United States

MDRO Colonization

- **Colonization** happens when a patient is carrying a germ but is not showing signs or symptoms of infection
- Patients colonized with MDRO can **still transmit the germ** to other patients
 - Silent transmission
- Patients can be colonized for many months or even years
 - **There is no formal “clearance” process**
- Colonized patients can also go on to develop clinical infections

Extensive Patient Sharing Networks: MDRO Travel

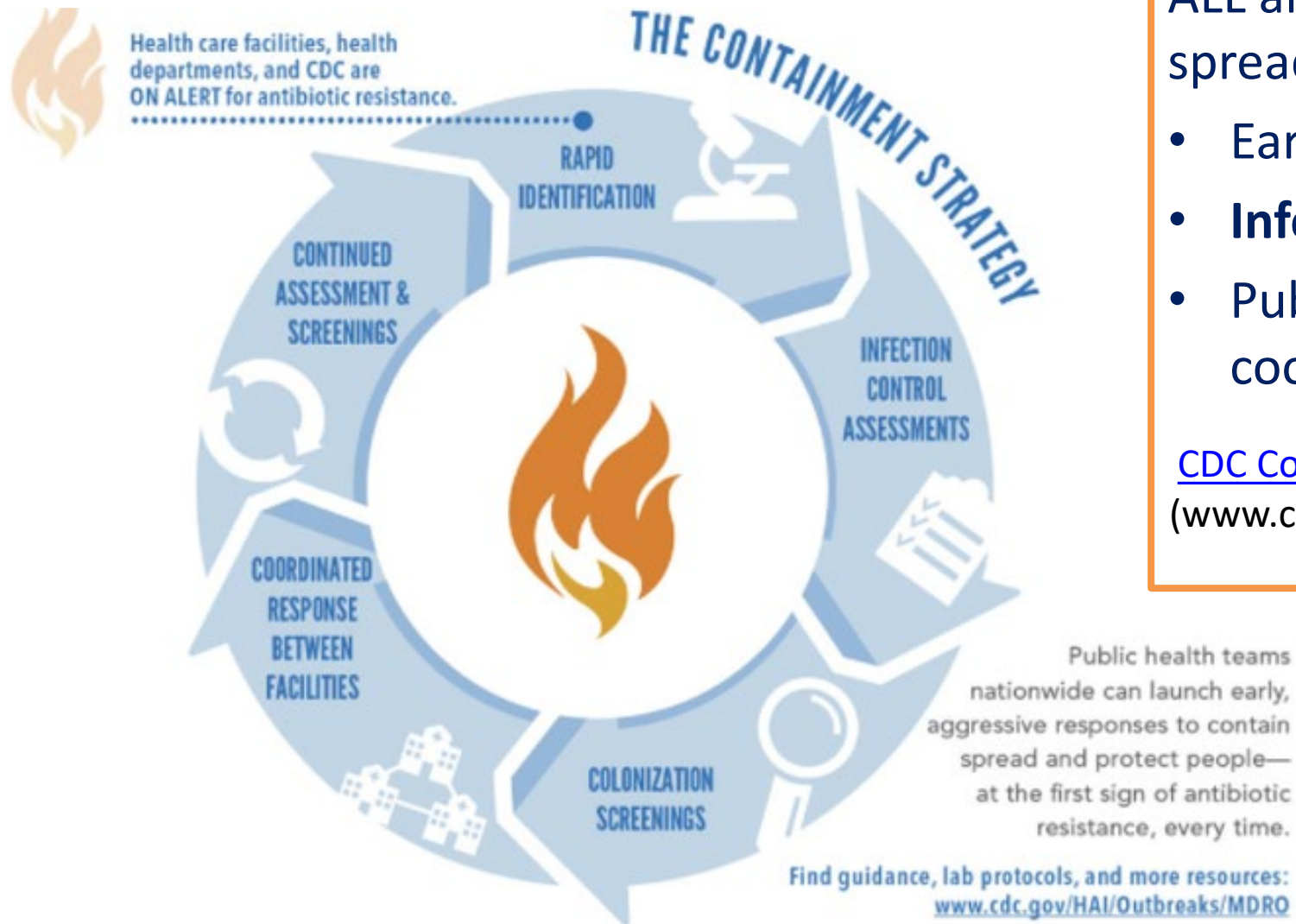


Healthcare-Associated MDRO*: What We Know

	<i>C. auris</i>	<i>Acineto- bacter</i>	CRE	<i>C. diff</i>
Causes outbreaks in healthcare settings	X	X	X	X
Leads to substantial morbidity, mortality	X	X	X	X
Risk factors include frequent or extended healthcare exposure, antimicrobial use	X	X	X	X
Patients can remain colonized for many months (no clearance recommendations)	X	X	X	X
Persistent in the healthcare environment	X	X		X
Difficult to identify	X			

* MDRO=multidrug-resistant organisms, *C. auris*=*Candida auris*; CRE=carbapenem-resistant Enterobacterales; *C. diff*=*Clostridioides difficile*)

What Can We Do?



ALL are necessary to contain spread:

- Early detection
- **Infection control**
- Public health-coordinated response

[CDC Containment Strategy Guidelines](http://www.cdc.gov/HAI/Outbreaks/MDRO)
(www.cdc.gov/HAI/Outbreaks/MDRO)



