ANTIBIOTIC RESISTANCE ORGANISMS (ARO) WORKSHOP

Southlake Health IPAC Hub

MONICA TAWADROUS
VINITA PERSAUD
MATHUSA SIVATHARMAN

SouthlakeHealth
Leading Edge Care. Close to Home.

Learning Objectives:

- ✓ Define antimicrobials and describe antibiotic resistant organisms (AROs).
- ✓ Differentiate between colonization and infection.
- ✓ Explain the development and transmission of ARO in LTCHs in Ontario.
- ✓ Recognize host and environmental factors for ARO.
- ✓ Identify common and emerging AROs relevant to LTCH.
- ✓ Applying IPAC measures.
- ✓ Utilize risk-based screening tools to guide precautions.
- ✓ Strengthening the Antibiotic Stewardship Program within LTCHs.
- ✓ Apply knowledge through a case-based scenario using PHO guidance.

SouthlakeHealth
Leading Edge Care. Close to Home.

ANTIMICROBIAL

A POWERFUL TOOL OR GROWING THREAT?

Antimicrobials are medications that help prevent the growth and spread of germs or microbes like:

- **Bacteria**
- Viruses
- Fungi
- Parasite



These germs each need a specific antimicrobial:

- **Antibiotics to treat or prevent bacterial infections.**
- Antivirals to treat or prevent viral infections.
- Antifungals to treat or prevent fungal infections.
- Antiparasitics to treat or prevent parasitic infections.

This education session focuses on unnecessary antibiotic use, how it contributes to antibiotic resistance, and the actions we can take to prevent it in LTC homes.

SouthlakeHealth
Leading Edge Care. Close to Home.

ANTIBIOTIC RESISTANT ORGANISMS (ARO)

- **Antibiotic-resistant organisms (AROs)** are bacteria that have developed resistance to one or more agents that would typically inhibit their growth or kill them.
- Antibiotic resistance can limit effective treatment options, resulting in infections that are more difficult to treat and increasing the risk of transmission, complications, and adverse outcomes.
- Residents of long-term care homes are at increased risk of harm from inappropriate antibiotic use, which can contribute to the emergence and spread of AROs.



PUBLIC HEALTH ONTARIO, 2018
YORK REGION PUBLIC HEALTH, N.D.

SouthlakeHealth
Leading Edge Care. Close to Home.

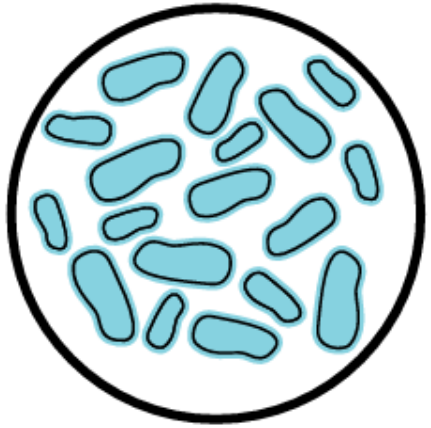
HOW ANTIBIOTIC RESISTANCE HAPPENS



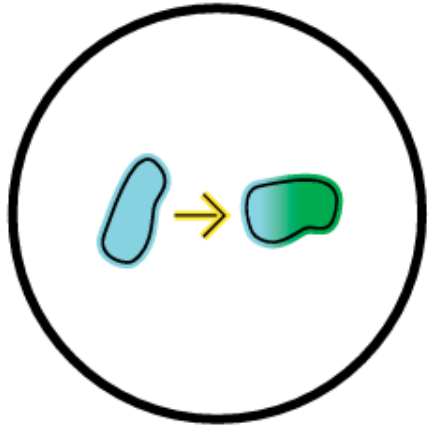
Our body is **home to countless microbes**. Some may be resistant to antibiotics



Antibiotics kill the bacteria causing the infections as well as the good bacteria



The antibiotic-**resistant bacteria** are now able to **grow and take over**



Some bacteria may **give** their antibiotic **resistance to other bacteria**



Normal bacterium

Resistant bacterium

Dead bacterium

COLONIZATION		INFECTION
Organism Present		Organism Causes Illness
No Symptoms		Symptoms Present
No Treatment		May Require Treatment
Transmissible		Transmissible

Question

Which of the following best describes why AROs pose risks in healthcare facilities?

