MDRO’s : Understanding the Threat

Prevent • Detect • Communicate • Protect

Doramarie Arocha, PhD, MT(ASCP)SM, CIC, AL-CIP, FAPIC
Director, Infection Prevention & Control
Epidemiologist/Infection Preventionist
University of Texas Southwestern Medical Center Dallas | 2026



Learning objectives

By the end of this session, participants will be able to:

Recognize

Differentiate colonization from infection and identify priority MDROs.

Interrupt

Explain the major routes of transmission and select prevention actions.

Respond

Use laboratory, EHR, and surveillance information to escalate concerns.

Apply

Use Standard and Transmission-Based Precautions appropriately.

Communicate

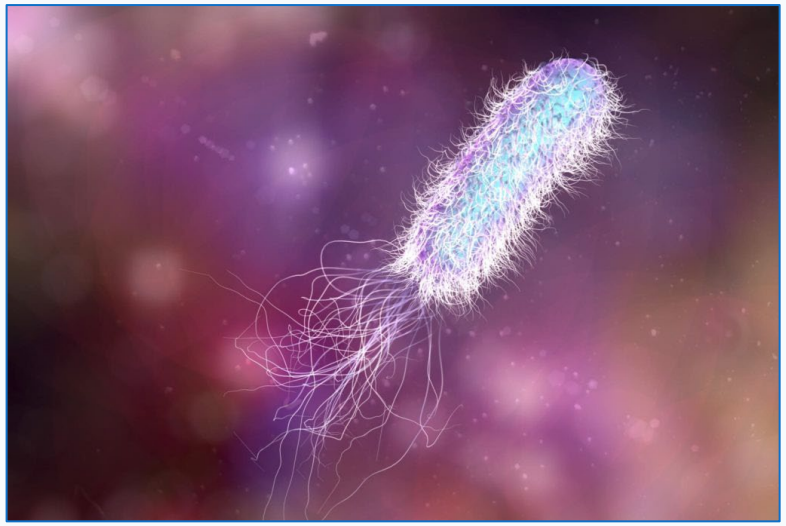
Ensure MDRO status is visible during transfers and handoffs.

Improve

Evaluate adherence and partner across disciplines to close gaps.

Background

- Multi-drug resistant organisms (MDRO's) have increased in prevalence in US hospitals over the last three decades.
- These organisms have important implications for patient safety.
- Options for treating patients with these infections are often extremely limited.
- MDRO infections are associated with increased lengths of stay, costs, and mortality.



Why MDRO prevention still matters

Resistance threatens routine care, and healthcare transmission is preventable.

2.8M+

antimicrobial-resistant infections occur in the U.S. each year

20% ↑

combined rise in six bacterial hospital-onset resistant infections during the pandemic period

5×

increase in reported clinical *C. auris* cases, 2019–2022

The prevention opportunity

- Reliable hand hygiene and appropriate precautions
- Communicate MDRO status across transfers and handoffs
- Clean and disinfect shared equipment and high-touch surfaces
- Use surveillance and stewardship data to drive action

MDRO basics: resistance does not equal infection

COLONIZATION

Organism is present without signs or symptoms attributable to infection.

May still contribute to transmission risk

Do not treat a culture result in isolation

INFECTION

Organism is causing disease with compatible clinical findings.

Requires clinical evaluation and targeted treatment

Use culture source, symptoms, imaging, and other data

Clinical context + microbiology + local policy guide the response.

Priority organisms in healthcare

Use current laboratory definitions and facility policy.

MRSA / VRE

Resistant gram-positive organisms
Transmission prevention, device and wound care

ESBL-E / AmpC-E

Resistance mechanisms in Enterobacterales
Interpret susceptibility results; avoid “one-size-fits-all” labels

CRE / CPE

Carbapenem-resistant or carbapenemase-producing Enterobacterales
Rapid recognition, containment, interfacility communication

CRAB / DTR P. aeruginosa

Highly resistant non-fermenting gram-negative rods
Environmental persistence, equipment and water risks

Candida auris

Emerging, often drug-resistant yeast
Accurate identification, contact-based measures, effective disinfectant

VISA / VRSA

Reduced or resistant vancomycin susceptibility in S. aureus
Urgent verification, private room, escalation and reporting