MDRO in California

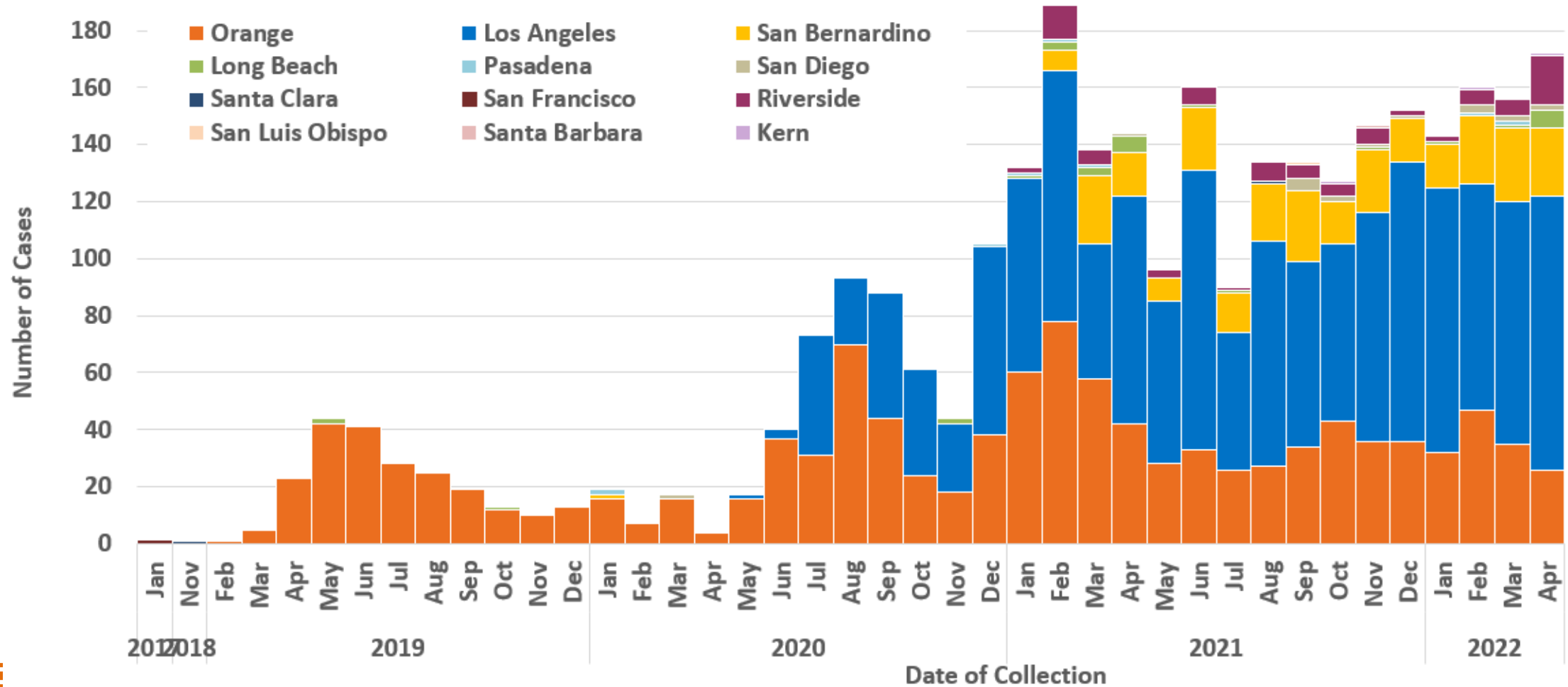


Candida auris

- Multidrug-resistant yeast
 - 90% to fluconazole
 - 30% to amphotericin B
 - <5% to echinocandins
 - Can be resistant to all 3 antifungal classes
- Difficult to identify with standard lab methods
- Easily transmissible in the healthcare environment
- Can cause serious, invasive infections with 30-60% mortality



C. auris Cases Reported in CA through April 2022 (N=3066)



C. auris Cases, February 2019 through January 2022

February 2019



December 2019



June 2020



January 2021



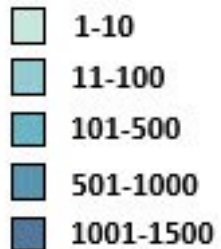
August 2021



January 2022

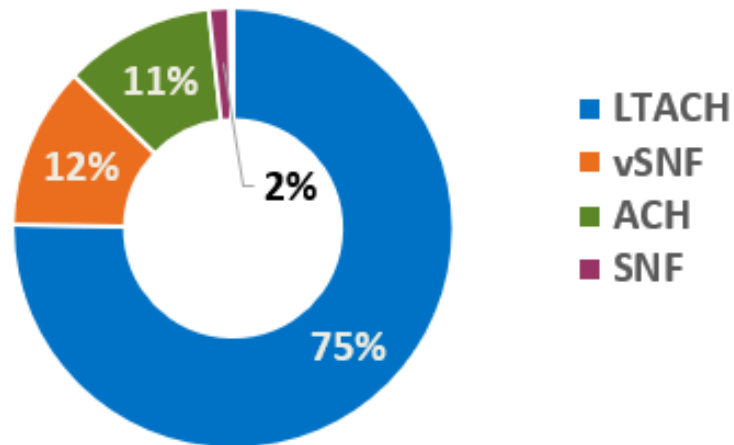


Number of cases

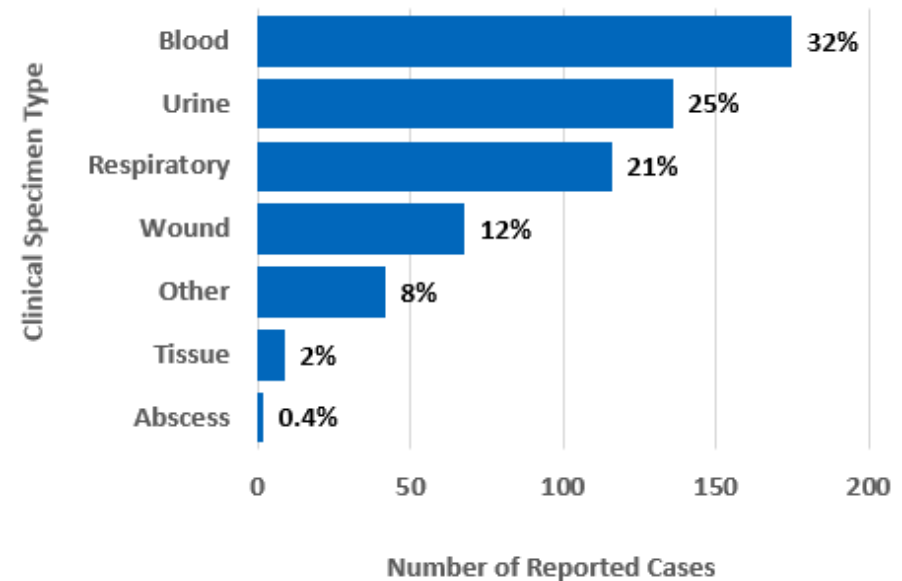


C. auris Reported in CA

By Facility Type



By Clinical Specimen Type (n=548)



ACH=acute care hospital; SNF=skilled nursing facility; vSNF=ventilator-equipped SNF; LTACH=long-term ACH

Carbapenem-Resistant Organisms (CRO)

- Gram-negative bacteria
- Resistant to the last-resort carbapenem antibiotics
 - Meropenem, doripenem, imipenem
- Types of CRO include carbapenem-resistant
 - Enterobacterales (formerly Enterobacteriaceae) (**CRE**)
 - *Pseudomonas aeruginosa* (**CRPA**)
 - *Acinetobacter baumannii* (**CRAB**)

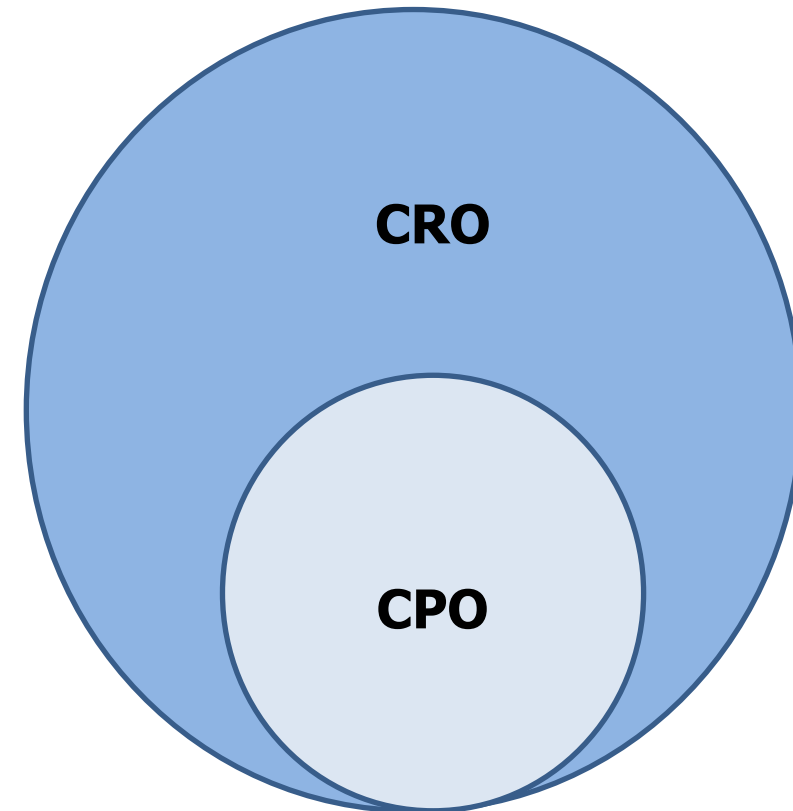
What are Carbapenemases and how do they work?