A. They are new and evolving viruses that cannot typically be treated with antivirals medications.

B. AROs are bacteria that have developed resistance to multiple antibiotics, making infections more difficult to treat.

C. AROs are parasites that require antifungal treatments.

D. They are bacteria that can only be prevented by avoiding all antimicrobials.

Answer

Which of the following best describes why AROs pose risks in healthcare facilities?

A. They are new and evolving viruses that cannot typically be treated with antivirals medications.

B. AROs are bacteria that have developed resistance to multiple antibiotics, making infections more difficult to treat.

C. AROs are parasites that require antifungal treatments.

D. They are bacteria that can only be prevented by avoiding all antimicrobials.

Question

What statement best describes colonization?

A. The presence of microorganisms causing signs and symptoms of infection.

B. Colonization occurs when a microorganism is present without causing signs or symptoms of infection.

C. Colonization always requires treatment in high-risk residents to prevent the progression of infection.

D. Colonization always progresses to active infection.

Answer

What statement best describes colonization?

A. The presence of microorganisms causing signs and symptoms of infection.

B. Colonization occurs when a microorganism is present without causing signs or symptoms of infection.

C. Colonization always requires treatment in high-risk residents to prevent the progression of infection.

D. Colonization always progresses to active infection.

WHY ARO MATTERS IN LONG-TERM CARE?

- Antimicrobial resistance has led to the emergence and spread of significant pathogenic microorganisms, including MRSA, VRE, and CPE, which can increase resident morbidity and mortality.
- Evidence shows that the transmission of AROs are linked to infection prevention and control (IPAC) practices in healthcare settings.
- Early, proactive measures that focus on preventing transmission are more effective at controlling AROs and reducing endemic cases within facilities.
- Long-term care residents present challenges to antimicrobial stewardship due to atypical infection presentation, cognitive impairment, and higher risk of resistant organisms from age, comorbidities, and hospitalizations.
- Increased antibiotic use is also driven by limited diagnostic resources, lower staffing levels, and reliance on tests for suspected infections.

PUBLIC HEALTH ONTARIO, 2013; PHO 2018

SouthlakeHealth
Leading Edge Care. Close to Home.

ARO: HOST RISK FACTORS

Immunocompromised residents
(e.g., Human Immunodeficiency virus (HIV), Transplant Recipients, Burn Victims)

Treatments that bypass the immune system
(e.g., indwelling medical devices)

Exposure to certain classes of antibiotics can put individuals at increased risk for infection.

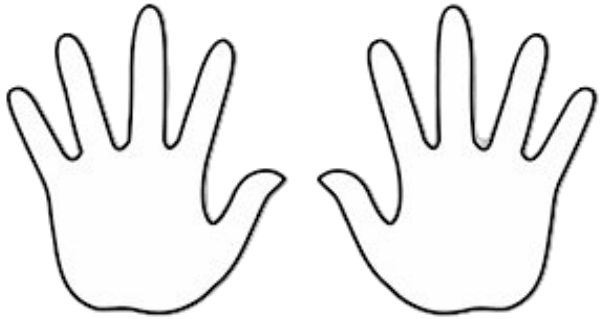
History of ARO colonization or infection

ARO: ENVIRONMENTAL RISK FACTORS

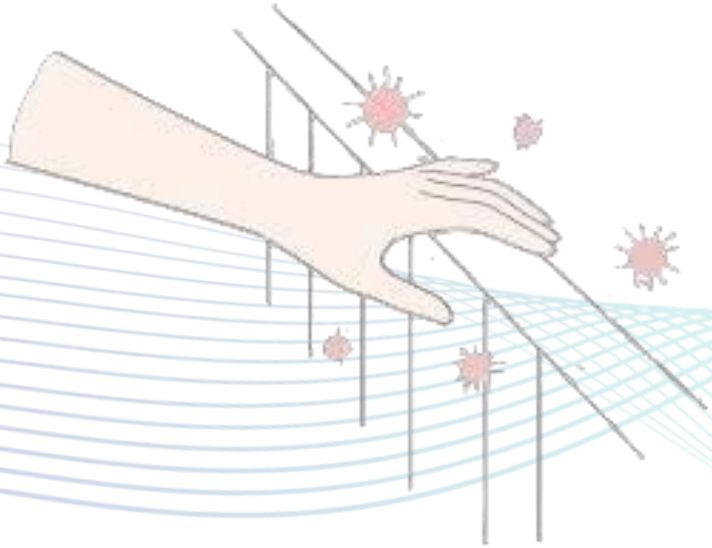
- Previous exposure to an ARO-positive client
- Hospitalization in an outbreak unit
- Previous hospitalization or transfer between health care facilities
- Receiving recent health care in another country
- Living in Long-Term Care Homes or Retirement Homes
- Living in a communal Setting (e.g., homeless, correctional facility)