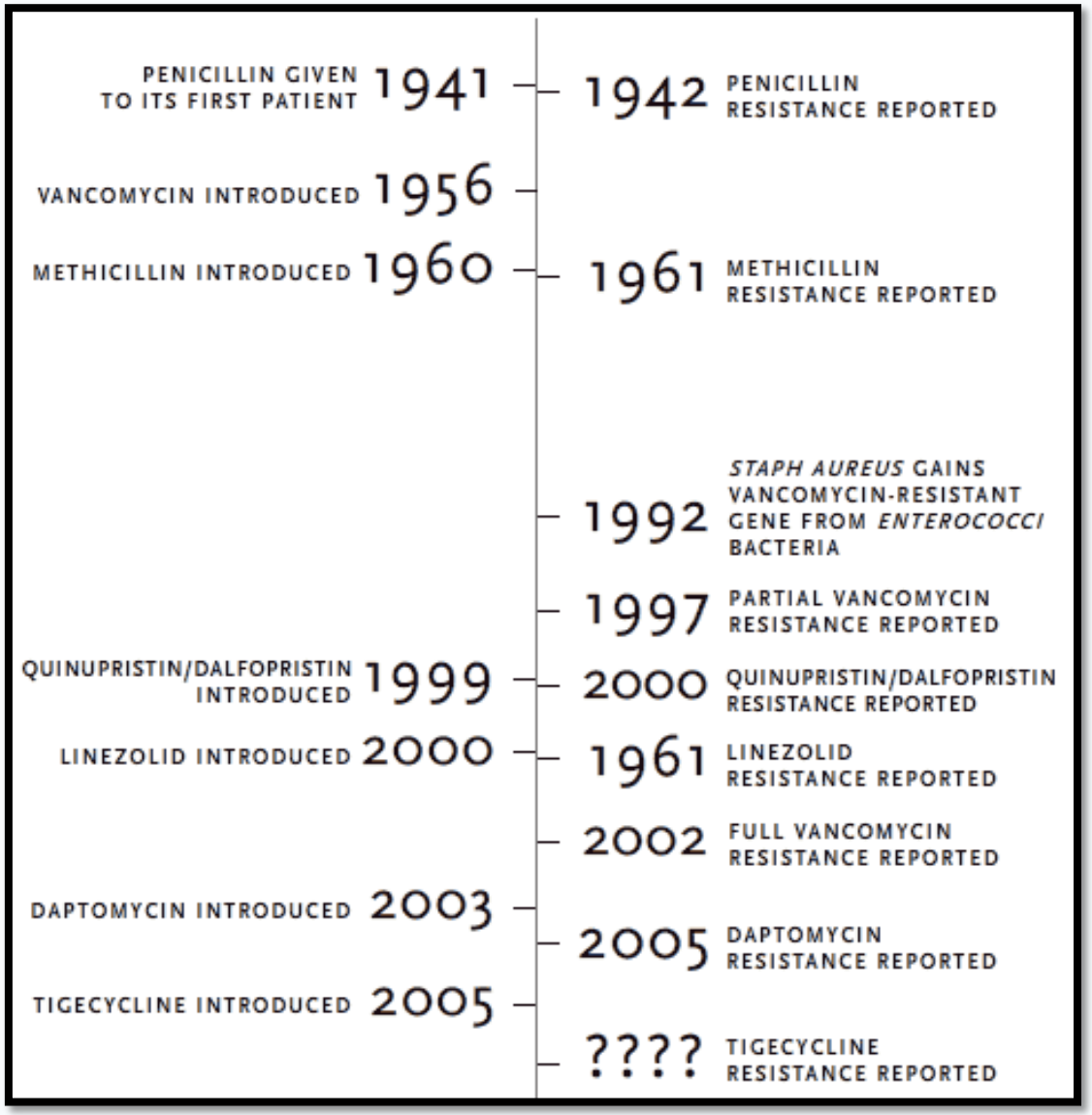
Specific definitions

- To be defined as an MDRO the organism must meet these criteria:
- MRSA: S. aureus tests resistant to Oxacillin
- VRE: Enterococcus species tests resistant to Vancomycin.
- MDRO-Acinetobacter species: Resistant to at least one agent within at least 3 antimicrobial classes:
  - B-lactams
  - Carbapenems
  - Aminoglycosides
  - Fluoroquinolones
  - Cephalosporins
  - Sulbactam

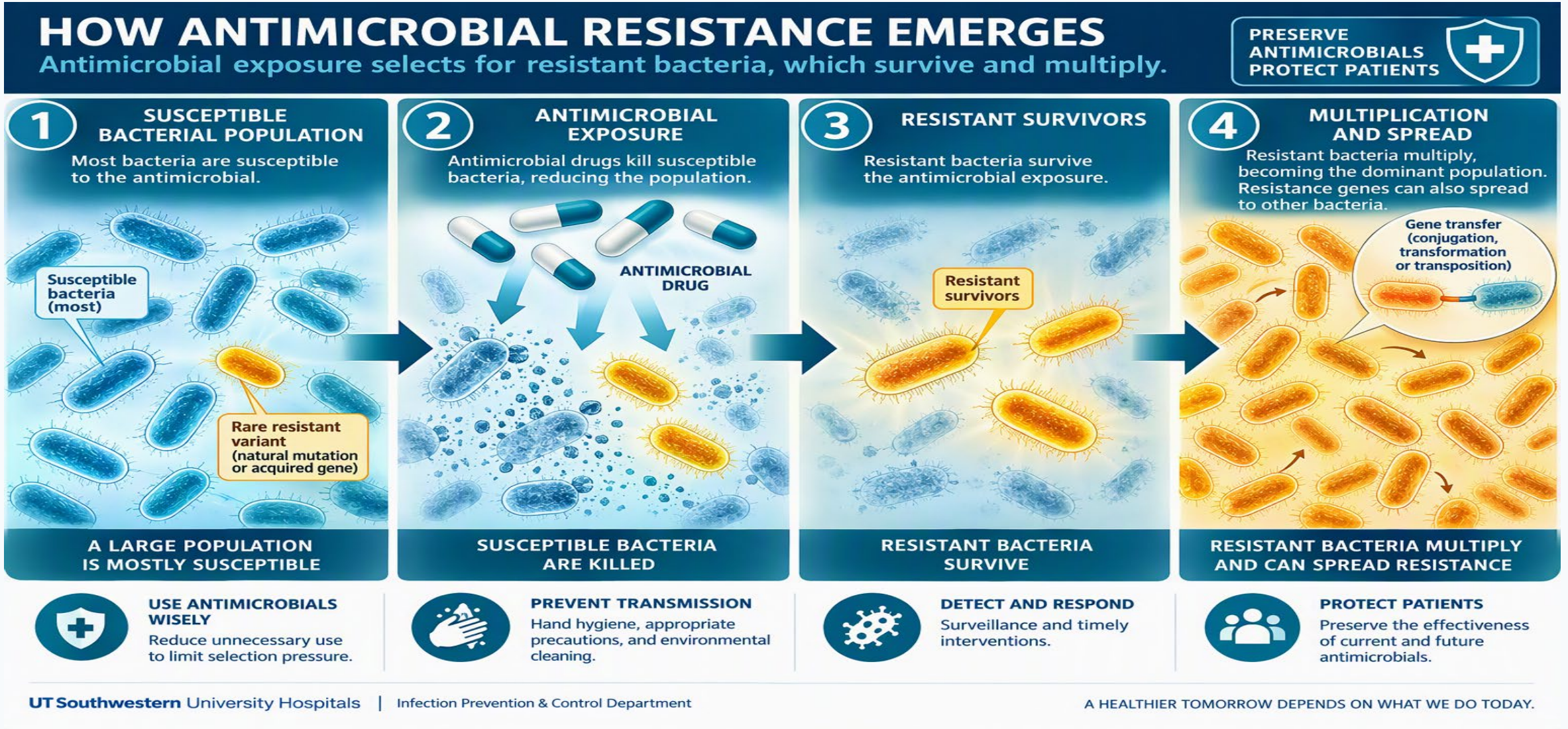
History of MDROs

- Methicillin Resistant Staphylococcus aureus (MRSA) was first isolated in the United States in 1968.
- In the early 1990s, MRSA accounted for 20%-25% of Staphylococcus aureus isolates from hospitalized patients.
- By 2003, MRSA accounted for >50% of S. aureus isolates from patients in ICUs.
- A similar rise in prevalence has occurred with Vancomycin Resistant Enterococcus (VRE) . From 1990 to 1997, the prevalence of VRE in Enterococcus isolates from hospitalized patients increased from <1% to approximately 15%.
- By 2003 VRE accounted for 28.5 % of Enterococcus isolates in ICUs.