- Carbapenemases = enzymes that inactivate carbapenem and other antibiotics
- Common carbapenemases = **KPC, NDM, OXA-48, VIM, IMP**
- Carbapenemases can be transmitted via genetic mobile elements, and “jump” within and between bacterial species (e.g., KPC-producing *E. coli* → KPC-producing *P. aeruginosa*)

KPC=Klebsiella pneumoniae carbapenemase; NDM=New Delhi Metallo-β-Lactamase; OXA=Oxacillinase, VIM=Verona Integron Metallo- β-Lactamase; IMP= Imipenemase

Carbapenemase-Producing Organisms (CPO)

- **CPO** = bacteria that can produce Carbapenemases
 - Carbapenemases makes the bacteria resistant to carbapenem and other antibiotics
 - CPO more likely to spread resistance
 - A subset of CRO
- Examples include:
 - KPC-*Klebsiella pneumoniae* (CP-CRE)
 - VIM-*Pseudomonas aeruginosa* (CP-CRPA)
 - NDM-*Acinetobacter baumannii* (CP-CRAB)



Comparing CRO and CPO

	CRE	CRPA	CRAB
% Carbapenem-resistant	3%	13%	43%
Of those carbapenem-resistant, % Carbapenemase-producing	48%	2-3%	50-90%
Common clinical specimen source	GI tract	Respiratory secretions, urine, wounds	
Screening specimen	Rectal	Rectal, respiratory, wound	Rectal, respiratory, axilla/groin

CRE=carbapenem-resistant Enterobacterales; CRPA=carbapenem-resistant *Pseudomonas aeruginosa*;
CRAB=carbapenem-resistant *Acinetobacter baumannii*

[CDPH Carbapenem-Resistant Organisms Quicksheet \(PDF\)](http://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CRO_Quicksheet_Oct2020.pdf)
(www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CRO_Quicksheet_Oct2020.pdf)

CRO and CPO Epidemiology

- CRAB and CP-CRAB can persist for long periods of time in the environment
- *VIM-Pseudomonas aeruginosa* cases have been associated with receiving medical care in Mexico
 - Including medical tourism, routine medical care, and medical emergencies
- Some CRO and CPO isolates have been identified as pan-nonsusceptible to all tested antimicrobial drugs

Healthcare-associated MDRO Containment and Infection Prevention Measures

- **Thorough, consistent hand hygiene**
 - Alcohol-based hand sanitizers (ABHS) preferred
- Contact precautions, single room if possible
- Thorough environmental cleaning and disinfection
- Routine adherence monitoring
- Cohorting of patients and healthcare personnel
- Lab surveillance
- Screening of high-risk contacts

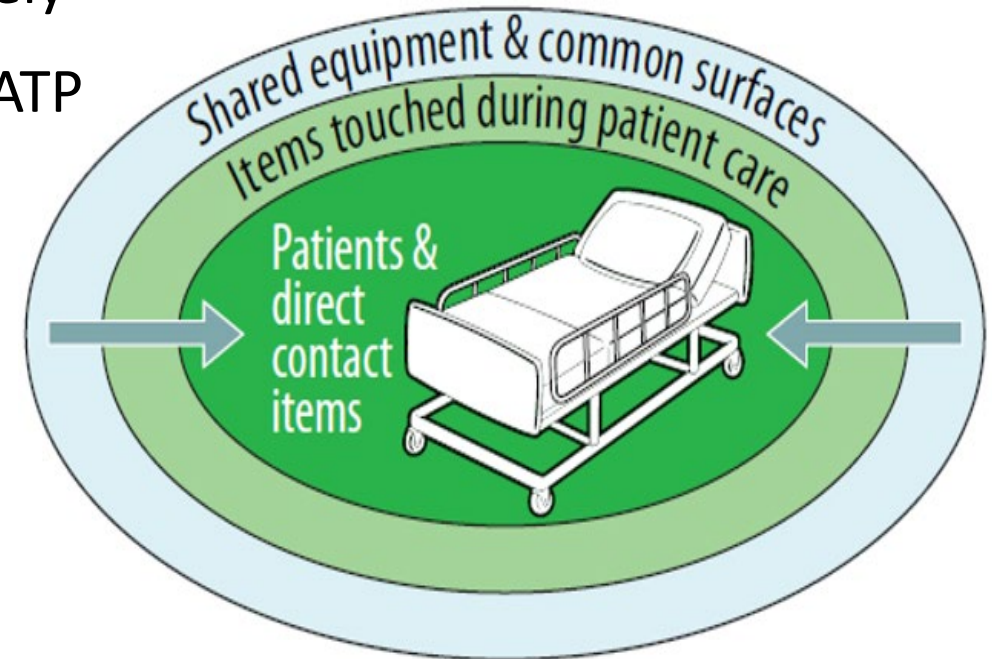
Core Infection Control Practices: Hand Hygiene

- Use ABHS over soap and water unless visibly soiled hands
- Place ABHS dispensers in as many patient care locations as possible
- More than “just gel-in/gel-out”; remember the **5 moments**
- Gloves are **NOT** a substitute for HH; perform HH before donning PPE, after doffing
- Perform adherence monitoring



MDRO Infection Control Basics: Environmental Cleaning

- High-touch surfaces, mobile medical equipment
- Read labels, know contact time
- Nursing vs EVS: who cleans what, audit separately
- Observe and monitor with fluorescent marker, ATP
- Adhesives, peeling and cracking surfaces
- Training, re-training
- For *C. auris*, use agent effective against *C. auris* ([List P](#)/List K/bleach)



[List P disinfectants](#)

(www.epa.gov/pesticide-registration/list-p-antimicrobial-products-registered-epa-claims-against-candida-auris)

MDRO Infection Control Basics: PPE and Contact Precautions

- **Do not practice** extended use or reuse of gowns* and gloves
- Everyone should adhere, including physicians and ancillary staff
- Double-gowning and -gloving are **NOT** recommended
- Don/Doff **WITH** hand hygiene
- Keep signage simple and consistent



[CDC Contact Precautions Signage \(PDF\)](#)

(www.cdc.gov/infectioncontrol/pdf/contact-precautions-sign-P.pdf)

MDRO Infection Control Basics: Patient Placement

- In acute care settings, **patients with MDROs should be in single-bed rooms** for the duration of the admission
- If cohorting patients, cohort by type of MDRO, regardless of specimen source, infection or colonization status
 - *C. auris* with *C. auris*
 - For CPO: by carbapenemase (e.g., KPC with KPC, NDM with NDM) first; then by organism
- Avoid unnecessary patient movement!

Facility Communication

- Key to preventing inter-facility transmission!
- Actively seek MDRO status of all admissions
- Flag medical record for future admissions
- Educate patients and family
- Establish a system between IP, nurse, and case manager to ensure clear communication
- Use interfacility transfer form

HEALTHCARE FACILITY TRANSFER FORM

Use this form for all transfers to an admitting healthcare facility.

Affix patient labels here.

Patient Name (Last, First): _____

Date of Birth: _____

MRN: _____

Transfer Date: _____

Receiving Facility Name: _____

Contact Name: _____

Contact Phone: _____

Sending Facility Name: _____

Contact Name: _____

Contact Phone: _____

PRECAUTIONS

Patient currently on precautions?

If yes, check all that apply:

Yes No

Airborne Contact Droplet Enhanced Standard*

Personal protective equipment (PPE) to consider at receiving facility*:



Gloves



Gown



Mask



N95/PAPR



Eye Protection

Long term care facilities may implement Enhanced Standard precautions for patients with MDRO or risk factors for transmission, i.e., gown and glove use for high contact care activities (<https://www.cdph.ca.gov/Programs/CHCQ/LCP/DPH%20Document%20Library/ARL.19.22.pdf>); such patients may be on Contact precautions in a acute care settings.

ORGANISMS (Include copy of lab results with organism ID and antimicrobial susceptibilities.)

Patient has multidrug-resistant organism (MDRO) or other lab results requiring precautions?

