Multidrug-Resistant Organisms and the Complicated Webs They Weave

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VERMONT
DEPARTMENT OF HEALTH

Vermont Immunization & Infectious Disease Conference
Hotel Champlain, Burlington, VT
May 21, 2025
Session III – From Viruses to Superbugs: Unraveling Infectious Disease Outbreaks and Investigations
Speakers: Laura Ann Nicolai, MPH, Christine Connor, MSN, MPH, RN, Allison Lafferty, MD, and John Davy, PhD

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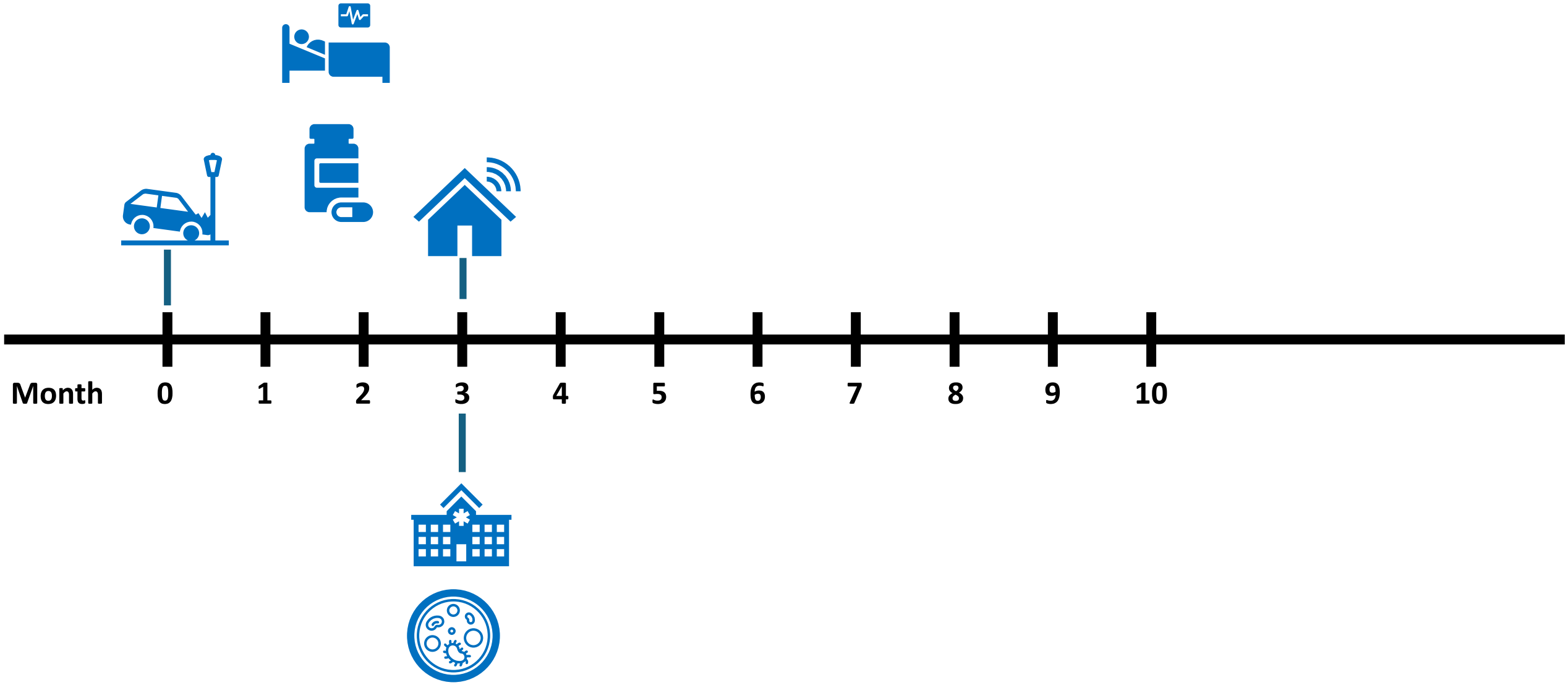
In support of improving patient care, this activity has been planned and implemented by The Robert Larner College of Medicine at the University of Vermont is jointly accredited by the Accreditation Council for Continuing Medical Education (ACCME) and the American Nurses Credentialing Center (ANCC), to provide continuing education for the healthcare team.

The University of Vermont designates this live activity for a maximum of 5.0 *AMA PRA Category 1 Credit(s)*™. Physicians should claim only the credit commensurate with the extent of their participation in the activity.

This program has been reviewed and is acceptable for up to 5.0 Nursing Contact Hours.

As a Jointly Accredited Organization, The Robert Larner College of Medicine at the University of Vermont is approved to offer social work continuing education by the Association of Social Work Boards (ASWB) Approved Continuing Education (ACE) program. Organizations, not individual courses, are approved under this program. State and provincial regulatory boards have the final authority to determine whether an individual course may be accepted for continuing education credit. The University of Vermont maintains responsibility for this course. Social workers completing this course receive 5.0 ethics continuing education credits.

This activity was planned by and for the healthcare team, and learners will receive 5.0 Interprofessional Continuing Education (IPCE) credit for learning and change.



PM’s Clinical Course Summary

Wound Culture results revealed 3 bacteria with significant resistance patterns

<u>3 CRO (Carbapenem resistant organisms)</u>

1. Enterobacter cloacae Complex
2. Klebsiella Pneumoniae
3. Pseudomonas Aeruginosa

CPO (Carbapenemase Producing Organisms)

