

---

---

# Antimicrobial Stewardship and Infection Prevention

Last Revised 2019

---

---

Healthcare-Associated Infections Program  
Center for Health Care Quality  
California Department of Public Health



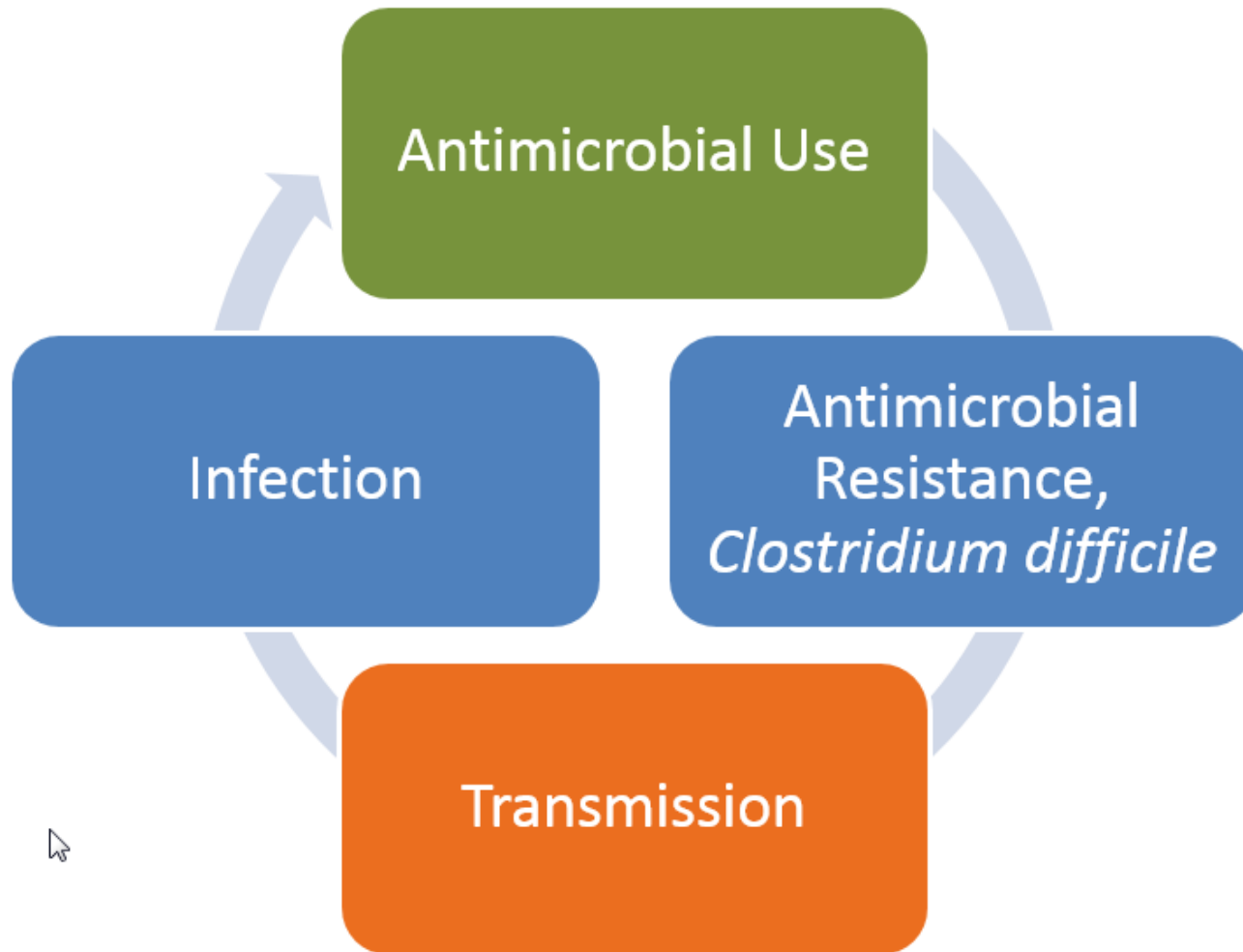
# Objectives

---

---

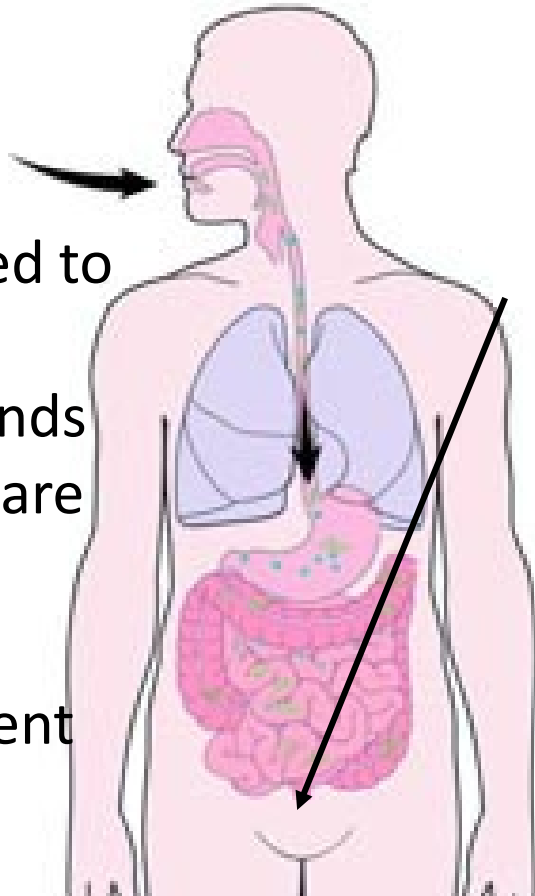
- Illustrate the link between antimicrobial stewardship and infection prevention
  - Review core elements of antimicrobial stewardship, and opportunities for coordination with infection prevention
  - Review roles of nursing staff in antimicrobial stewardship programs
- 
-