Yes (record organism(s), specimen source, collection date) No

Exposed to MDRO/other (record organism(s) and last date(s) of exposure if known)

Organism	Carbapenemase (if applicable)**	Source	Date
<input type="checkbox"/> <i>Candida auris</i> (<i>C. auris</i>)			
<input type="checkbox"/> <i>Clostridioides difficile</i> (<i>C. diff</i>)			
<input type="checkbox"/> <i>Acinetobacter</i> , multidrug-resistant (e.g., CRAB**)			
<input type="checkbox"/> Carbapenem-resistant Enterobacteriales (CRE**)			
<input type="checkbox"/> <i>Pseudomonas aeruginosa</i> , multidrug-resistant (e.g., CRPA**)			
<input type="checkbox"/> Extended-spectrum beta-lactamase (ESBL)-producer			
<input type="checkbox"/> Methicillin-resistant <i>Staphylococcus aureus</i> (MRSA)			
<input type="checkbox"/> Vancomycin-resistant <i>Enterococcus</i> (VRE)			
<input type="checkbox"/> No organism identified (e.g., molecular screening test**)			
<input type="checkbox"/> Other, specify: (e.g., SARS-CoV-2 (COVID-19), lice, scabies, disseminated shingles (<i>Herpes zoster</i>), norovirus, influenza, tuberculosis)			

**Note specific carbapenemase(s) (e.g., NDM, KPC, OXA-23) if known

[Interfacility Transfer Communications Guide](#)

(www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/.aspxInterfacilityCommunication)

Antimicrobial Stewardship (AS)

Limit unnecessary use of antimicrobial agents

- Broad-spectrum antimicrobials (e.g., carbapenems)
- Antifungal treatment not recommended for *C. auris* isolated from noninvasive sites without evidence of infection



[CDPH AS Program Honor Roll](#)

(www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/Honor_Roll.aspx)

Public Health MDRO Testing Capacity

Public Health Laboratory	<i>C. auris</i> Screening (axilla/groin)	CPO Screening (rectal)	<i>C. Auris</i> ID	Carbapenemase Testing	Antimicrobial Susceptibility Testing
Local, some			X	X	
State, MDL			X	CRE, CRPA	
Regional, AR Lab Network	X	CRE, CRPA, CRAB	X	CRE, CRPA, CRAB	CRE, CRPA, CRAB, <i>Candida</i>

- Access state and regional testing in consultation with CDPH HAI Program, HAIProgram@cdph.ca.gov
- Guidance available for prioritizing carbapenemase testing

MDRO Colonization Testing (Screening)

- When new case is identified
- Screen roommates, those who shared bathroom
- Consider screening other epi-linked high-risk patient contacts
 - Common high-risk procedure (e.g., duodenoscopes)
 - Shared medical equipment/services (e.g., respiratory therapy)
 - Ventilated, incontinent, bedbound, in high-risk (intensive care/burn/oncology) unit overlapping on same unit/ward
- Discuss point prevalence survey (PPS) testing with your local health department for novel pathogens or MDROs
 - Consider increased transmission risk due to high-risk unit

[CDPH *C. auris* and CPO Screening Decision Tree](#) (PDF)

(www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/Tier2_Pathogen_Screening_Decision_Tree_Oct2020.pdf)



Reporting

- **Carbapenemase-producing CRE** (*Klebsiella*, *Enterobacter* species, *E. coli* only) are lab-reportable under Title 17. See [CP-CRE Reporting Requirements FAQ](http://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CP_CRE_ReportingFAQ_Approved_10.4.19_ADA.pdf) (PDF) (www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CP_CRE_ReportingFAQ_Approved_10.4.19_ADA.pdf)
- ***C. auris*, and any other carbapenemase-producing organisms, or other unusual or highly-resistant organisms** are reportable as unusual infectious disease occurrences and outbreaks to public health under Title 17, and CDPH Licensing & Certification per [All Facilities Letter 19-18](http://www.cdph.ca.gov/Programs/CHCQ/LCP/CDPH%20Document%20Library/AFL-19-18.pdf) (PDF) (www.cdph.ca.gov/Programs/CHCQ/LCP/CDPH%20Document%20Library/AFL-19-18.pdf)

Summary

- Antibiotic resistance threatens our ability to prevent and treat infectious diseases
- Core actions to prevent resistance include improving antimicrobial prescribing through stewardship, reducing infections, and preventing transmission of MDRO
- Acute care IP lead coordinated responses in their healthcare facilities using a systematic framework to prevent or contain the spread of MDRO's
- IPs need to understand the variety of MDROs challenging their healthcare facilities

CDPH MDRO Resources

- [CDPH Antimicrobial Resistance Resources landing webpage](http://www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/AntimicrobialResistanceLandingPage.aspx)

(www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/AntimicrobialResistanceLandingPage.aspx)

- [CDPH *C. auris* Webpage](http://www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/Candida-auris.aspx)

(www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/Candida-auris.aspx)

- [CDPH *C. auris* Quicksheet](http://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/C%20auris%20Quicksheet_Int%20erim_070720_ADA.pdf) (PDF)

(www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/C%20auris%20Quicksheet_Int%20erim_070720_ADA.pdf)

- [CDPH CRE Webpage](http://www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/CRE_InfectionPreventionStrategies.aspx)

(www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/CRE_InfectionPreventionStrategies.aspx)

- [CDPH CRE Quicksheet](http://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CRE_QuicksheetOct2019.pdf) (PDF)

(www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CRE_QuicksheetOct2019.pdf)

CDPH MDRO Resources - Continued

- [CDPH CRPA and CRAB Quicksheet](http://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CRO_Quicksheet_Oct2020.pdf) (PDF)
(www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CRO_Quicksheet_Oct2020.pdf)
- [CDPH *C. auris* and CPO Screening Decision Tree](http://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/Tier2_Pathogen_Screening_Decision_Tree_Oct2020.pdf) (PDF)
(www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/Tier2_Pathogen_Screening_Decision_Tree_Oct2020.pdf)
- [CDPH Algorithm for Prioritizing Carbapenemase Testing](http://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CP_Testing_Prioritization_Algorithm_Oct2020.pdf) (PDF)
(www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/CP_Testing_Prioritization_Algorithm_Oct2020.pdf)
- [CDC/CDPH Novel MDRO in Long-Term Care Facilities Webinar](http://www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/C_auris_AHR_CDC_CDPHshareWebinarCombined_ADA_121020.pdf) (slides)(PDF)
(www.cdph.ca.gov/Programs/CHCQ/HAI/CDPH%20Document%20Library/C_auris_AHR_CDC_CDPHshareWebinarCombined_ADA_121020.pdf)
- [CDC/CDPH Novel MDRO in Long-Term Care Facilities Webinar](https://www.youtube.com/watch?v=5ulpo7wi6xk) (recording) (YouTube)
([www.youtu.be/5ulpo7wi6xk](https://www.youtube.com/watch?v=5ulpo7wi6xk))