1. OXA48, NDM
2. OXA48, NDM
3. VIM

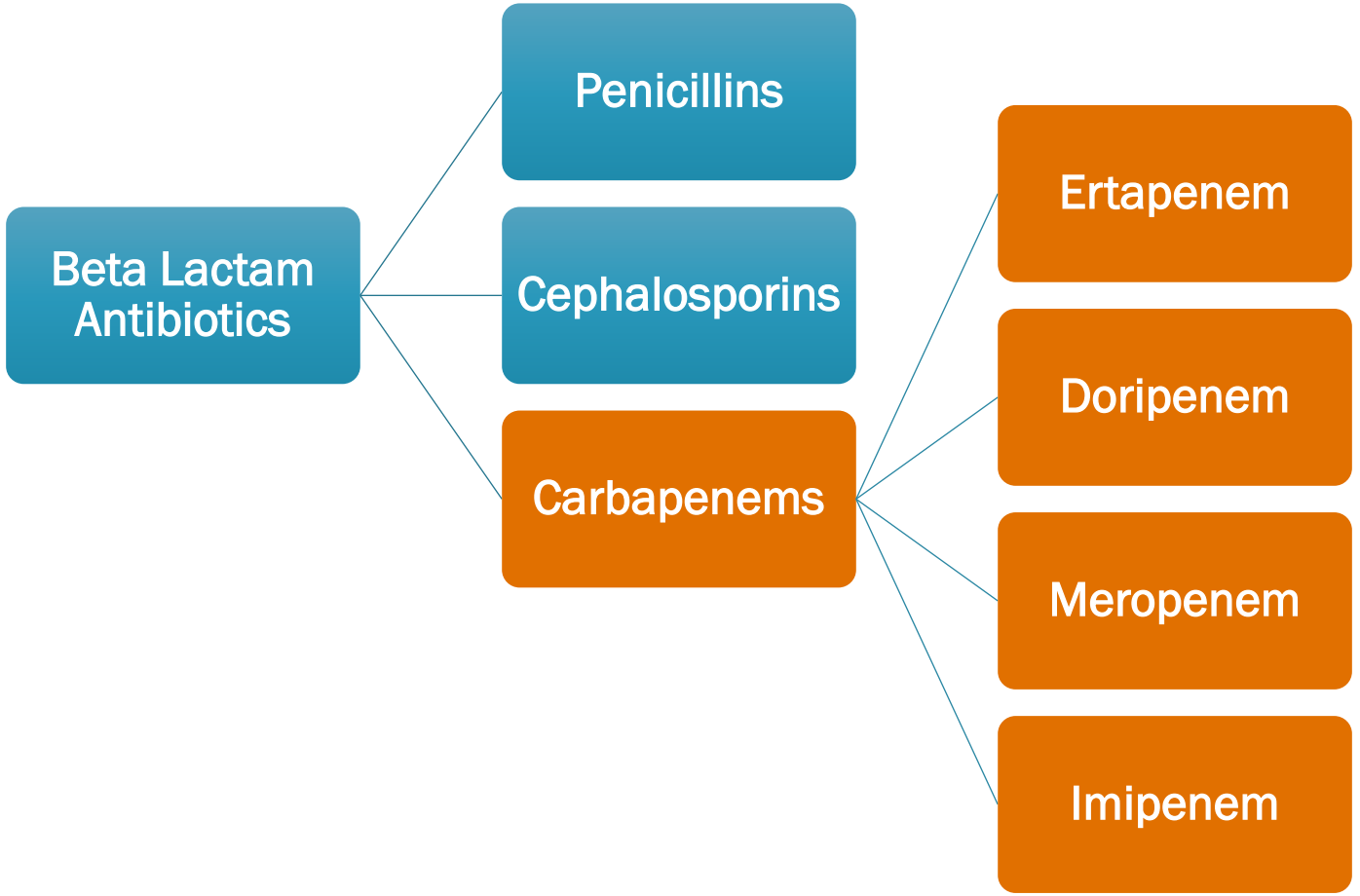
Questions you might be asking yourself at this point?

1. What are these organisms?

2. What are the resistance mechanisms and how do they work?

3. How significant is the impact of these pathogens?

Carbapenems



What are Reportable CROs (carbapenem resistant organisms)?

CRE	Carbapenem-resistant Enterobacterales
CRPA	Carbapenem-resistant *Pseudomonas aeruginosa*
CRAB	Carbapenem-resistant *Acinetobacter baumannii*

Carbapenemase-producing CRO (CP-CRO/CPO)

Non-CP-CRO

CP-CRO

What are the carbapenemases we test for?

KPC	Klebsiella pneumoniae carbapenemase
NDM	New Delhi metallo beta lactamase
IMP	Imipenemase
VIM	Verona Integron Metallo-beta-lactamase
OXA-48	Oxcillinase-48

Results

3 CRO (Carbapenem resistant organisms)

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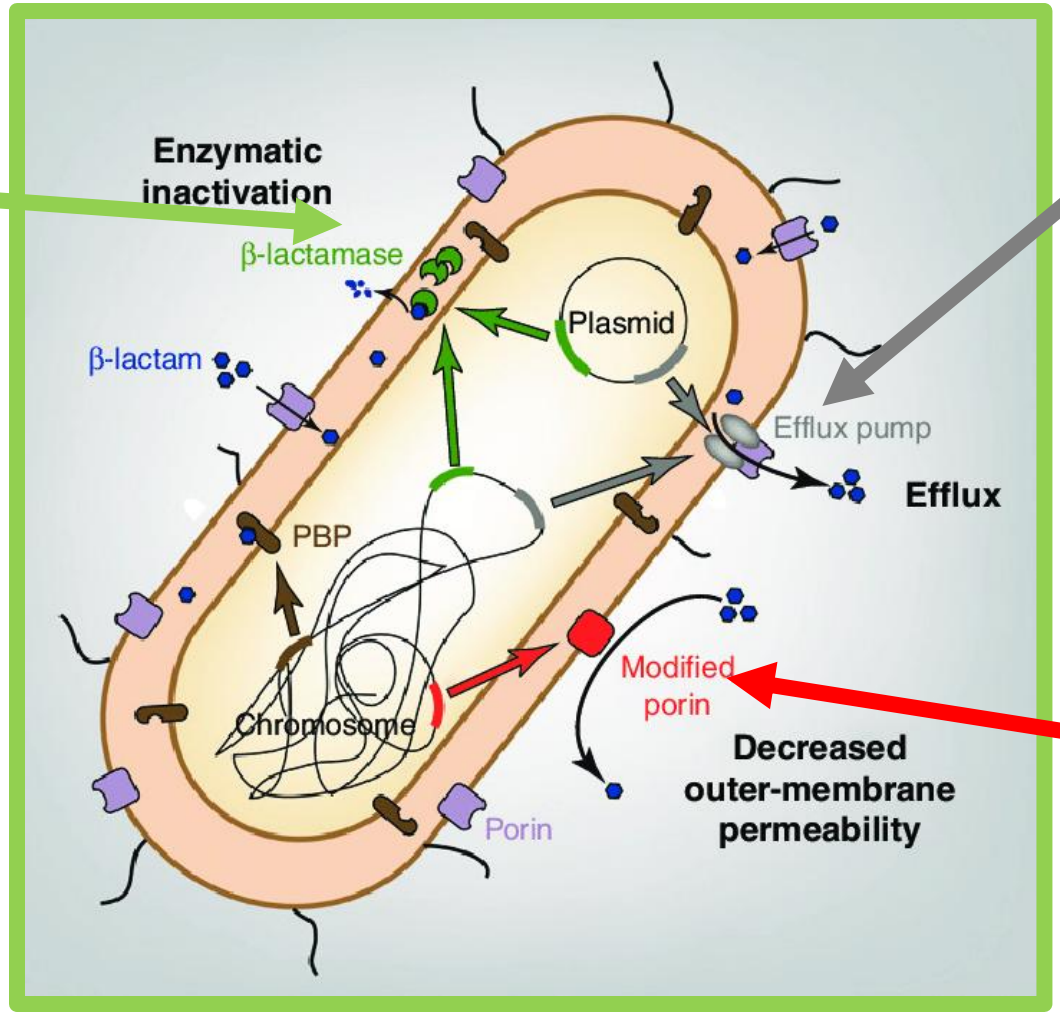
Mechanisms responsible for facilitating antibiotic resistance