# Antimicrobial Stewardship and Infection Prevention are Linked

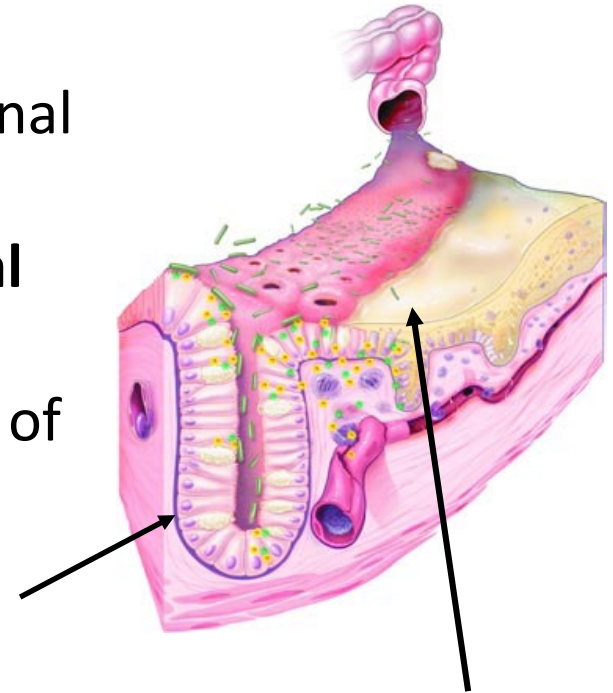


# *Clostridium difficile* Pathogenesis

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

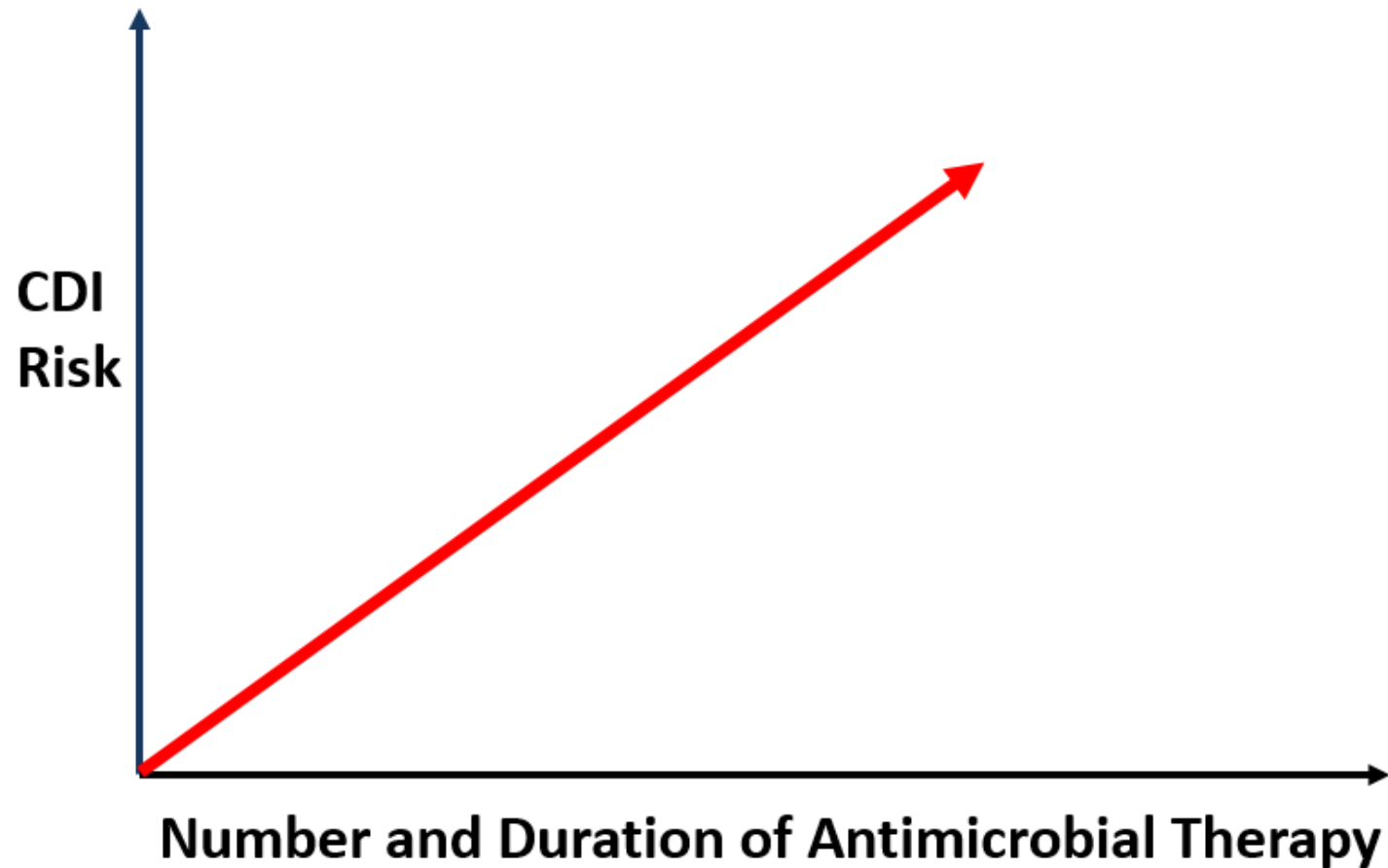
## 2. The normal intestinal flora is compromised allowing for *C.difficile* to establish itself and proliferate

## Focus Interventions on Preventable Events - continued

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

→ 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
- **Drug 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
  - $\geq 3$  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).

**DIARRHEA = Partial / Entirely liquid stool(s) in ≤ 24 hours (Bristol Stool Scale 6 or 7)**

NO

Do not test  
Exception: Symptoms present on admission (Day 1-2). Utilize admission screening protocol.

YES

Patient has received laxative or stool softener in the previous 24 hours?

YES

**[Testing NOT Indicated]**  
Patient must be off laxative / stool softener for 24 hours before testing for C.diff.

NO

Alternate cause for diarrhea (e.g. short bowel, tube feeding, IBD, medication side effect, etc.)

YES

**[Testing NOT Indicated]**  
Address other clinical causes of diarrhea prior to testing for C.diff.

NO

**Criteria for clinical suspicion of C.difficile met.  
Initiate order for ONE C. difficile stool test.**

Consider testing for other causes of infectious diarrhea if appropriate

Result  
Negative

Result  
Positive

Concern for Infectious Diarrhea?  
(norovirus, rotavirus, enterovirus, etc.)