Additional Resources

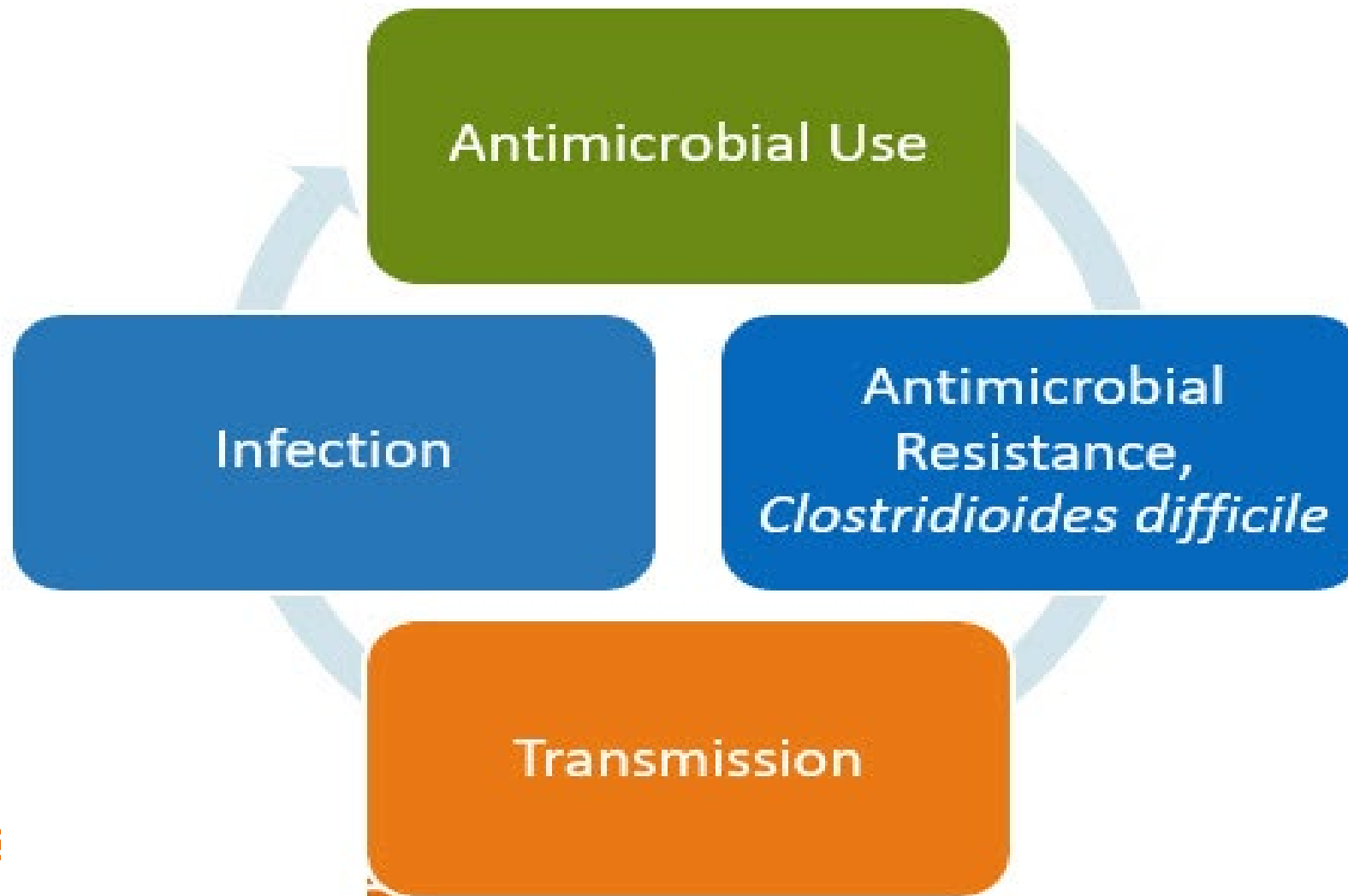
- [CDPH Enhanced Standard Precautions](#) (PDF)
(www.cdph.ca.gov/Programs/CHCQ/LCP/CDPH%20Document%20Library/Enhanced-Standard-Precautions.pdf)
- [CDPH Adherence Monitoring Tools](#)
(www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/MonitoringAdherenceToHCPracticesThatPreventInfection.aspx)
- [CDPH Interfacility Transfer Communications Guide](#)
(www.cdph.ca.gov/Programs/CHCQ/HAI/Pages/InterfacilityCommunication.aspx)

Antimicrobial Stewardship and Infection Prevention

Objectives

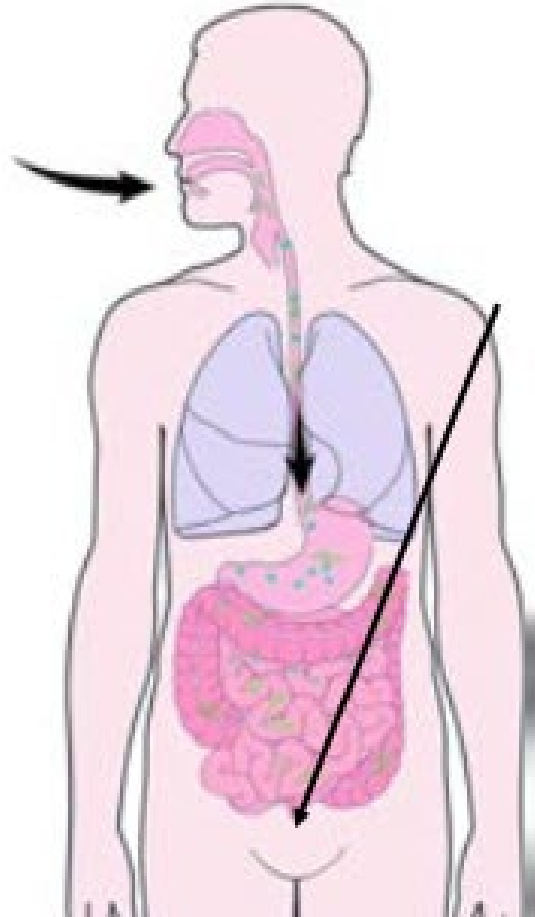
- Illustrate the link between antimicrobial stewardship and infection prevention
- Review core elements of antimicrobial stewardship, and opportunities for coordination with infection prevention
- Review roles of nursing staff in antimicrobial stewardship programs

Antimicrobial Stewardship and Infection Prevention are Linked

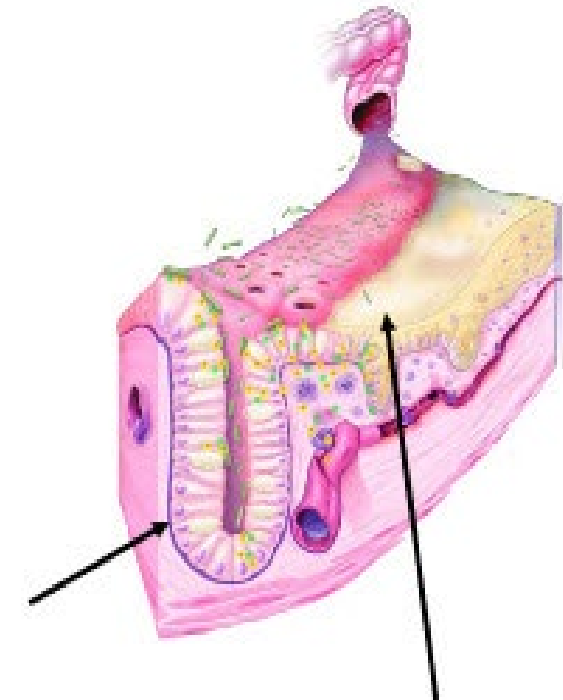


Clostridioides difficile Pathogenesis

Ingest *C. difficile* spores transmitted to patients via the hands of healthcare personnel and environment



Changes in lower intestinal flora due to **antimicrobial use** allows proliferation of *C. difficile* in colon



Toxin A & B production leads to colon damage

Two Preventable Events in CDI

The following events may occur separately and, in any order, but both are required for infection to occur:

1. The ***C.difficile*** bacterium or spore is ingested
2. The normal **intestinal flora is compromised** allowing for *C.difficile* to establish itself and proliferate