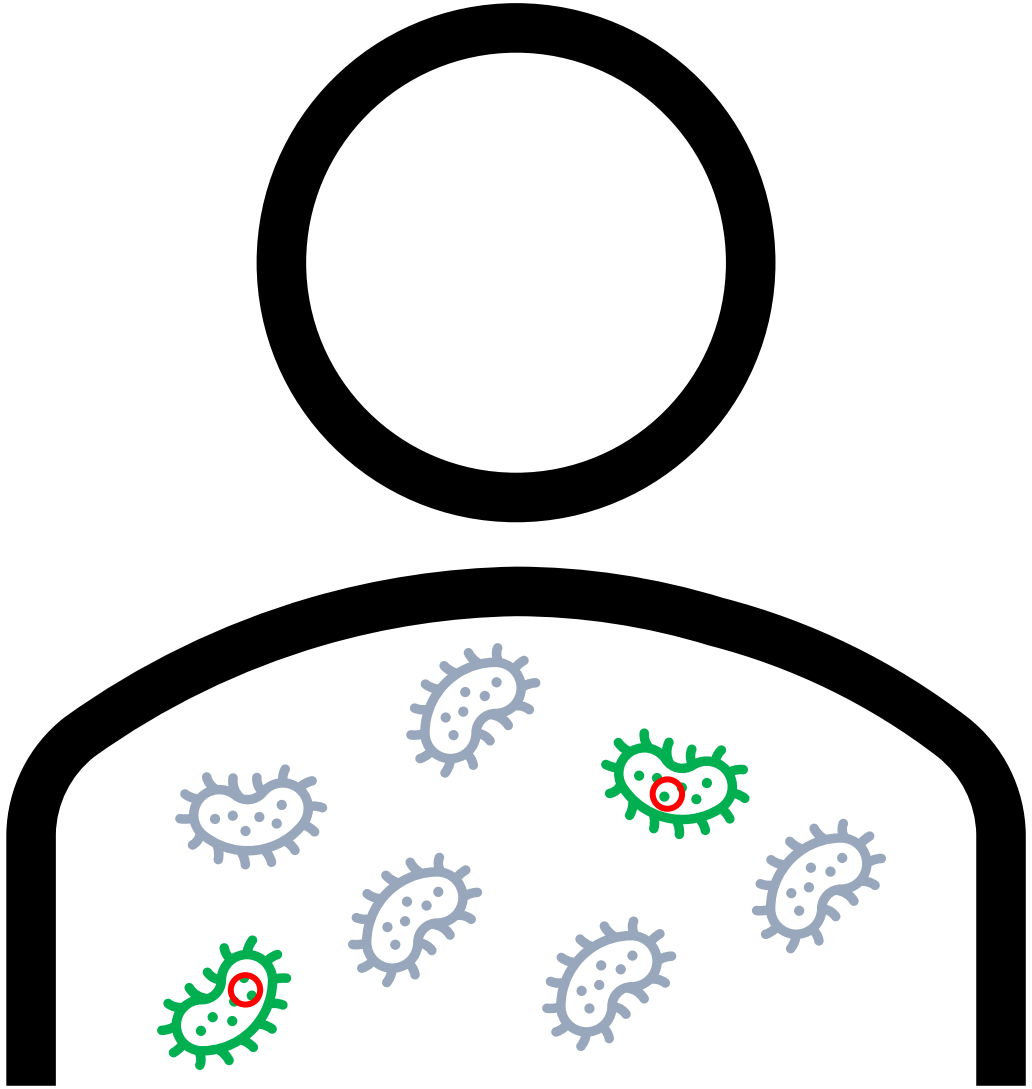
Carbapenemase
Enzyme Production



Efflux Pump
Overexpression

Porin Channel
Loss/Modification

CPOs are especially concerning because they can transfer the carbapenem resistance to other bacteria in a patient's body.



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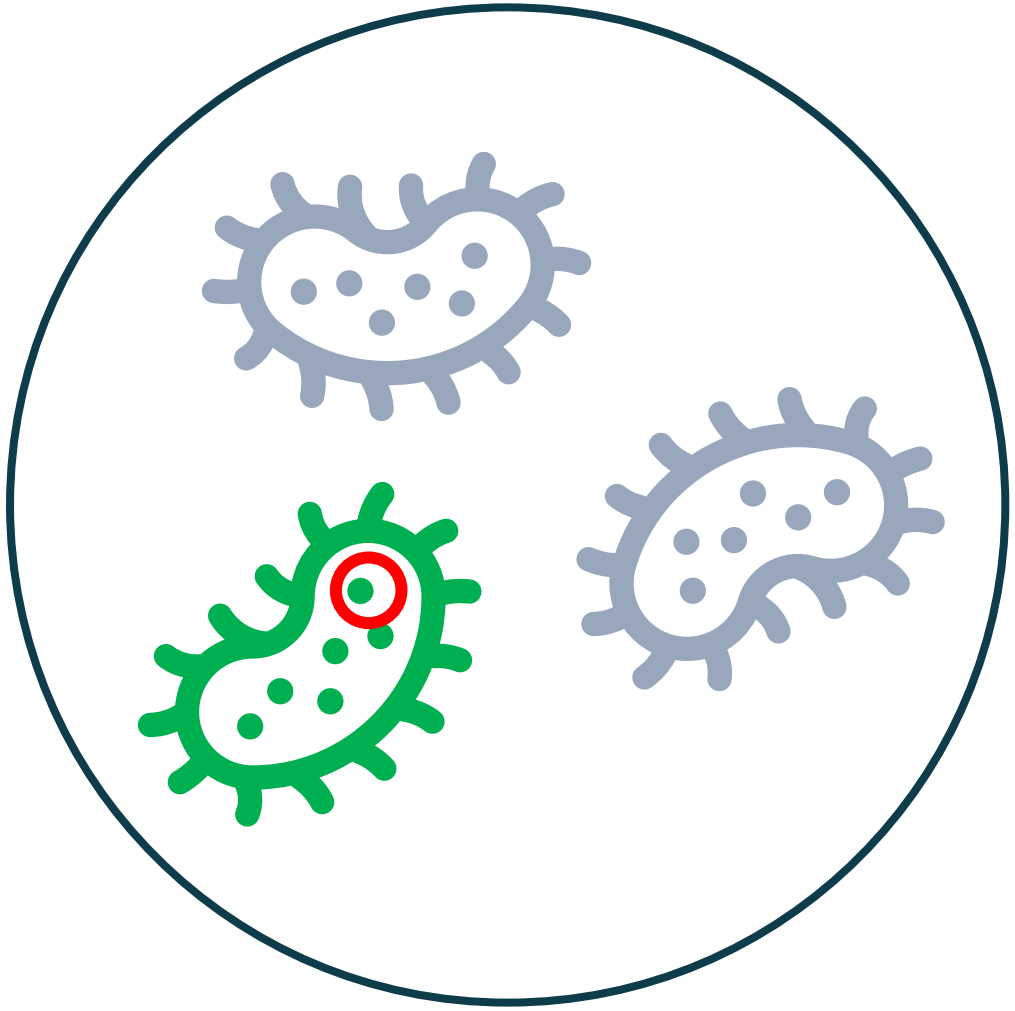