ARO: MODE OF TRANSMISSION

DIRECT AND IN-DIRECT CONTACT



Transmission occurs through contact from person to person and among residents, by reduced hand hygiene compliance.



Transmission may also occur through contact with contaminated objects and lack of disinfecting shared equipment.

Word Cloud

What are some of the main challenges in your home that contribute to increased antibiotic use?

TYPES OF AROs









FULL NAME: Methicillin-Resistant Staphylococcus aureus (MRSA)

DEFINITION:

- A gram-positive bacteria that periodically lives on the skin and mucous membranes of healthy individuals.
- When S.aureus develops resistant to the beta-lactam class of antibiotics, it is called MRSA.

RESERVOIR:

- Human: Skin, respiratory tract, urinary tract, and moist body areas.
- Environment: Can survive on surfaces for weeks

TRANMISSION:

- Direct: Contact with hands (especially healthcare workers)
- Indirect: Contaminated materials or uncleaned inanimate objects

DISEASE PROFILE:

- Occurs when bacteria enters through a break in the skin.
- Common infections: Wound/skin infections, pneumonia, and urinary tract infections.



FULL NAME: Vancomycin Resistant Enterococci (VRE)

DEFINITION:

- Enterococci are bacteria that normally live in the gastrointestinal tract without causing harm (colonization).
- Some strains of Enterococci have become resistant to the antibiotic vancomycin, making infections difficult to treat.

RESERVOIR:

- Human: Gastrointestinal system, and feces
- Environment: Can survive on surfaces for weeks (e.g., toilet seats)

TRANMISSION:

- Direct: Contact with hands (especially healthcare workers)
- Indirect: Contaminated materials or uncleaned inanimate objects

DISEASE PROFILE:

- Common infections: Blood infections, urinary tract infections, and abscesses.



FULL NAME: CARBAPENEMASE-PRODUCING ENTEROBACTERIACEAE (CPE)

DEFINITION:

- *Enterobacteriaceae* that are resistant to carbapenem antimicrobials through the production of carbapenemase are known as carbapenamase producing *Enterobacteriaceae* (CPE).
- CPEs are also usually resistant to first, second, and third-generation cephalosporins and penicillins.
- They are also referred to as CPO (carbapenemase-producing organisms).

RESERVOIR:

- Human: Lower gastrointestinal tract
- Environment: Sinks, Shower drains
- Medical Equipment: Endoscopes that have not been reprocessed correctly

CPE colonization or infection are reportable to Public Health in Ontario.

TRANMISSION:

- Direct: Contact with hands (especially healthcare workers)
- Indirect: Contaminated materials or uncleaned inanimate objects

DISEASE PROFILE:

- Common infections: Pneumonia, urinary tract infections, and bloodstream infections.



FULL NAME: Extended-Spectrum Beta-Lactamase

DEFINITION:

- Beta-lactamase (β-lactamase) is an enzyme produced by certain bacteria that inactivates β-lactam class of antibiotics (e.g., penicillin and cephalosporins).
- ESBLs are enzymes capable of inactivating a broader range of β-lactam antibiotics, including third-generation cephalosporins and monobactam aztreonam. ESBL production commonly occurs in Escherichia coli (E. coli) and Klebsiella pneumoniae, resulting in reduced antibiotic treatment options and increased challenges in managing infections.

RESERVOIR:

- Human: Lower digestive tract, urinary tract, respiratory secretions, and skin (wounds)
- Environments: ESBL can survive in the health care environment, however, has rarely been implicated in outbreaks.