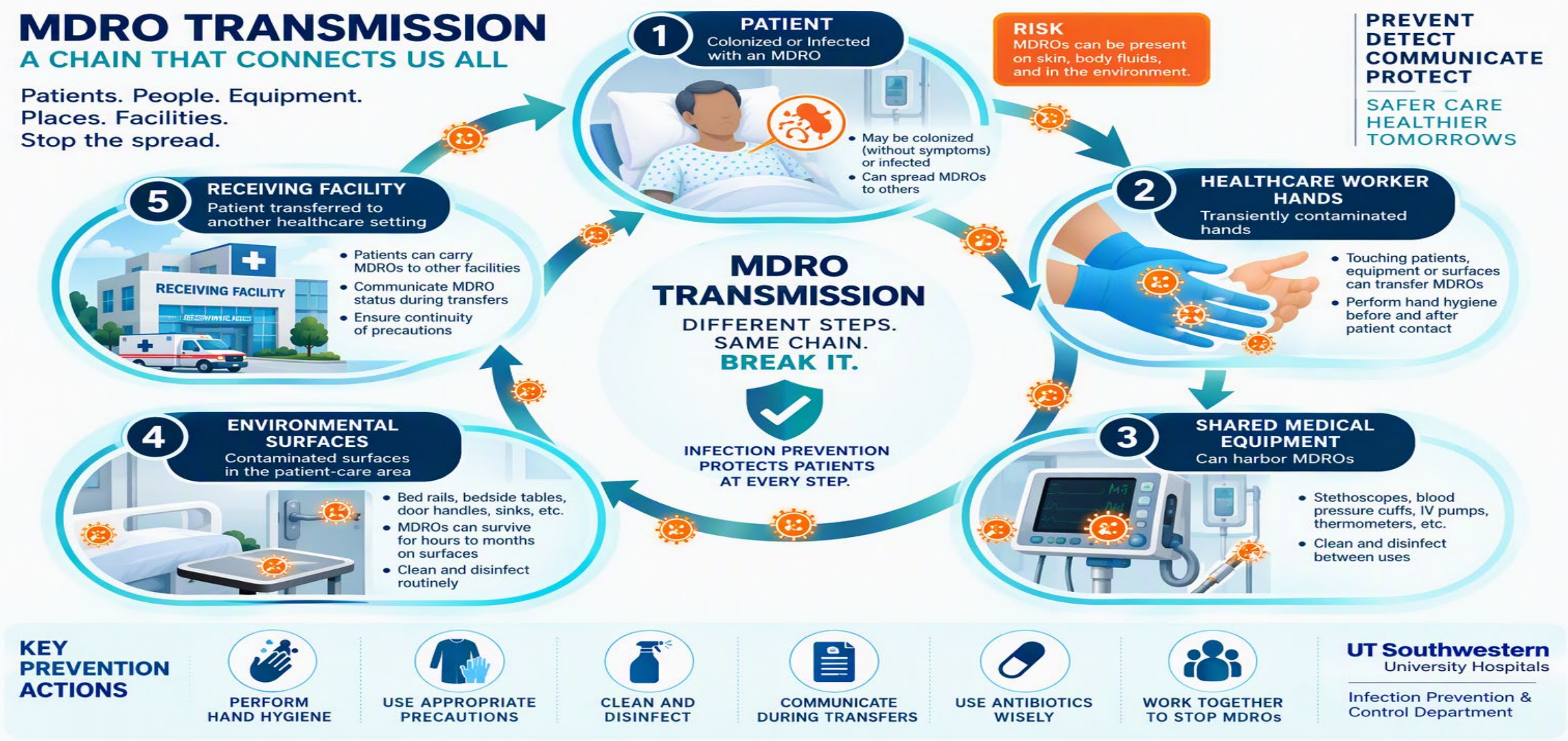
Timeline of Antibiotic Resistance



How antimicrobial resistance emerges



Transmission: different steps, same chain



Who is at higher risk?

Risk is shaped by host factors, care intensity, and healthcare exposure.

Host

Severe illness
Immunocompromise
Disrupted skin or wounds

Devices

Urinary catheter
Central or vascular access
Endotracheal tube

Exposure

Recent hospitalization
Antimicrobial exposure
Residence in another care facility

Care environment

ICU or high-acuity care
Frequent hands-on care
Shared equipment and surfaces

Risk assessment supports early recognition, but precautions and treatment decisions must follow organism-specific guidance and current policy.

Precautions: use the right layer for the risk

1 STANDARD

- Apply to every patient
- Anticipate exposure and select PPE
- Perform hand hygiene and safe equipment practices

2 TRANSMISSION-BASED

- Add when an organism or syndrome requires it
- Use patient placement, PPE, transport, and equipment controls
- Continue per current policy

ESCALATE

Novel or targeted MDRO

Suspected cluster

VISA/VRSA

C. auris or carbapenemase-producing organism

When in doubt: isolate risk, notify Infection Prevention, and verify the current policy.

When a priority MDRO is identified

A coordinated response minimizes delay and secondary transmission.



Hands and shared equipment are high-impact controls

1

Before

Before touching the patient or entering the care workflow

2

During

Avoid unnecessary contact with nearby surfaces; change gloves when indicated

3

After

Remove PPE correctly and perform hand hygiene

4

Between patients

Disinfect reusable equipment with a hospital-approved product

Gloves do not replace hand hygiene.

Environmental cleaning: focus on high-touch and shared items



Every care episode

- Clean and disinfect reusable equipment between patients
- Prioritize bed rails, tables, handles, monitors, pumps, and mobile devices
- Use the correct product, dilution, and wet contact time
- Escalate discrepancies or persistent contamination concerns

Methicillin-Resistant *Staphylococcus aureus (*MRSA) Fact Sheet

Staphylococcus aureus

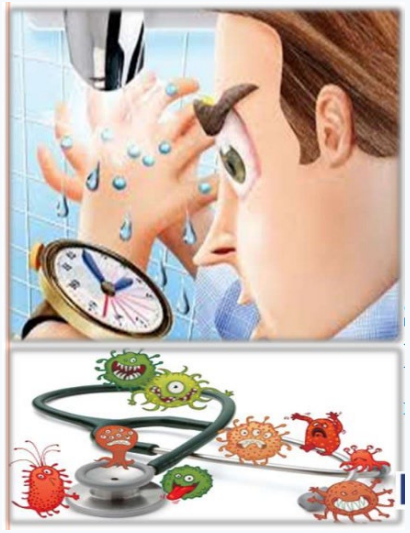
- commonly found on skin, in eyes, upper respiratory track, mouth, and GU system
- developed resistance to many Antibiotics including Methicillin (oxacillin) to create the particular strain, MRSA

MRSA

- Can cause severe problems such as bloodstream infections, pneumonia, wound infections, surgical site infections, etc.
- may colonize the patient or cause active infections
- is a public health concern because there are few drugs left to treat serious MRSA infections. Vancomycin is the current drug of choice for serious infections. Other antimicrobial agents would include: Daptomycin and Linezolid.

Methicillin-Resistant *Staphylococcus aureus (*MRSA) Fact Sheet

- A high percentage of wound infections are caused by MRSA.
- Reservoirs for MRSA in the hospital include infected or colonized patients with HCW being the link for nosocomial spread of the infection. The main mode of transmission is via hands of HCW.
- Other reservoirs include contaminated equipment and other items in the environment





Community Onset MRSA

- The emergence of new epidemic strains of MRSA in the community, (CO-MRSA) among patients without established MRSA risk factors, may present new challenges to MRSA control in healthcare settings.

- Historically, genetic analyses of MRSA isolated from patients in hospitals worldwide revealed a relatively small number of MRSA strains have the unique qualities to facilitate transmission from patient to patient.

- To date, most MRSA strains isolated from patients with CO-MRSA infections have been microbiologically distinct from those endemic in healthcare settings, suggesting some of these strains may have arisen *de novo* in the community via the acquisition of the mecA gene from Methicillin Susceptible Staph aureus.

Vancomycin-resistant Staphylococcus aureus

- 1st case in US, June, 2002, Michigan; 2nd case -September, 2002, Pennsylvania
- Vancomycin resistant gene transferred from VRE in same patient
- To date, the US has had approximately 16 cases of VRSA through 2021
- CDC recommends private room, contact precautions
- Reportable to your state and CDC

https://www.cdc.gov/staphylococcus-aureus/about/vancomycin-resistant-staph.html?utm_source

Vancomycin-Resistant Enterococcus (VRE)

- Most common species are: Enterococcus faecalis and Enterococcus faecium.
- Enterococci are bacteria (germs) that are normally present in the human intestines and in the female genital tract, and are often found in the environment, like in soil and water. These bacteria can cause infections.
- In 2017, VRE caused an estimated 54,500 infections among hospitalized patients and 5,400 estimated deaths in the United States.
- Enterococci bacteria are constantly finding new ways to avoid the effects of antibiotics used to treat infections. Antibiotic resistance occurs when germs no longer respond to antibiotics designed to kill them.