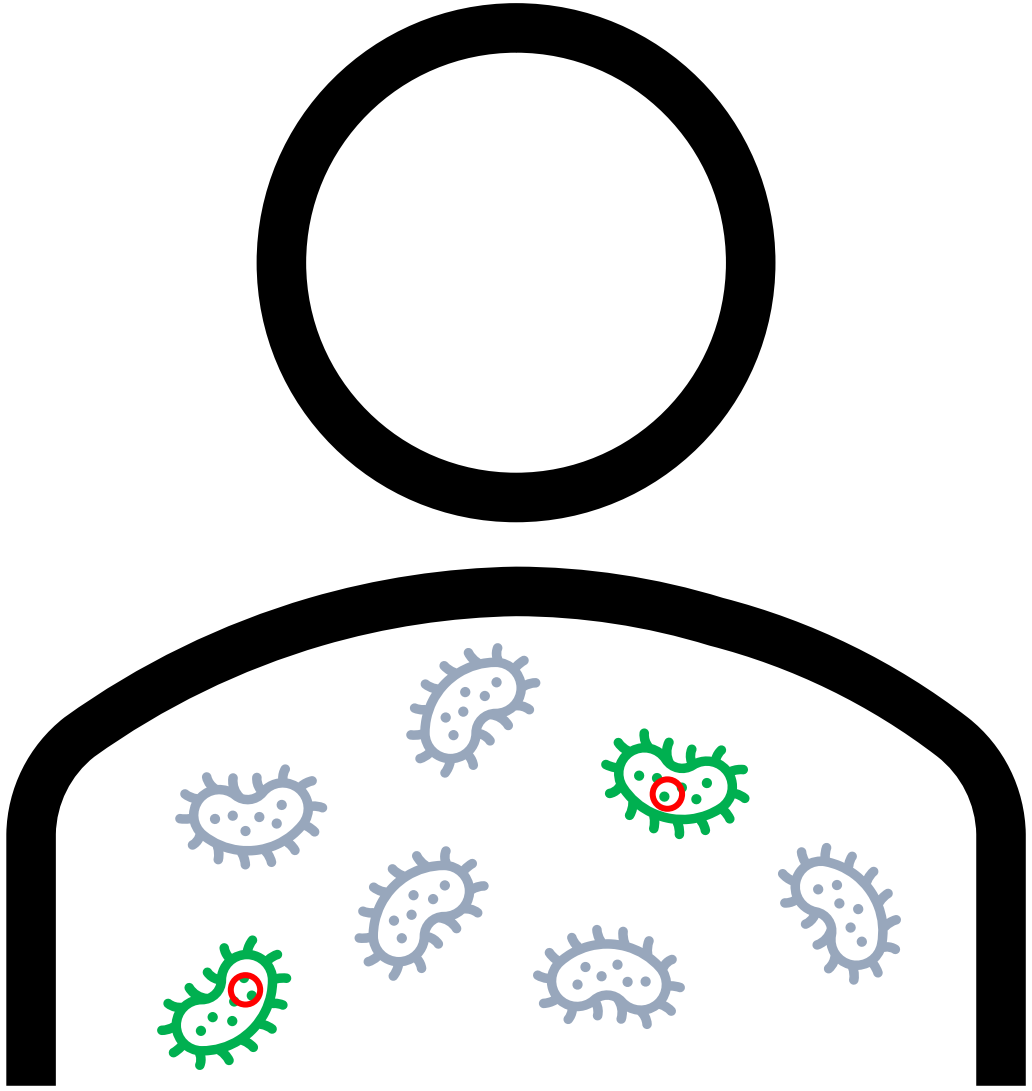

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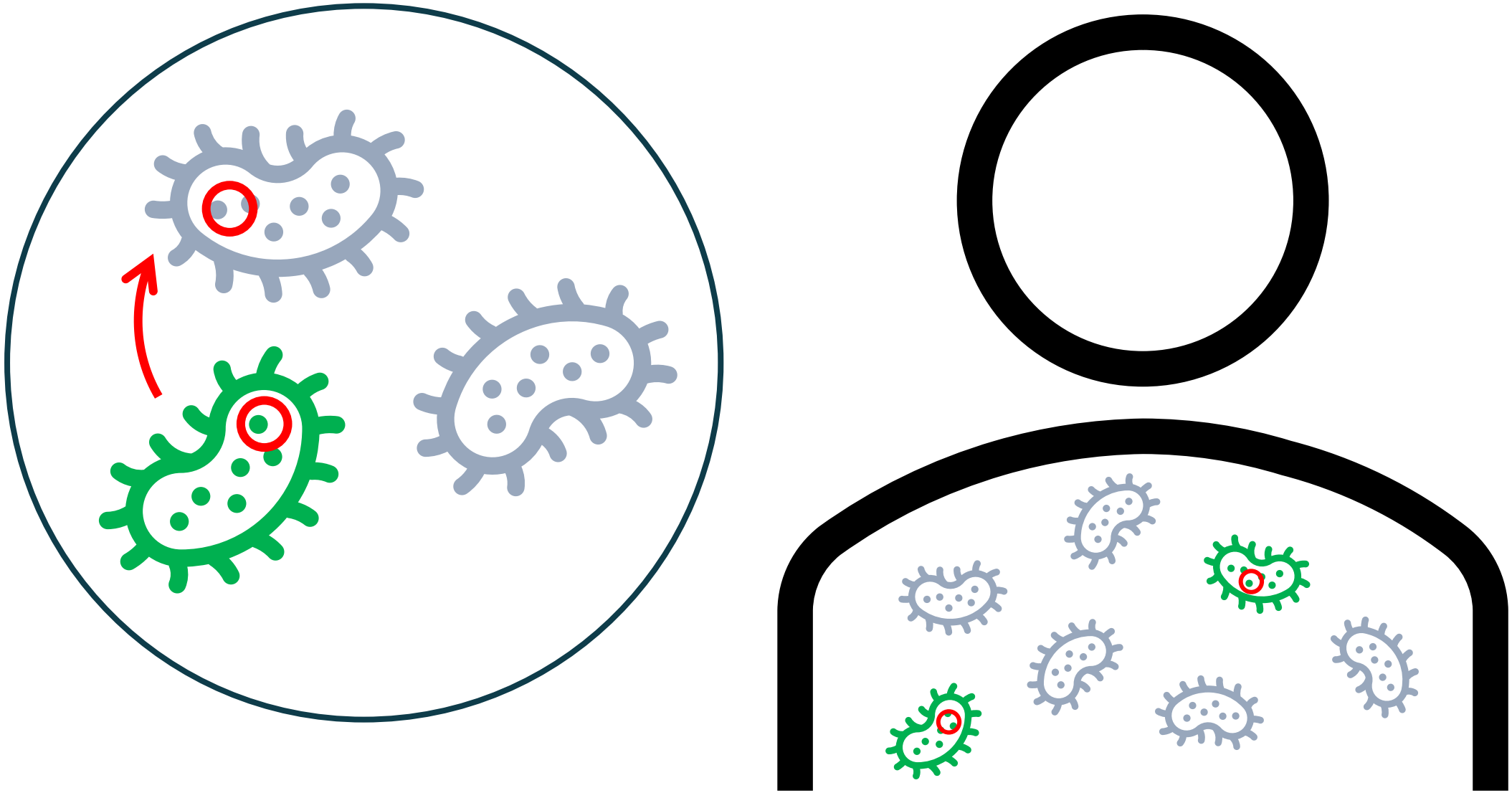