Focus Interventions on Preventable Events

1. The *C.difficile* bacterium or spore is ingested

- ✓ Hand hygiene
- ✓ Environmental cleaning and disinfection

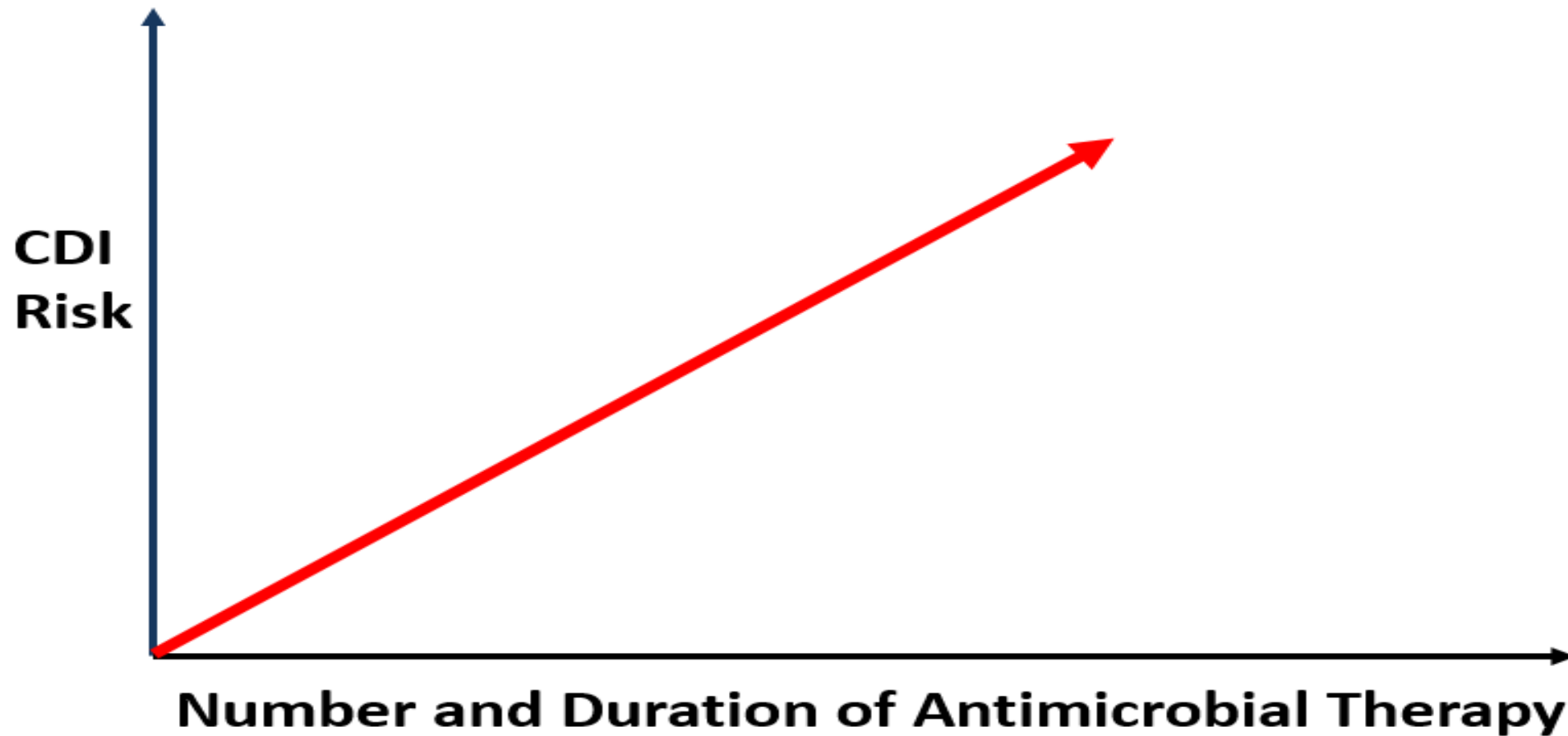
2. The normal **intestinal flora is compromised** allowing for *C.difficile* to establish itself and proliferate

- ✓ Antimicrobial stewardship

Focus Interventions on Preventable Events - continued

1. The *C.difficile* bacterium or spore is ingested
 - ✓ Hand hygiene
 - ✓ Environmental cleaning and disinfection
2. The normal **intestinal flora is compromised** allowing for *C.difficile* to establish itself and proliferate
 - ✓ Antimicrobial stewardship

Increased Risk of CDI With Cumulative Antimicrobial Exposure



Stevens, et al. Clin Infect Dis. 2011;53(1):42-48

Antimicrobial Stewardship

- **Promote and measure appropriate antimicrobial use** by optimizing antimicrobial selection, dosing, route, and duration of therapy
 - Improved patient care, increased cure rates, reduced treatment failures
 - Reductions in hospital rates of CDI and antimicrobial resistance
 - Decreased or controlled costs

Howell et al. Arch Intern Med 2010;170:784–90

Evans and Johnson. Clin Infect Dis. 2015;60(S2):S122-8

Regulatory Mandates

Requirements highlight key roles of infection prevention programs in advancing successful antimicrobial stewardship interventions across the continuum care.



Elements of Antimicrobial Stewardship Programs (ASP)

- **Leadership Commitment:**
Dedicate necessary resources
- **Accountability:**
Appoint a leader responsible for program outcomes
- **Pharmacy Expertise:**
Appoint pharmacist leader responsible for working to improve antimicrobial use
- **Action:**
Implement at least one recommended action
 - **Diagnosis:**
Promote accurate and timely testing, and ensure appropriate indications
- **Tracking:**
Monitor antibiotic prescribing and resistance patterns
- **Reporting:**
Regularly report information on antibiotic use and resistance to doctors, nurses, and relevant staff
- **Education:**
Educate clinicians about resistance and optimal prescribing

What are the Roles and Alignment with Infection Prevention and Nursing?

Leadership Commitment and Accountability: Antimicrobial Stewardship/Infection Prevention Alignment

- Both infection prevention and antimicrobial stewardship programs require
 - Leadership commitment
 - Accountability
 - Multidisciplinary engagement among physician, pharmacist, and nursing champions
 - Infection prevention and antimicrobial stewardship are both critical patient safety programs
 - Align strategies to promote, disseminate, measure and sustain best practices
-
-

Drug Expertise: Contributions from Nursing Staff

- Nursing staff can obtain and document a detailed allergy history
 - Include details of timing and nature of reaction
 - Nursing staff can educate patients and families
 - What constitutes an accurate antibiotic allergy history
-
-

Example

Penicillin (Beta-Lactam) Allergy Assessments and CDI Prevention

- Patients with reported penicillin (beta-lactam) allergies frequently receive alternative antimicrobials and are at increased risk of CDI
- Penicillin (beta-lactam) allergy assessments and skin testing for patients with reported allergy
 - Improve use of preferred penicillin (beta-lactam) therapy
 - Reduce use of alternative agents with greater CDI risk

Macy, et al. J Allergy Clin Immunol. 2014; 69(7): p.1748-54.