Example: Enterococcus organisms can develop resistance to vancomycin, making them VRE.



https://www.cdc.gov/hai/organisms/vre/vre.html

Resistant Acinetobacter baumannii

- Aerobic gram-negative bacillus
- Commonly found in the environment
- High level of resistance
- High numbers of A. baumannii infection among our troops in Iraq
- Causing outbreaks in healthcare facilities
- Cause pneumonia and wound, bloodstream, and urinary tract infections.
- Contact Precautions

The newer surveillance data show that **34.7% of tested *Acinetobacter* isolates were carbapenem-resistant in 2024**, down from 43.1% in 2023. However, this percentage does not tell us the total number of infections or deaths.

Important update: The CDC announced plans to publish updated national antimicrobial-resistance burden estimates in 2026.



Extended spectrum beta-lactamase producers (ESBLs)

Type of MDRO	Definition	Precautions
Extended Spectrum Beta-Lactamase Producers (ESBLs)	Extended Spectrum Beta-Lactamase is an enzyme (chemical tool) that allows bacteria to become resistant to a wide variety of penicillins and cephalosporins.	Contact
Found in: Gram negative organisms - Enterobacteriaceae		
- Klebsiella pneumoniae - Klebsiella oxytoca - Escherichia coli - Citrobacter - Enterobacter	- Morganella - Proteus - Salmonella - Serratia - Shigella	

Carbapenem Resistant Enterobacteriaceae (CRE)

Enterobacteriaceae are a large family of different types of germs (bacteria) that commonly cause infections in healthcare settings.

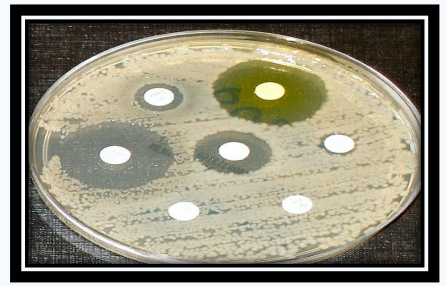
Examples of germs in the Enterobacteriaceae family include Escherichia coli (E. coli) and Klebsiella pneumoniae.

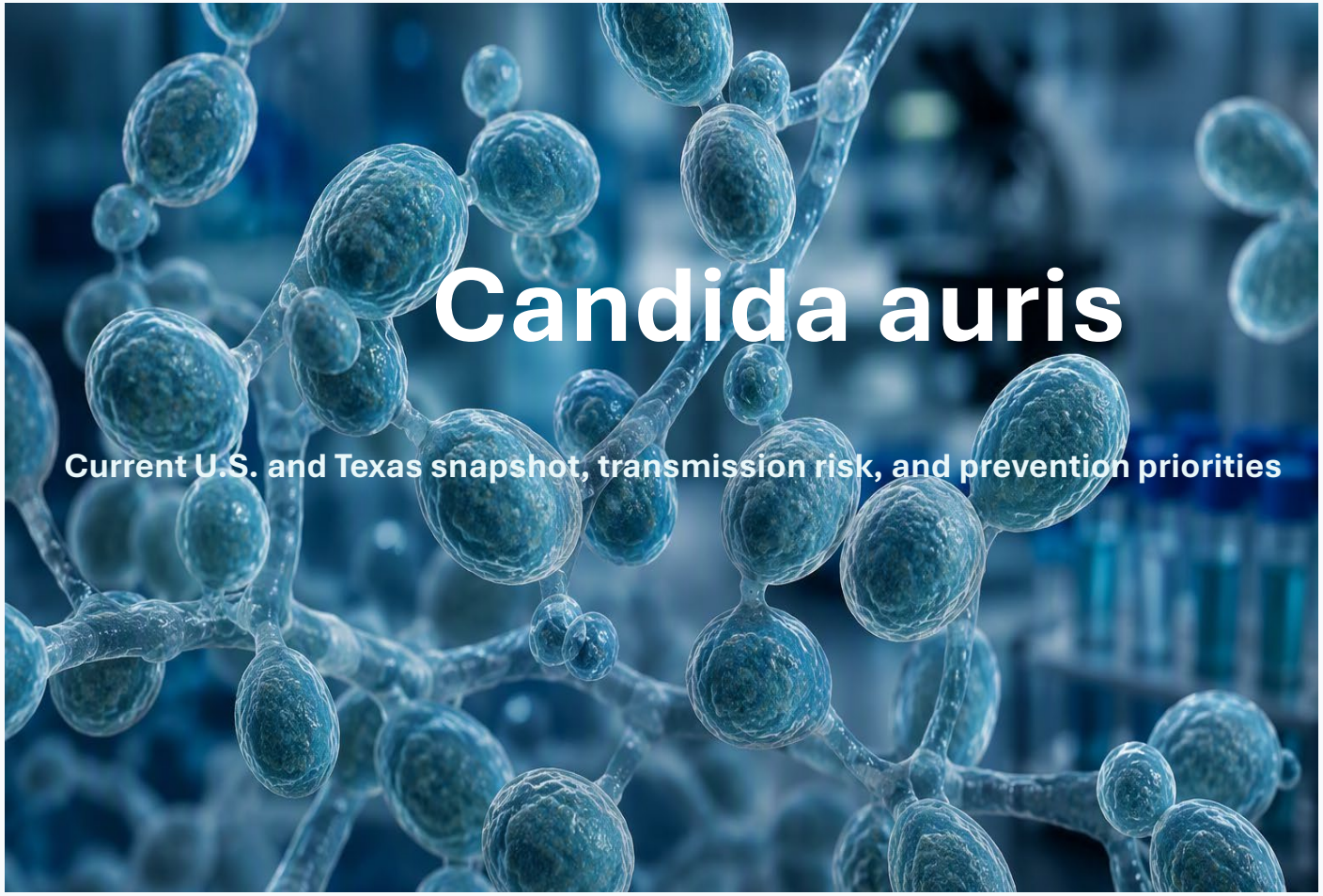
Antibiotic resistance occurs when the germs no longer respond to the antibiotics designed to kill them.

When Enterobacteriaceae develop resistance to the group of antibiotics called carbapenems, the germs are called carbapenem-resistant Enterobacteriaceae (CRE).

CRE are difficult to treat because they do not respond to commonly used antibiotics. Occasionally CRE are resistant to all available antibiotics.

CRE are a threat to public health.





In 2025, there were 8,780 new clinical cases of *C. auris* reported in the United States.

Texas has reported 2,264 cases in Texas from 2016 thru 2025. It is among the states with the highest cumulative clinical cases.

Texas has reported 820 clinical cases for 2026. Data through November 14, 2026.

The drug-resistant fungus spreads easily in healthcare settings and poses the greatest risk to medically vulnerable patients.

Why this matters now

Reported cases remain widespread, and Texas is among the most affected states in the provided summary

6,941

U.S. clinical cases reported

as of November 2026

820

Texas clinical cases reported

as of November 2026

28+

states affected

across more than half of the U.S.