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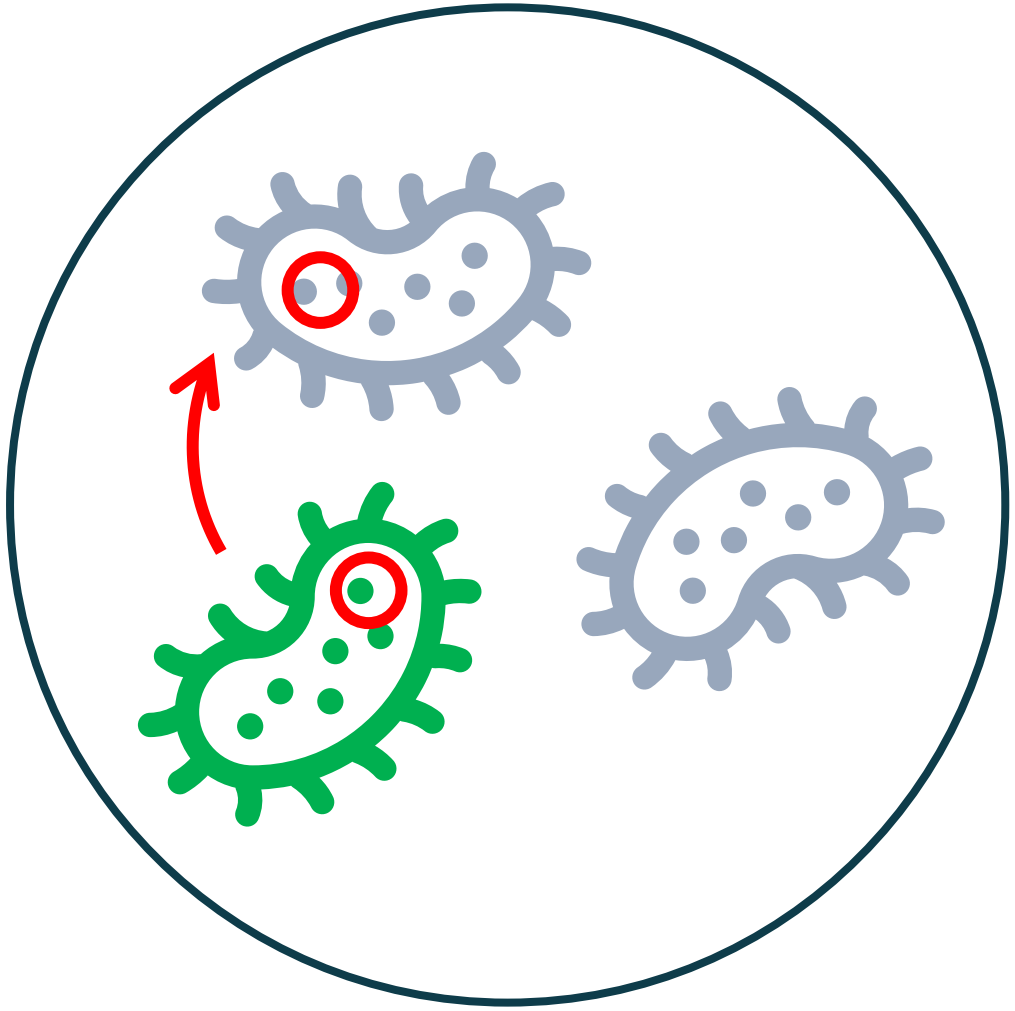
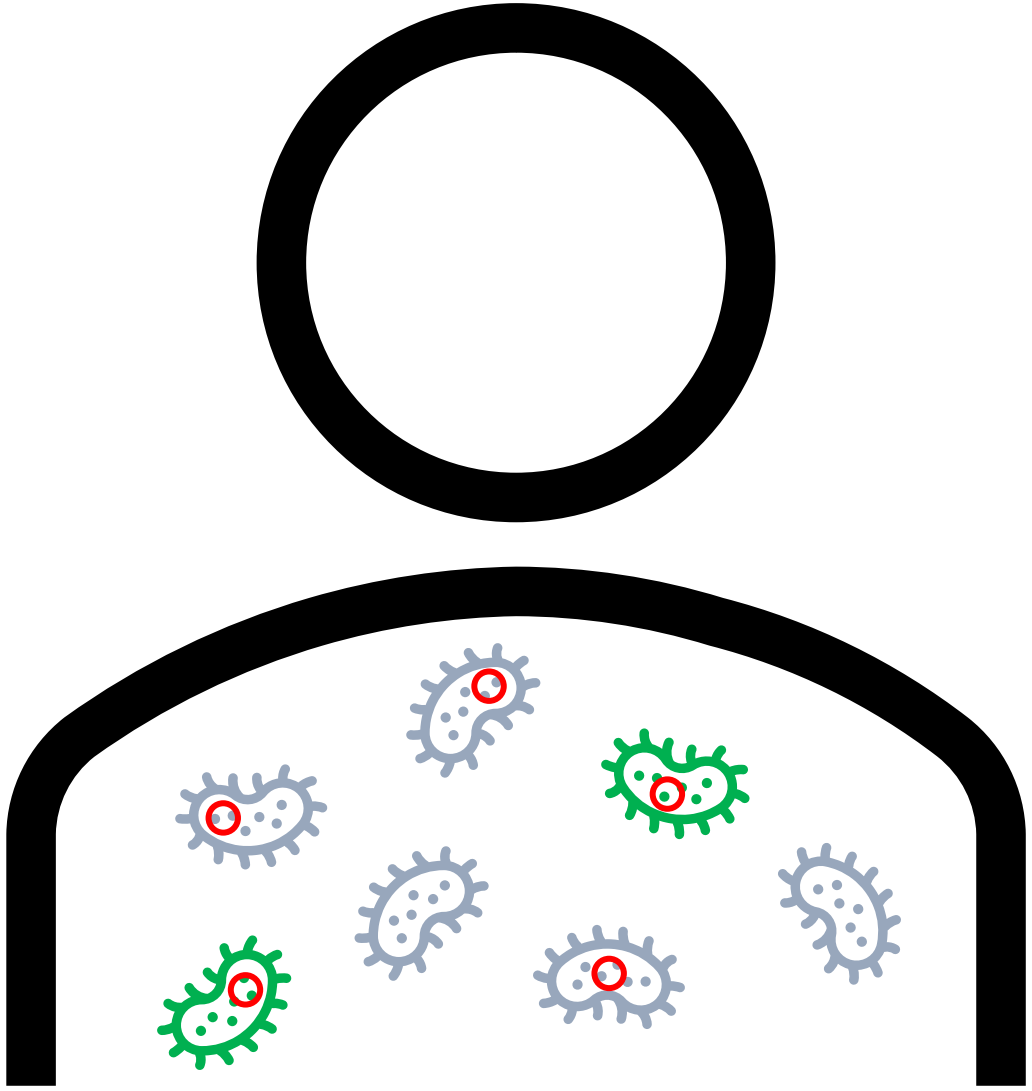
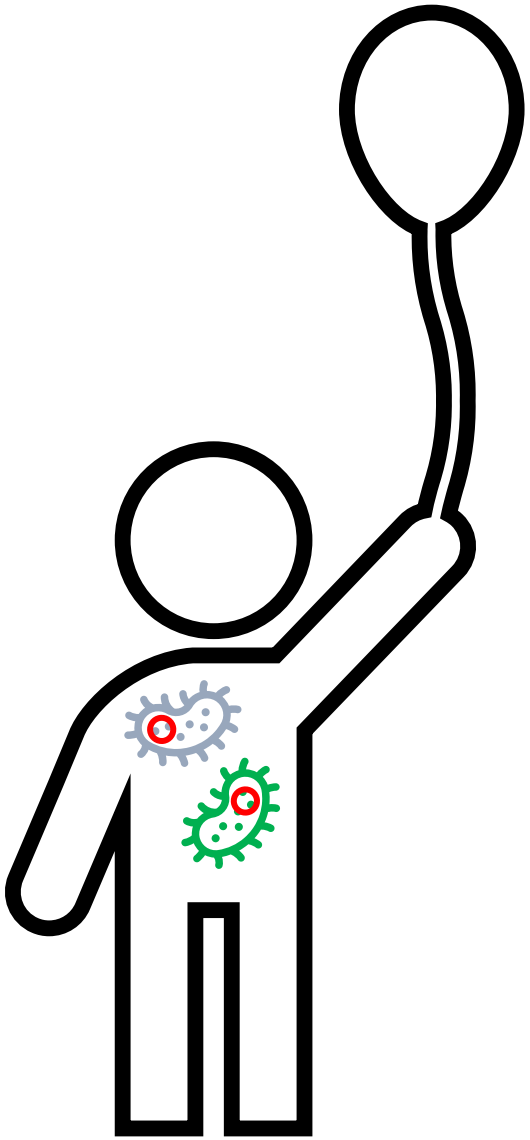