Leis et al. Clin Infect Dis. 2017; Trubiano et al. Clin Infect Dis. 2017

ASP Action: Roles of Nursing Staff

- Inform decisions to start antimicrobials promptly upon early signs of likely bacterial infections, including sepsis
 - Prompt and participate in discussions about changes in antimicrobial use by evaluating and communicating patients' clinical status and medical history
 - 48–72-hour antibiotic “timeout” -> stop or narrow therapy
 - Readiness for transition from intravenous to oral therapy
 - History of CDI or other antibiotic complication
 - Perform medication reconciliations during patient transitions of care
-
-

Example

Avoid Unnecessary Antimicrobial Therapy in Patients with CDI

- Optimal CDI treatment includes stopping or avoiding non-CDI antimicrobial use wherever possible
 - “Flag” patients with risk factors or recent CDI and alert prescriber to avoid antibiotics or to use lower-risk agents
 - Target patients with CDI diagnoses for medication review to identify and discontinue unnecessary antibiotics

Diagnosis: Nursing and Infection Prevention Roles

- Promote optimal use of diagnostic tests and microbiology cultures
 - Verify reason for test is appropriate
 - Use proper specimen collection technique and transport to a laboratory in a timely manner
 - Ensure specimens are collected before antimicrobials are started
-
-

Example

Accuracy of CDI Diagnosis

- Sensitive diagnostic testing methods allow for rapid identification of patients with CDI
 - Prompt initiation of CDI therapy improves patient outcomes
 - Prompt initiation of Contact precautions minimizes transmission risk to others
- Sensitive diagnostic tests sometimes used inappropriately
 - Detect asymptomatic *C. difficile* colonization
 - Initiate unnecessary CDI therapy

Example

CDI Testing

- CDI testing should be limited to symptomatic patients with unformed stool
 - Presence of unexplained and new-onset diarrhea
 - ≥ 3 unformed stools over 24 hours
- Implement pre-agreed criteria for CDI testing
 - Algorithm to direct proper testing
 - Discontinue laxatives 24-48 hours prior to testing
 - Laboratory rejects testing if formed stool (does not conform to shape of container)

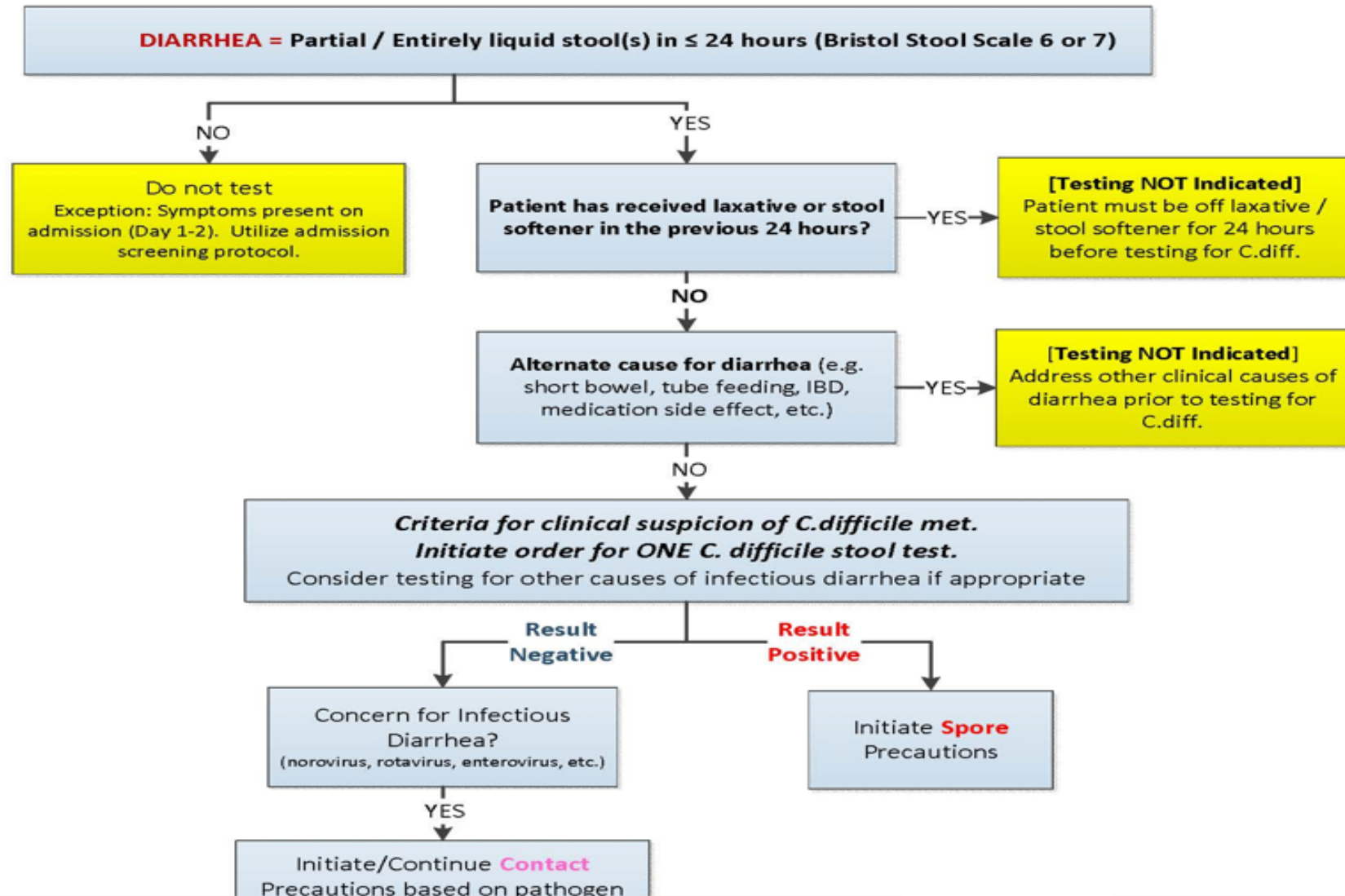
Clinical C. difficile Testing Protocol

The protocol does not substitute for clinical assessment and judgment

Protocol Initiation Criteria

1. Age >1 year old.
2. Testing cannot be repeated if already performed within 7 days (regardless of result).
3. For use on day 3+ of inpatient admission (else use Admission Screening Protocol).

Example CDI Testing Algorithm



Tracking: Antimicrobial Stewardship / Infection Prevention Collaboration

- Conduct HAI surveillance
 - Use surveillance data to prioritize ASP interventions
 - Consult regarding use of NHSN (Hospitals only)
 - NHSN Antimicrobial Use and Resistance (AUR) module tracks and analyzes antimicrobial use and resistance trends
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Reporting: Antimicrobial Stewardship / Infection Prevention Collaboration

- Provide feedback of HAI data
 - Clinicians, patient safety and medical executive committees, board of directors, and other stakeholders
 - Provide feedback that is timely, frequent, individualized, non-punitive, and customized
-
-