Trend context

- The first U.S. case was reported in 2016; annual cases have continued to increase since then.
- U.S. clinical cases: 6,941in 2026 vs. 6,054 in 2025 nationally (+14.7%).
- U.S. screening cases: 7,584 (Combined clinical/screening cases in 2026 - **Total = 14,525**)
- Texas clinical cases: 820 clinical cases and 1,352 screening/colonization cases of C. auris in 2026.
- **Combined** clinical cases and screening cases is **2,172 in 2026** vs **2,130 in 2025**.

How cases are classified

CDC classification separates symptomatic infection from colonization detected through screening

Clinical cases

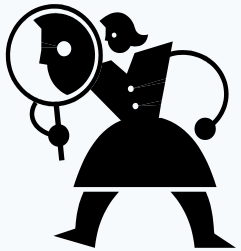
- Positive test after evaluation while symptomatic.
- May include severe or life-threatening infection in medically vulnerable patients.
- Texas: 433 clinical cases as of July 25; updated source report: 438.

Screening cases

- Positive test in a patient who is not currently sick from C. auris.
- Used to identify colonization and guide prevention actions.
- Texas: 715 screening cases as of July 25; updated source report: 743.

Key point: infected and colonized patients can spread C. auris

Communicate MDRO status across the continuum



1. **EHR / flag** — Make the organism and required precautions visible to the care team.
2. **Handoff** — Include organism, specimen site, current precautions, and unresolved actions.
3. **Transport** — Notify receiving department before movement; contain drainage or secretions.
4. **Transfer** — Notify the receiving facility before transfer and include relevant documents.
5. **Patient / family** — Explain what the MDRO means and how to reduce spread without blame.



Communication is an infection-prevention intervention.

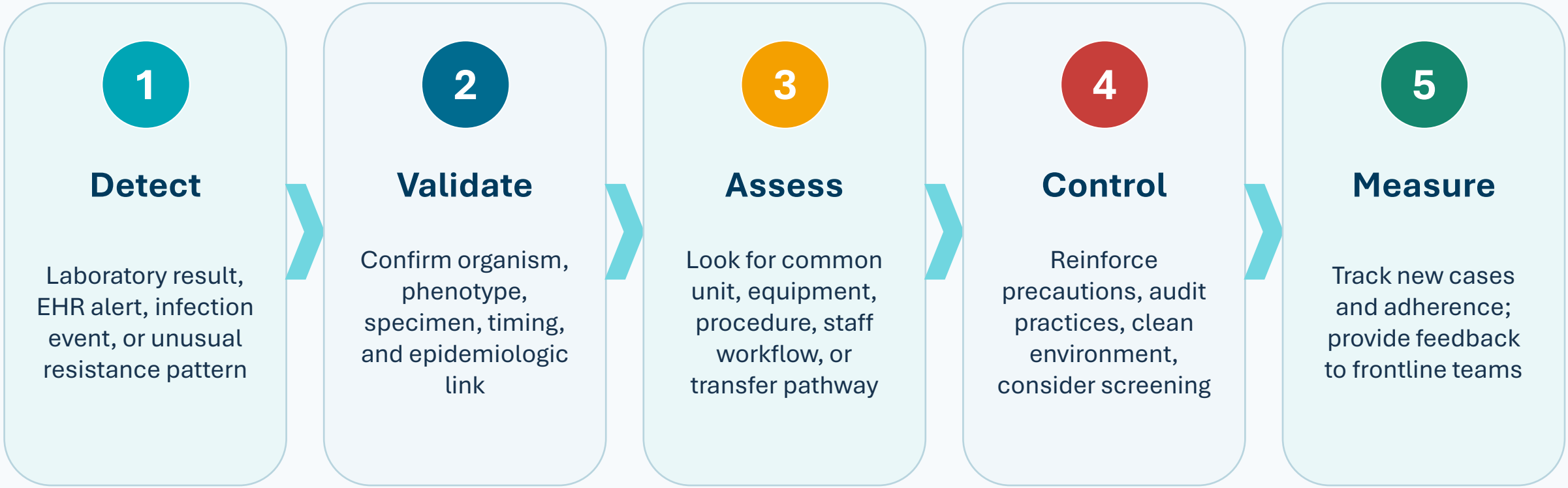
Antimicrobial stewardship reduces selection pressure

RIGHT



- Obtain cultures when indicated before antibiotics, without delaying urgent therapy
- Reassess diagnosis and microbiology at 48–72 hours
- De-escalate, stop, or shorten therapy when clinically appropriate
- Avoid treating colonization or contamination as infection

Surveillance turns signals into action



Escalate suspected clusters and novel/targeted resistance promptly to Infection Prevention and Microbiology.

Case: what would you do first?

A patient transfers from another facility. A culture later identifies a carbapenemase-producing Enterobacterales. The patient has a draining wound and has already visited imaging.

What are your first 5 actions?

1. Place appropriate precautions and contain drainage
2. Notify Infection Prevention and the clinical team
3. Verify EHR flag and prior facility information
4. Identify locations, equipment, and contacts
5. Ensure cleaning and receiving-area communication

Key takeaways

Prevent

Standard Precautions are the foundation. Add organism-specific controls when indicated.

Detect

Use microbiology, clinical context, and surveillance trends.

Communicate

Make MDRO status visible in the EHR, handoffs, transport, and transfers.

Protect

Clean hands, equipment, and the environment. Use antimicrobials wisely.

Every discipline can interrupt the chain of transmission.

References and local resources

- CDC. Multidrug-resistant Organisms (MDRO) Management Guidelines.
- CDC. Core Infection Prevention and Control Practices for Safe Healthcare Delivery in All Settings.
- CDC. Standard Precautions and Transmission-Based Precautions.
- CDC. Antimicrobial Resistance Facts and Stats. Updated February 4, 2025.
- CDC. Antimicrobial Resistance & Patient Safety Portal. Updated January 30, 2026.
- IDSA. 2026 Guidance on the Treatment of Antimicrobial-Resistant Gram-Negative Infections.
- UT Southwestern. UHIC 13 Prevention and Management of VISA and VRSA, 2026.
- UT Southwestern. Current Standard and Transmission-Based Isolation Precautions and MDRO policies.

Always follow the current institutional policy and Infection Prevention guidance.

Isolation Precautions

Contact Precautions for every admission examples:

- CRE (Carbapenem-resistant or Carbapenemase-Producing Enterobacteriaceae)
- MDR-AB (Multidrug Resistant Acinetobacter)
- VISA (Vancomycin Intermediate Staphylococcus aureus)
- VRSA (Vancomycin Resistant Staphylococcus aureus)
- MRSA (Active Infections)
- VRE (Active Infections)
- Note: Colonized patients with MRSA/VRE do not require contact isolation.