TRANMISSION:

- Direct: Contact with hands (especially healthcare workers)
- Indirect: Contaminated materials or uncleaned inanimate objects

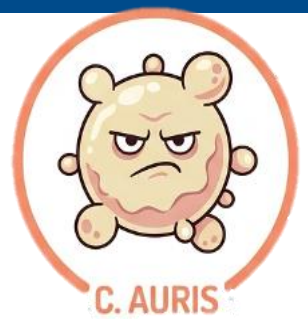


DISEASE PROFILE:

Common infections: Urinary tract infection (UTI), bloodstream, pneumonia, and wound infections

Additional Healthcare-Associated Pathogens of Concern

EMERGING THREAT



FULL NAME: Candida Auris

DEFINITION:

- *Candida auris* (*C. auris*) is a multi-drug-resistant **fungal pathogen** that can cause healthcare-associated invasive infections and outbreaks.
- Following recognition of this pathogen in Japan in 2009, it has spread globally resulting in persistent and difficult to control hospital outbreaks.
- The majority of C. auris isolates are resistant to fluconazole.

RESERVOIR:

- Human: Skin, respiratory tract, and urinary tract
- Environment: Can survive on surfaces for weeks including shared equipment and other fomites.

TRANMISSION:

- Direct: Contact with hands (especially healthcare workers)
- Indirect: Contaminated materials or uncleaned inanimate objects (e.g., axillary thermometer probes)

DISEASE PROFILE:

- Common Infections: Pseudomembranous colitis, toxic megacolon, and bowel perforation in severe cases.

FULL NAME: Clostridioides difficile (C. diff.)



DEFINITION:

- C. diff. is a bacteria that is gram-positive, spore-forming, and anaerobic.
- It is resistant to many environmental cleaning and disinfecting products allowing it to survive for longer periods of times.
- Some individuals can be carrying C. diff. within their intestines and show no signs of symptoms.
- This is known as *colonization* and this occurs in up to 3-5% of adults.
- It is one of the most common healthcare-acquired infections, and the most common cause of infectious diarrhea without healthcare settings.
- There are various strains of C. diff., but toxin A and toxin B are the two that cause diarrhea.

RESERVOIR:

- Human: The gastrointestinal (GI) tract of carriers.
- Environment: Contaminated surfaces and shared equipment.

TRANMISSION:

- Direct: Contaminated hands or gloves.
- Indirect: Contaminated surfaces or shared equipment that is not effectively cleaned and disinfected.

DISEASE PROFILE:

- Common Infections: Mild to severe diarrhea, pseudomembranous colitis, toxic megacolon, fulminant (complicated) CDI

Question

When tracking how AROs spread within healthcare facilities, which of the following is true regarding where they "might be hiding"?

A. CPE is known to be found in sinks, shower drains and endoscopes that have not been reprocessed effectively.

B. MRSA and ESBL are unique AROs as we see them in respiratory droplets.

C. C. diff. can hide in the intestines of healthy adults, with up to 3-5% of people being carriers with no apparent signs or symptoms.

D. A and C.

E. All of the above.

Answer

When tracking how AROs spread within healthcare facilities, which of the following is true regarding where they "might be hiding"?

A. CPE is known to be found in sinks, shower drains and endoscopes that have not been reprocessed effectively.

B. MRSA and ESBL are unique AROs as we see them in respiratory droplets.

C. C. diff. can hide in the intestines of healthy adults, with up to 3-5% of people being carriers with no apparent signs or symptoms.

D. A and C.

E. All of the above.

Question

A 76-year-old resident is being admitted. Upon admission, swabs were taken and results indicate that the resident is positive for CPE (Carbapenemase-Producing Enterobacteriaceae) but shows no signs or symptoms at this time. What would be the next best action?

A. Start a course of antibiotics to treat the infection.

B. Put the resident on Additional Precautions and begin a 7-day decolonization process using antimicrobials.

C. The resident is asymptomatic, so no treatment is needed at this time, place on Contact Precautions.

D. Initiate Contact Precautions, and re-swab the resident daily until negative cultures return.

Answer

A 76-year-old resident is being admitted. Upon admission, swabs were taken and results indicate that the resident is positive for CPE (Carbapenemase-Producing Enterobacteriaceae) but shows no signs or symptoms at this time. What would be the next best action?