Example

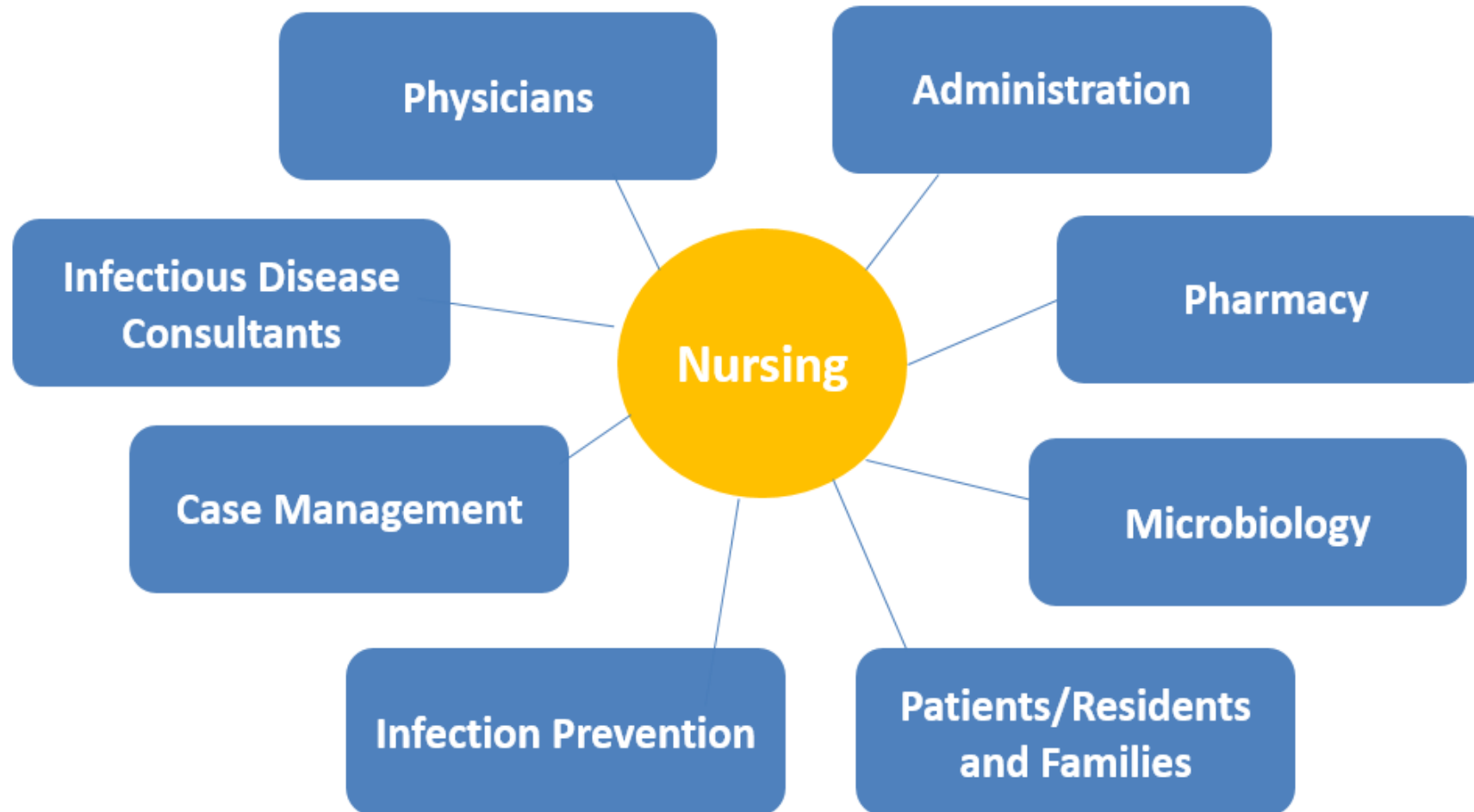
Establish CDI Reduction Goals for the ASP

- Include the hospital infection preventionist as an active ASP participant
- Use CDI surveillance data to prioritize ASP interventions
 - Example: Identify locations and service lines with the highest CDI incidence
- Track and report CDI incidence as a primary ASP outcome

Education: Antimicrobial Stewardship / Infection Prevention Collaboration

- Create educational strategies to address each discipline's clinical interests
 - Include why infection prevention and antimicrobial stewardship is of value to staff and their patients
 - Consider team-oriented and problem-based trainings, including multidisciplinary workshops, bedside teaching, and simulation-based training
-
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Nursing as the Hub of Communication for Antimicrobial Use Stakeholders



Antimicrobial Stewardship Across Transitions of Care

- Establish **consistency of practice and messaging** about antimicrobial use across diverse care settings
- Ensure communication of **antimicrobial indication and anticipated duration** when patients transfer between facilities
 - Avoid duplicative or unnecessarily prolonged courses of antimicrobial therapy, which increase CDI risk
- Ensure communication and documentation of **patient symptoms** upon transfer
 - Ensure appropriate diagnostic testing and infection control measures implemented promptly

Inter-facility Transfer Communication Tool

- Document antimicrobials patient is receiving, including
 - Antimicrobial name, dose, frequency
 - What infection is being treated
 - Start and anticipated stop dates

INFECTION CONTROL TRANSFER FORM

This form should be sent with the patient/resident upon transfer. It is NOT meant to be used as criteria for admission, only to foster the continuum of care once admission has been accepted.




Affix any patient labels here.

Demographics	Patient/Resident (Last Name, First Name): _____			
	Date of Birth: / /	MRN:	Transfer Date: / /	
	Sending Facility Name: _____			
	Contact Name: _____		Contact Phone: () -	
	Receiving Facility Name: _____			

⚠	Currently in Isolation Precautions? <input type="checkbox"/> Yes	<input type="checkbox"/> No isolation precautions
	If Yes, check: <input type="checkbox"/> Contact <input type="checkbox"/> Droplet <input type="checkbox"/> Airborne <input type="checkbox"/> Other: _____	

Organisms	Did or does have (send documentation, e.g. culture and antimicrobial susceptibility test results with applicable dates):	Current (or previous) infection or colonization, or ruling out *	<input type="checkbox"/> No known MDRO or communicable diseases
	MRSA	<input type="checkbox"/>	
	VRE	<input type="checkbox"/>	
	<i>Acinetobacter</i> resistant to carbapenem antibiotics	<input type="checkbox"/>	
	<i>E. coli</i> , <i>Klebsiella</i> or <i>Enterobacter</i> resistant to carbapenem antibiotics (CRE)	<input type="checkbox"/>	
	<i>E. coli</i> or <i>Klebsiella</i> resistant to expanded-spectrum cephalosporins (ESBL)	<input type="checkbox"/>	
	<i>C. difficile</i>	<input type="checkbox"/>	
Other^: _____	<input type="checkbox"/> (current or ruling out*)		
^e.g. lice, scabies, disseminated shingles, norovirus, flu, TB, etc			
*Additional information if known: _____			

Symptoms	Check yes to any that currently apply**:	<input type="checkbox"/> No symptoms / PPE not required as "contained"
	<input type="checkbox"/> Cough/uncontrolled respiratory secretions <input type="checkbox"/> Acute diarrhea or incontinent of stool <input type="checkbox"/> Incontinent of urine <input type="checkbox"/> Draining wounds <input type="checkbox"/> Vomiting <input type="checkbox"/> Other uncontained body fluid/drainage <input type="checkbox"/> Concerning rash (e.g.; vesicular)	
**NOTE: Appropriate PPE required ONLY if incontinent/drainage/rash NOT contained.		

PPE	PERSONAL PROTECTIVE EQUIPMENT CONSIDERATIONS	Answers to sections above ANY YES → [Left] ALL NO → [Down]
	 <input type="checkbox"/>  <input type="checkbox"/>  <input type="checkbox"/>	
CHECK ALL PPE TO BE CONSIDERED AT RECEIVING FACILITY		Person completing form: _____ Date: __/__/__ Role: _____

Other MDRO Risk Factors	Is the patient currently on antibiotics? <input type="checkbox"/> Yes <input type="checkbox"/> No				
	Antibiotic	Dose, Frequency	Treatment for:	Start date:	Stop date:

Other MDRO Risk Factors	Does the patient currently have any of the following devices? <input type="checkbox"/> Yes <input type="checkbox"/> No	
	<input type="checkbox"/> Central Line/ PICC, Date inserted: __/__/__	<input type="checkbox"/> Subrapubic catheter
	<input type="checkbox"/> Hemodialysis Catheter	<input type="checkbox"/> Percutaneous gastrostomy tube
	<input type="checkbox"/> Urinary Catheter, Date inserted: __/__/__	<input type="checkbox"/> Tracheostomy <input type="checkbox"/> Fecal management system

IZ	Were immunizations received at sending facility? <input type="checkbox"/> Yes <input type="checkbox"/> No
	If yes, specify: _____ Date(s): _____



Summary

- Antimicrobial stewardship and infection prevention programs complement each other to promote patient safety
- Infection prevention and nursing staff have critical roles to play in antimicrobial stewardship programs

Questions?

For more information,
please contact

HAIProgram@cdph.ca.gov

Include “ACH IP Training Course” in
the subject line

Post Test

Now that you have completed this
module,
Click on the “Post Test” link when it
pops up

To Return to
Learning Stream
and take the post test

*If the Post Test link does not pop up,
you will be sent a link via e-mail*