Contact Precautions for current admission examples:

- Uncontained body fluids (e.g., leaking, incontinent, draining wounds)
- Uncontained respiratory secretions (e.g., trach)
- Scabies and Lice (until 24 hours after effective treatment)

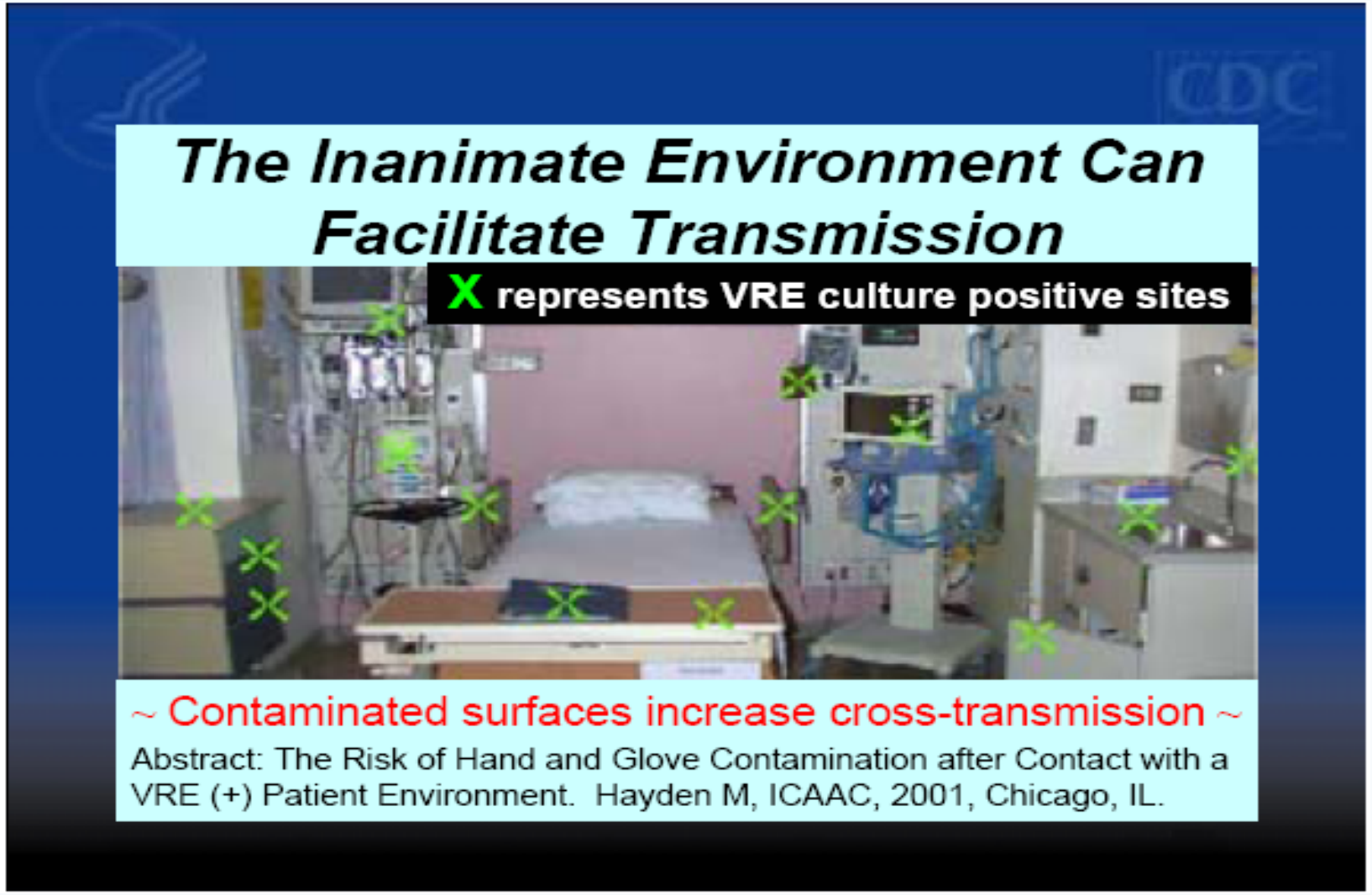


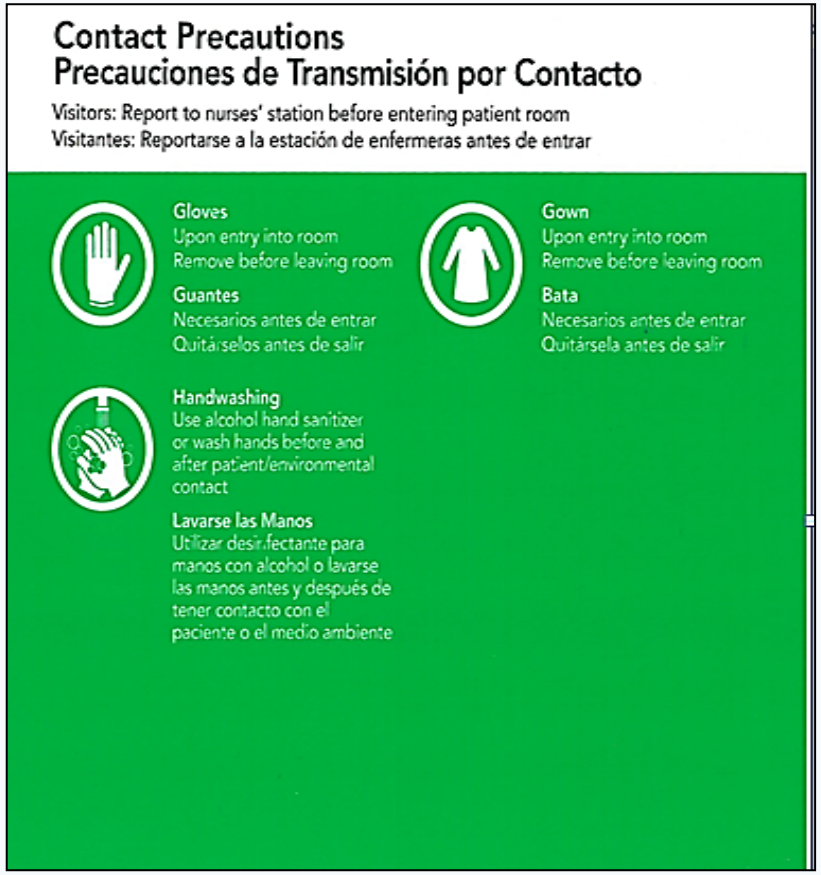
Environmental Survival Rates



• Influenza	24-48 hrs.	• Hepatitis B	7 days
• MRSA	7 months	• Norovirus	3 wks
• VRE	58 days	• SARS	24-72 hrs.
• *Acinetobacter*	5 months	• Candida sp.	3 days
• *C. difficile*	5 months	• Parainfluenza	10 hrs.
• *Pseudomonas*	7 hours	• Rotavirus	3 months