A. Start a course of antibiotics to treat the infection.

B. Put the resident on Additional Precautions and begin a 7-day decolonization process using antimicrobials.

C. The resident is asymptomatic, so no treatment is needed at this time, place on Contact Precautions.

D. Initiate Contact Precautions, and re-swab the resident daily until negative cultures return.

Prevention Measures: AROs

Additional Precaution Measures:

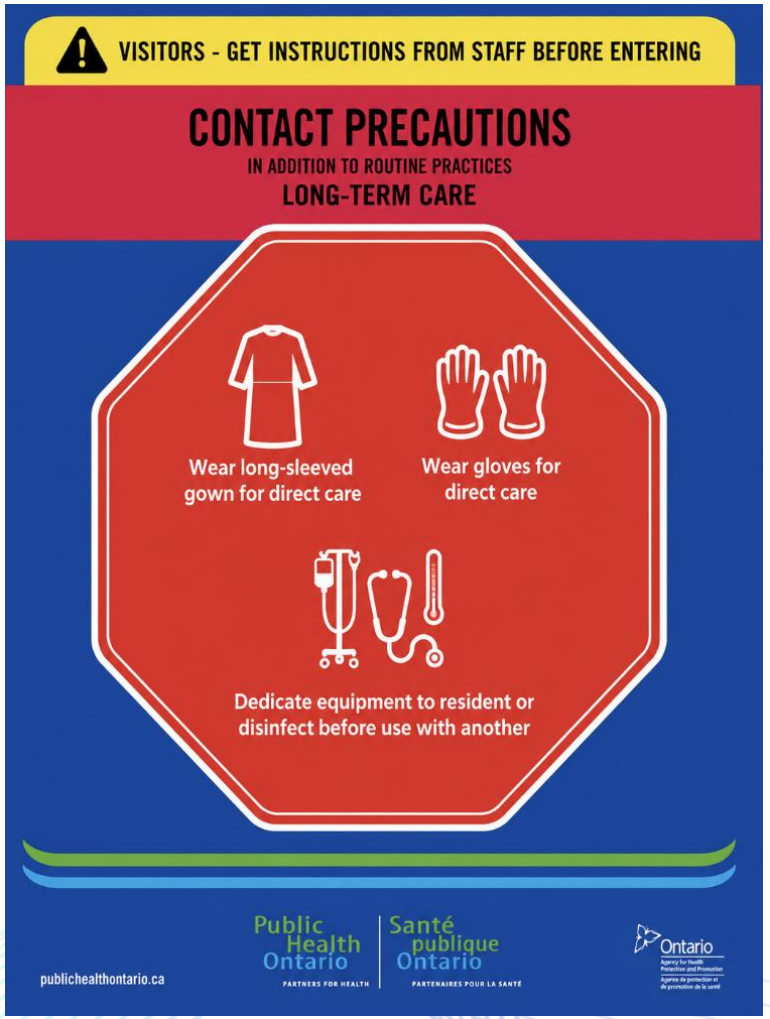
- Contact Precaution
- Implementing a color-coding system to distinguish Contact Precautions for residents with ARO colonization from Contact Precautions used for other indications (e.g., Norovirus).
- This can help staff readily identify rooms where modified Contact Precautions for ARO colonization is in place.

Room Placement:

- A single/private room with individual toileting facilities is preferable.

Personal Protective Equipment (PPE):

  - Gown
  - Gloves
- Gown and gloves must be worn and changed between each client.
- PPE should be worn for all DIRECT CARE, which is defined as providing hands-on care. This includes bathing, washing, turning the resident, changing clothes/briefs, dressing changes, care of open wounds, and lesions, and toileting.