Once a person is infected with a CPO, they are colonized for life.



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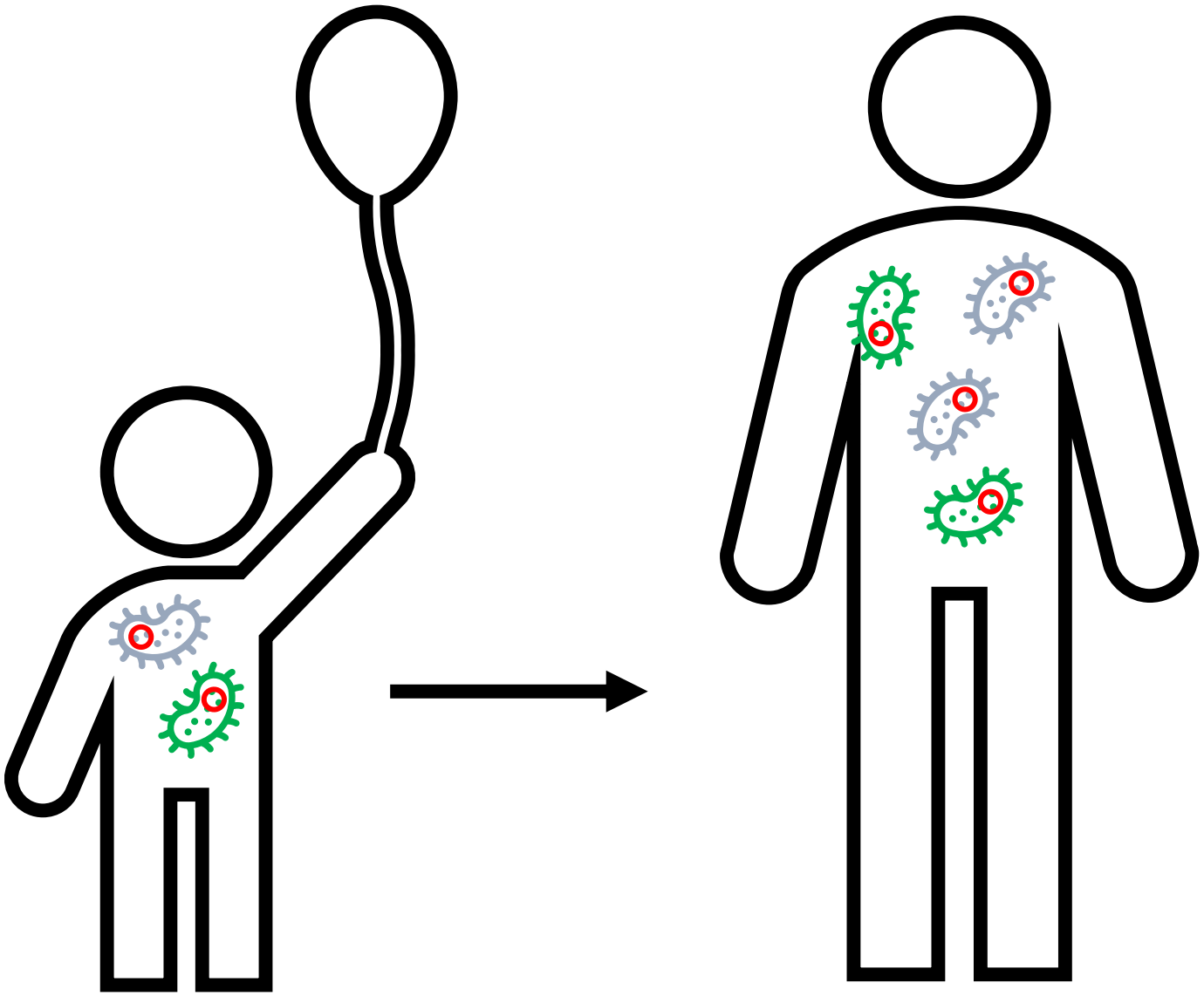