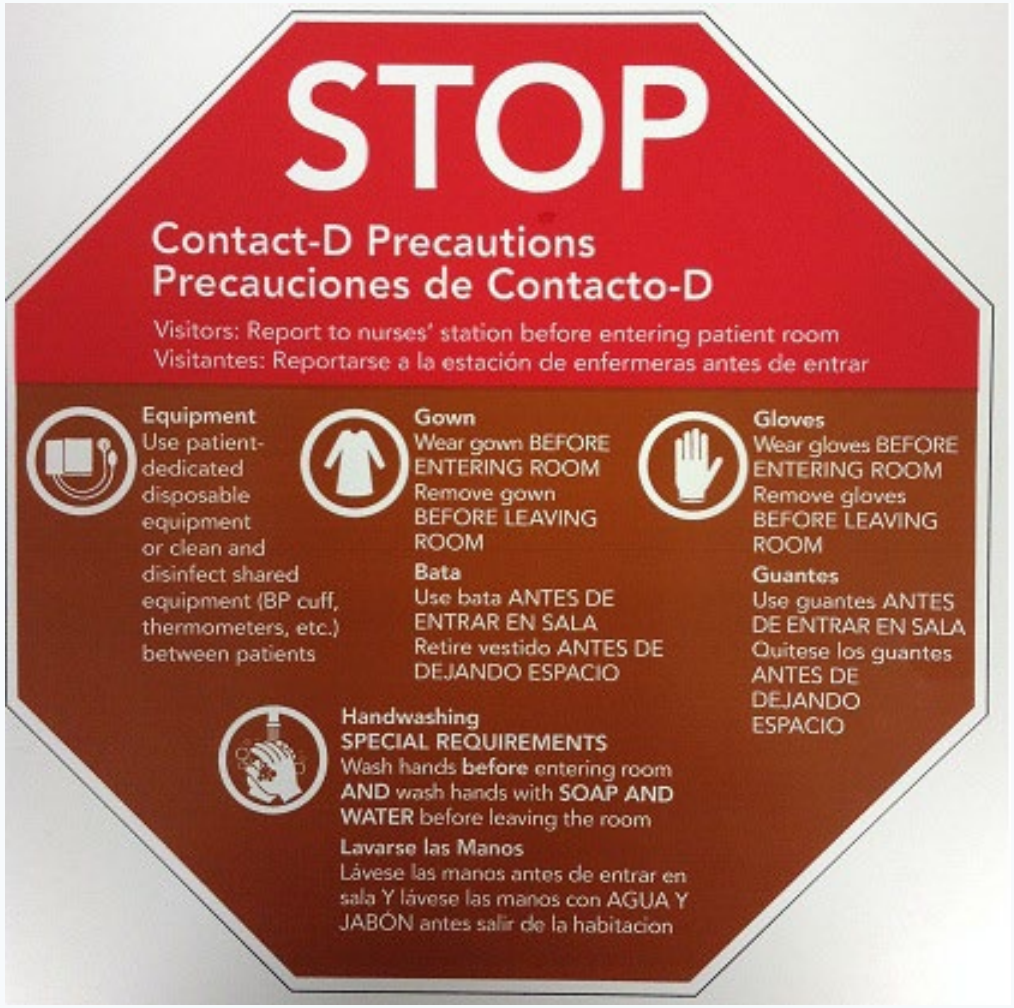
Touching the PATIENT isn't the only way to become contaminated with an MDRO!





Contact Isolation Precautions Sign

	Contact
Sign Color	Fluorescent Green
Type of Bug Isolated	MRSA VRE Clostridium difficile Lice Scabies
Procedure for Isolation	**Wash Hands** Don **Gown & Gloves** BEFORE entering room REMOVE **Gown & Gloves** BEFORE leaving room **Wash hands--** Soap & water only if C. diff, otherwise use alcohol foam when leaving room



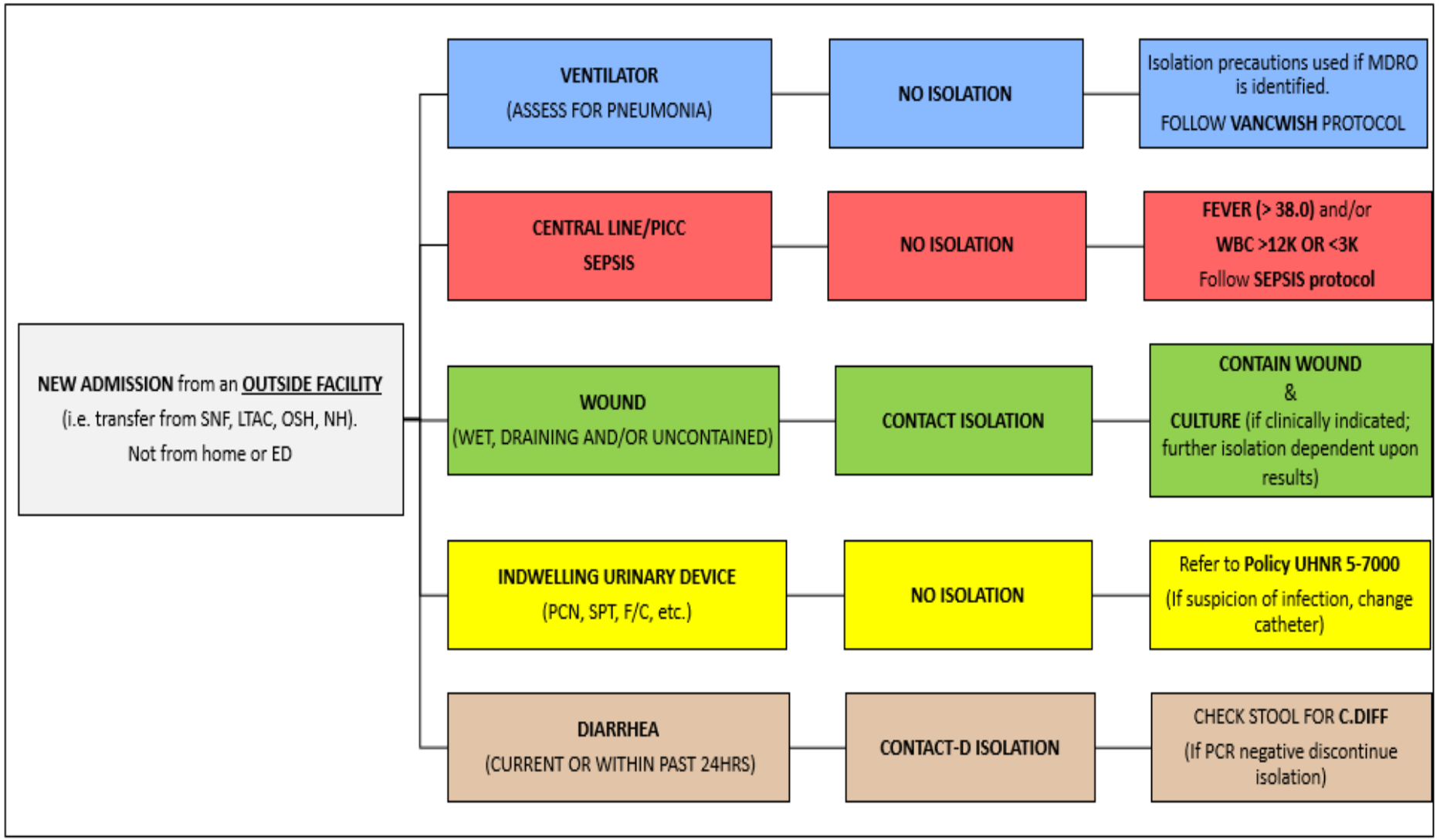
Contact Precautions

+

Use <u>ONLY</u> soap & water to wash hands

	C. difficile
Sign Color	Red Stop Sign
Type of Organism Isolated	Clostridium difficile
Procedure for Isolation	**Wash Hands** Don **Gown & Gloves** BEFORE entering room REMOVE **Gown & Gloves** BEFORE leaving room **Wash hands-- <u>SOAP & WATER ONLY</u>** when leaving room