Initiate **Spore** Precautions

YES

Initiate/Continue **Contact** Precautions based on pathogen

## 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

# 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
- 
-



# Nursing as the Hub of Communication for Antimicrobial Use Stakeholders



# Facilities work together to protect patients.

## Common Approach *(Not enough)*

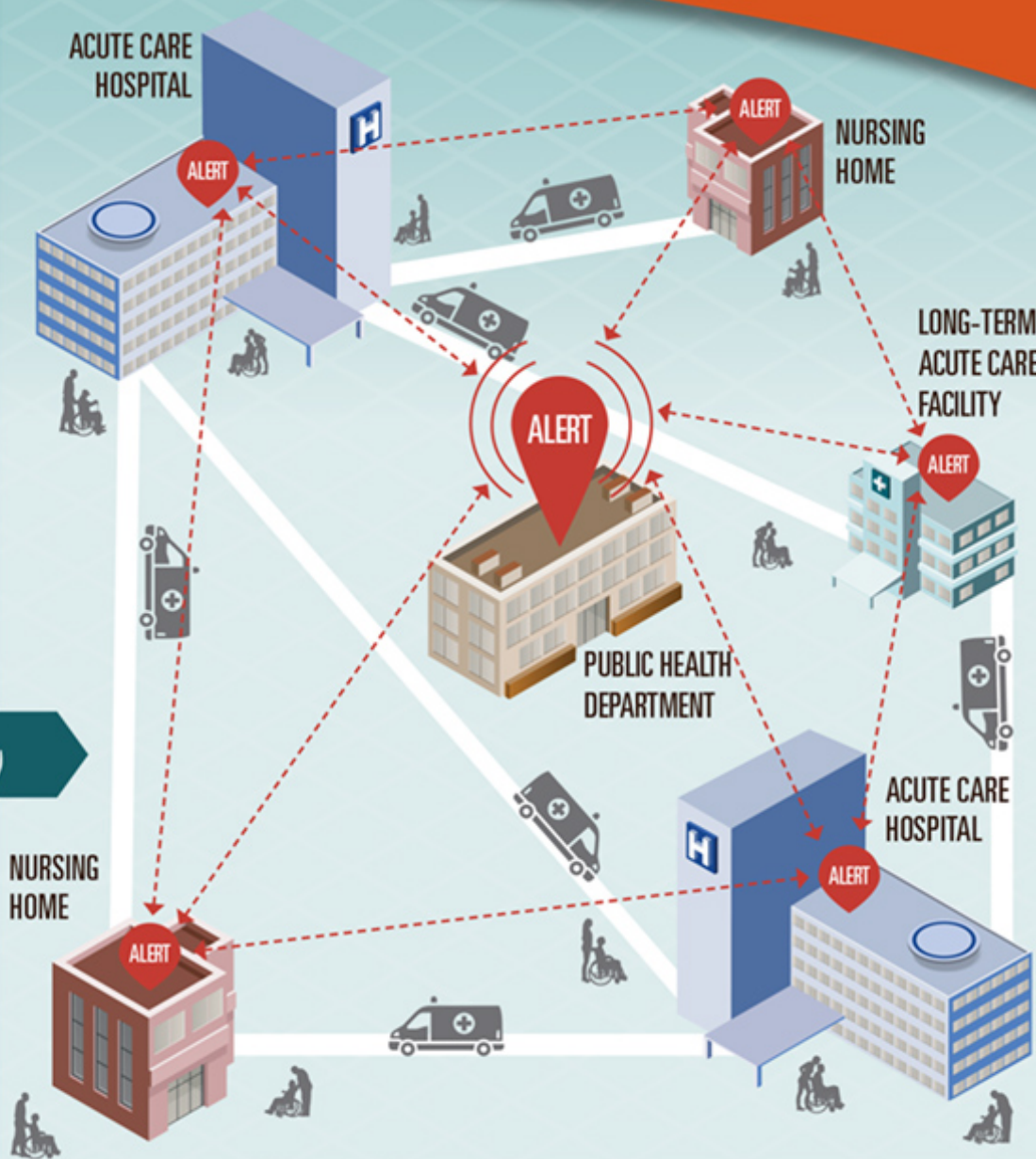
- Patients can be transferred back and forth from facilities for treatment without all the communication and necessary infection control actions in place.

## Independent Efforts *(Still not enough)*

- Some facilities work independently to enhance infection control but are not often alerted to antibiotic-resistant or *C. difficile* germs coming from other facilities or outbreaks in the area.
- Lack of shared information from other facilities means that necessary infection control actions are not always taken and germs are spread to other patients.

## Coordinated Approach *(Needed)*

- Public health departments track and **alert** health care facilities to antibiotic-resistant or *C. difficile* germs coming from other facilities and outbreaks in the area.
- Facilities and public health authorities share information and implement shared infection control actions to stop spread of germs from facility to facility.



# 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
- 
-

# Interfacility 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: _____			
<b>Currently in Isolation Precautions?</b> <input type="checkbox"/> Yes <input type="checkbox"/> No 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 *	
	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 <b>currently</b> apply**: <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)			<input type="checkbox"/> No symptoms / PPE not required as "contained"
	**NOTE: Appropriate PPE required ONLY if incontinent/drainage/rash NOT contained.			
PPE	PERSONAL PROTECTIVE EQUIPMENT CONSIDERATIONS <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> CHECK ALL PPE TO BE CONSIDERED AT RECEIVING FACILITY			Answers to sections above ANY YES → [PPE Section] ALL NO → [Signature/Date Box]
	Person completing form: _____ Role: _____ Date: __/__/__			
Other MDRO Risk Factors	Is the patient <b>currently</b> on antibiotics? <input type="checkbox"/> Yes <input type="checkbox"/> No			
	Antibiotic	Dose, Frequency	Treatment for:	Start date:
Does the patient <b>currently</b> 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 or consultation, contact  
[HAIProgram@cdph.ca.gov](mailto:HAIProgram@cdph.ca.gov) or (510) 412-6060.