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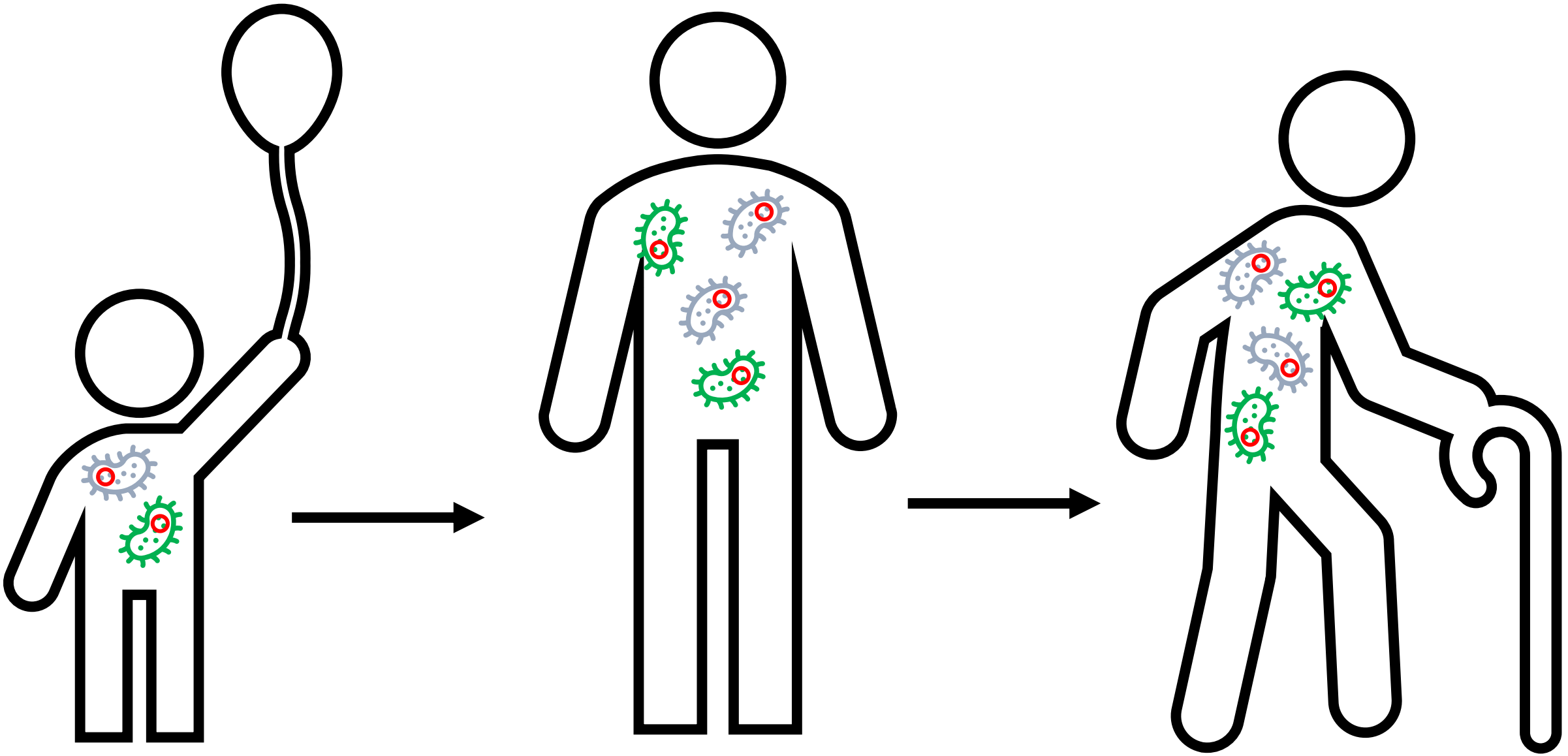

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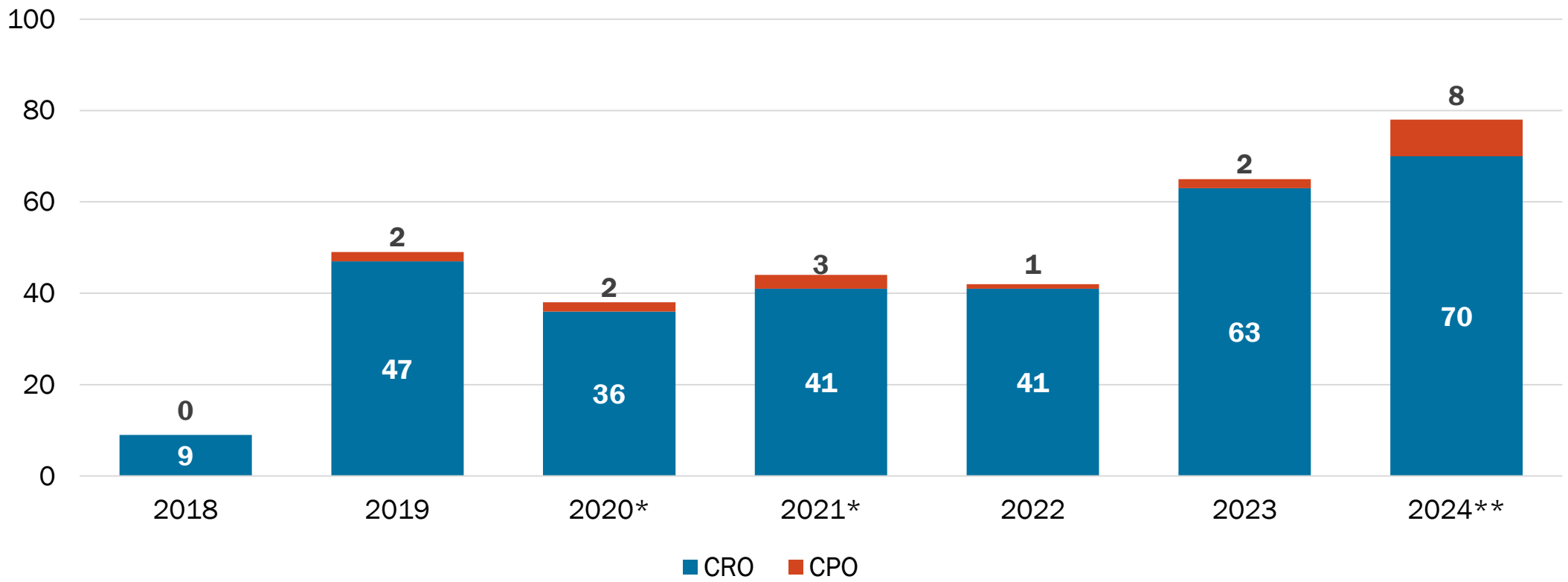
Carbapenem-Resistant Organisms (CRO) and Carbapenemase-Producing Organisms (CPO) in Vermont Residents 2018-2024