MDRO SCREENING ALGORITHM



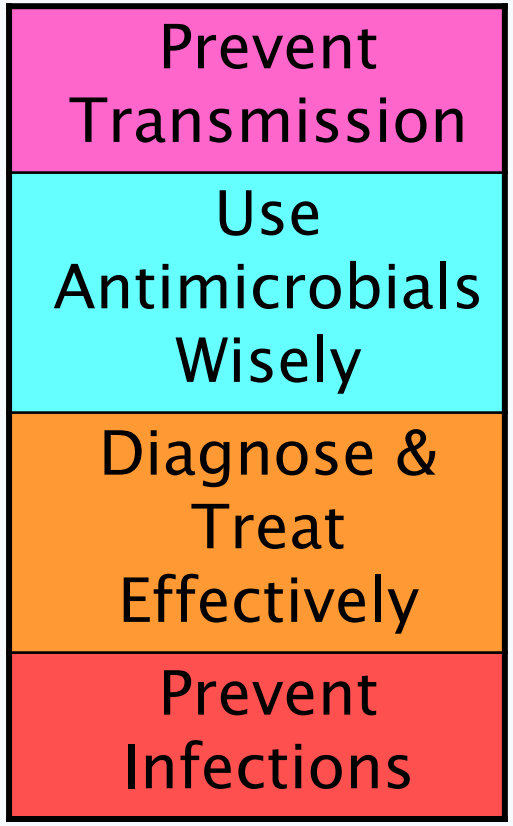
Removing Patients From Isolation

Patients may only be removed from isolation by the Infection Prevention Department or by Infectious Disease faculty note or order.

- For C. diff patients – isolation may be removed when the signs and symptoms have resolved and the antibiotic therapy has been completed.
- Patient must be transferred to a clean room prior to removing the isolation status for C. diff.
- Notify Infection Prevention to Remove Isolation Status from EPIC.
- MRSA and VRE colonized patients will no longer be placed on contact isolation.
- For any patient who has had a positive MRSA or VRE infection greater than 6 months, isolation can be discontinued as long as there are no current wounds, ulcers, sores, or evidence of an active infection.

Note: Colonization is defined as a positive MRSA from nasal screen/culture or a VRE positive rectal screen/culture without evidence of active infection.

12 Steps to Prevent Antimicrobial Resistance: Hospitalized Adults



12 Contain your contagion

11 Isolate the pathogen

10 Access the experts

9 Educate your patients

8 Avoid use for inappropriate indications

7 De-escalate/stop antibiotics

6 Optimize antibiotic administration

5 Observe antibiotic “best practices”

4 Practice antimicrobial control

3 Target the pathogen

2 Get the catheters out

1 Vaccinate

Prevent Infection: Get the catheters out

Fact: Catheters and other invasive devices are the #1 exogenous cause of hospital-onset infections.

Actions:



- ✓Use catheters only when essential
- ✓Use the correct catheter
- ✓Use proper insertion & catheter-care protocols
- ✓Remove catheters when not essential



Prevent Transmission:
Contain Your Contagion

Fact: Healthcare personnel spread antimicrobial-resistant pathogens from patient-to-patient.





Use Antimicrobials Wisely

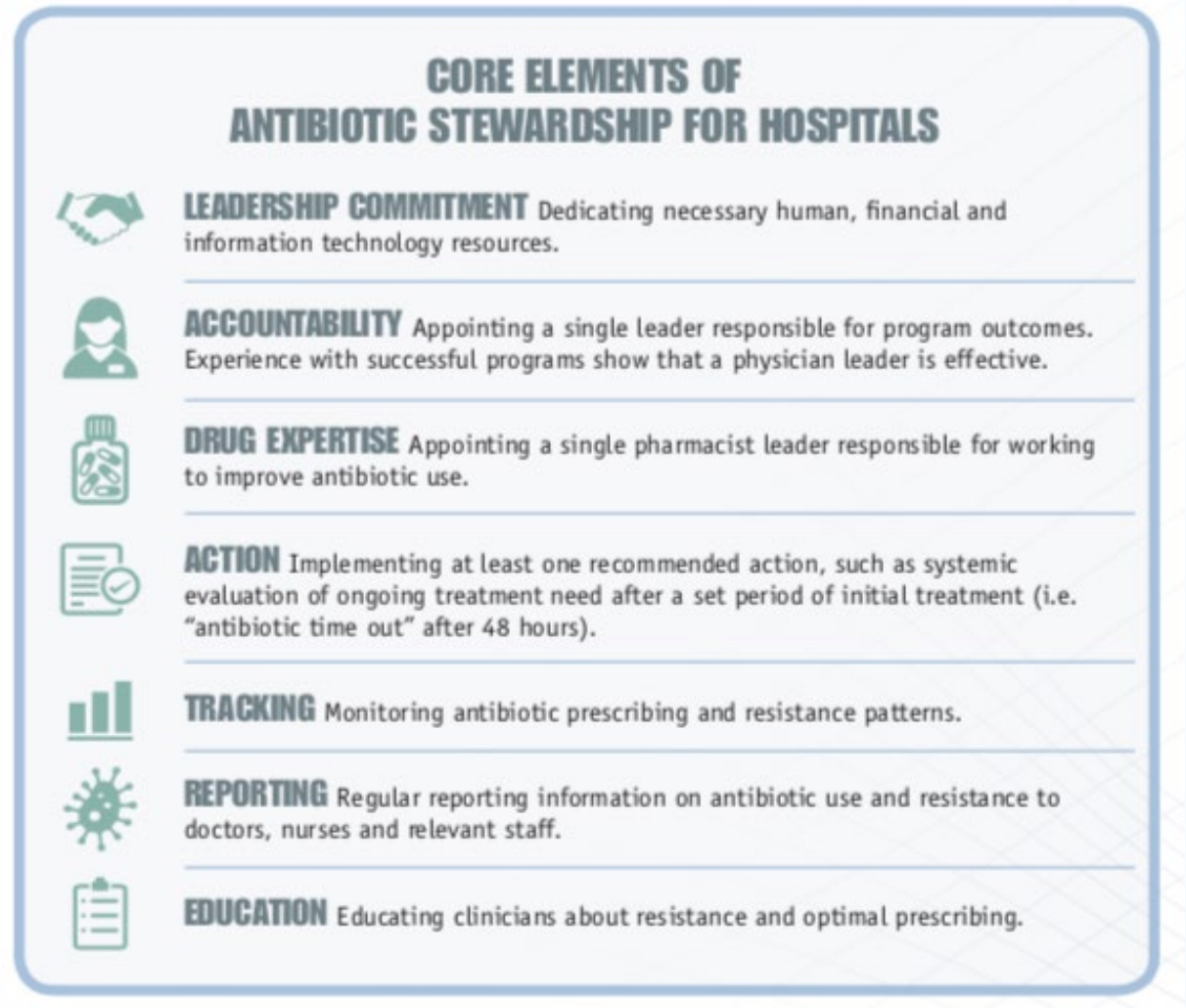
What is stewardship?

- What is antimicrobial stewardship?
  - An effort to promote best antimicrobial practices, by ensuring the right drug is used for the right bug, at the right dose, for the right duration.
  - The primary goal is to improve patient outcomes, while simultaneously decreasing toxicity, antimicrobial resistance, *C. difficile* infections, and cost

Right DRUG for Right BUG,
Right TIME and Right DOSE for
the Right DURATION

Use Antimicrobials Wisely

What are the core elements of stewardship?



Use Antimicrobials Wisely

Observe antibiotic “best practices”