*Pandemic years – reporting may be incomplete

**Preliminary

Read data notes

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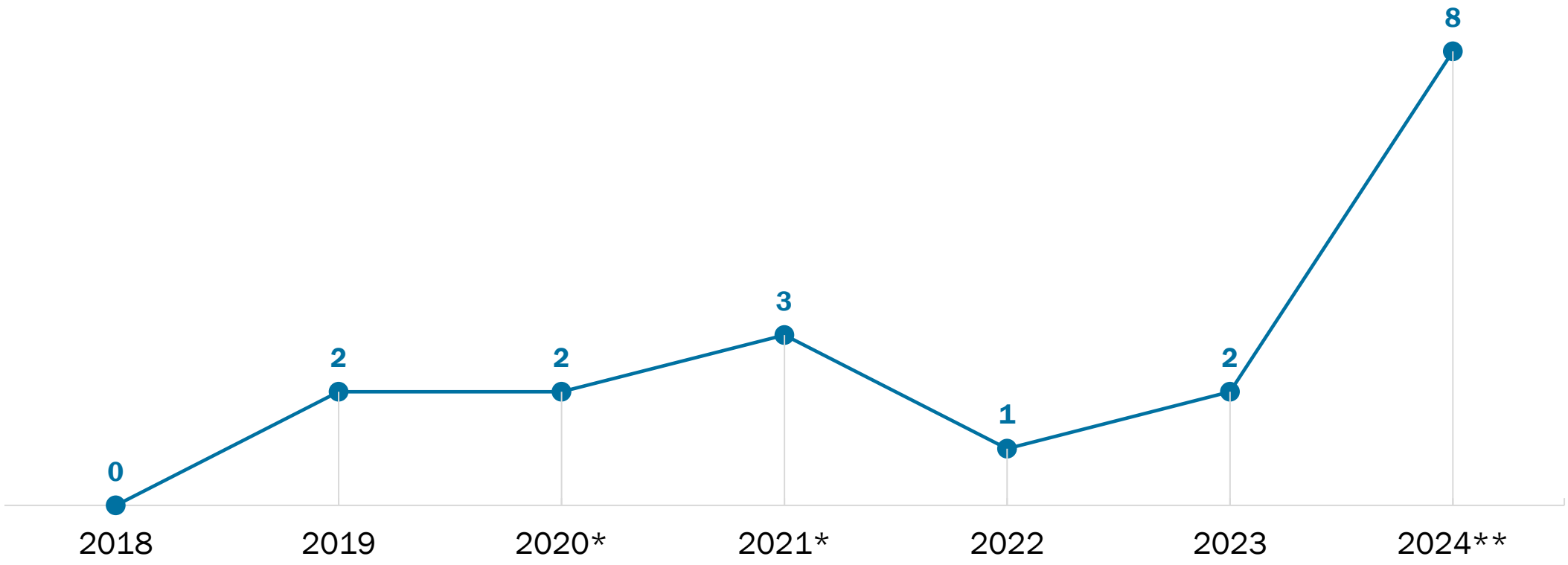
Carbapenemase-Producing Organisms (CPO) Identified in Vermont Residents by Year, 2018-2024



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**Preliminary

Read data notes

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The Threat of Antibiotic Resistance in the United States

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

New National Estimate*

Antibiotic-resistant bacteria and fungi cause at least an estimated:

2,868,700 infections

35,900 deaths

+

***Clostridiodes difficile* is related to antibiotic use and antibiotic resistance: ***

223,900 cases

12,800 deaths

New Threats List

Updated urgent, serious, and concerning threats—totaling 18

5 urgent threats

2 new threats

NEW:
Watch List with 3 threats

Antibiotic resistance remains a significant One Health problem, affecting humans, animals, and the environment.

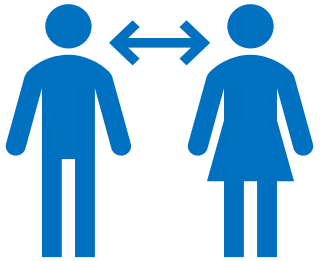
* *C. diff* cases from hospitalized patients in 2017

www.cdc.gov/DrugResistance/Biggest-Threats

Transmission is strongly associated with health care settings.

Healthcare Transmission

Contaminated surfaces



Colonization precedes infection

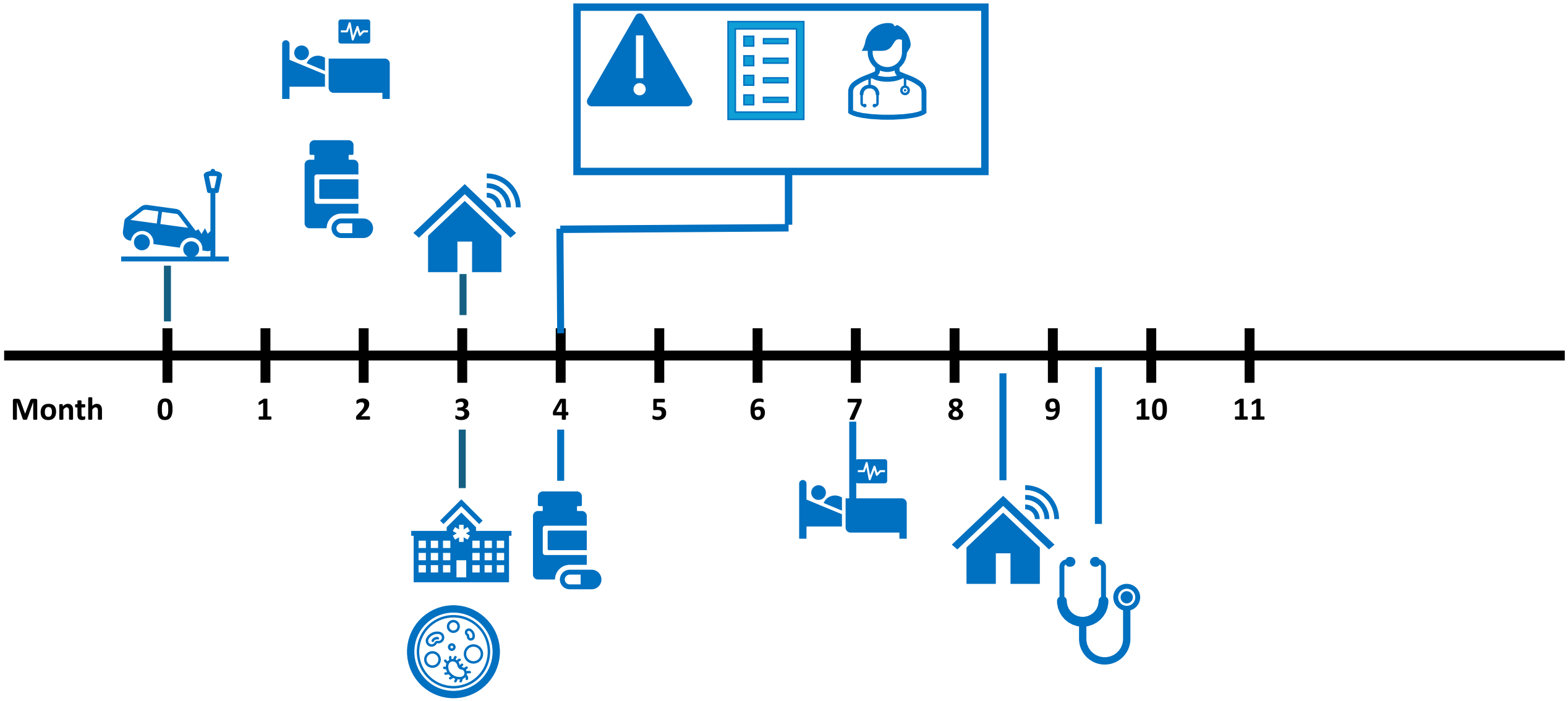
Preventing transmission is essential to keep prevalence low in VT.

Infection Control Practices

Antibiotic Stewardship

Source Control

Screening High Risk Patients



PM’s Clinical Course Summary

Acknowledgements

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•collaborating on this situation

•connecting our team with information, resources, on CPO's

•informing the content of this presentation

•working to improve outcomes for Vermonters with significant health care needs across Vermont

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Thank you!

Let's stay in touch.

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