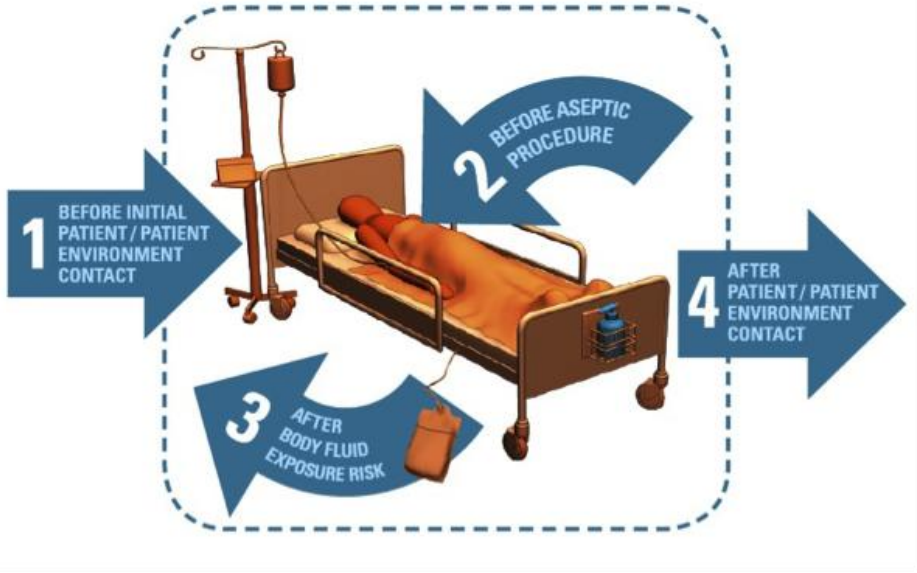


Prevention Measures: AROs

Routine and Additional Precaution Measures

Hand Hygiene: Hand washing and Hand Sanitizing

- Hand hygiene is the most important IPAC practice for preventing transmission of infections.
- Hand hygiene must always be performed:
  - ✓ Before client/client environment contact
  - ✓ Before aseptic procedure
  - ✓ After client/client environment contact
  - ✓ After body fluid exposure risk



Dedicated Equipment

- Dedicated equipment (e.g., commodes, stethoscopes, wash basins) whenever possible.
- If equipment cannot be dedicated, shared equipment **MUST** be cleaned and disinfected after use.

Remember: When in doubt, clean and disinfect it before use!

Prevention Measures: AROs

Routine and Additional Precaution Measures

Environmental Cleaning and Disinfection:

- ✓ For cleaning and disinfection of environmental surfaces, appropriate product approved by Health Canada with a drug identification number (DIN) should be used.
- ✓ Accelerated hydrogen peroxide (AHP) one-step cleaning and disinfectant wipes (0.5%) can kill most AROs with a short contact time of usually 1-3 min.
- ✓ Quaternary ammonium compound or quats can also kill most of the AROs. However, the contact time is usually longer depending on the product used (usually 4-5 minutes).

Special Environmental Cleaning Considerations:

- ✓ VRE:
  - Routine cleaning and disinfection is sufficient.
  - Use fresh supplies and equipment.
  - Consider double cleaning.
- ✓ CPE:
  - Routine cleaning and disinfection is sufficient.
  - Pay particular attention to sink and shower cleaning and disinfection.

Discontinuation of Contact Precautions

MRSA

- 3 negative cultures taken at least one week apart.

VRE

- Minimum 3 successive negative cultures with at least one culture taken three months after the last positive culture

CPE

- At least 3 months have elapsed since the last positive sample
- At least 3 consecutive negative CPE specimens collected at least 7 days apart have been obtained, including swabs of all previously positive sites, if still present, and patient is not on antibiotics suppressive to CPE

ESBL

- Negative results from all colonized/infected body sites (e.g., 3 consecutive negative cultures taken at least one week apart) in the absence of antibiotic therapy.

DECOLONIZATION

- Decolonization is the use of topical and systemic antimicrobials to eradicate colonization of resistant bacteria.
  - Examples: Chlorhexidine rinses for bathing or showering, a mouthwash to clean the oral cavity, nasal spray containing Mupirocin, or using antibiotics, antifungals, or antiseptics.
- The process can reduce the likelihood of colonization developing into a serious infection.
- One of the caveats with decolonization is that prolonged or widespread use of antibiotics for decolonization may promote antibiotic resistance.
- Decolonization is generally not recommended for VRE, CPE, and ESBL but decision would be made based on the discretion of the clinical care provider.
- Decolonization for MRSA might be considered in certain conditions.

Question

Which answer best reflect discontinuation protocols for AROs?

A. For MRSA, 3 negatives cultures are taken at least 5 days apart.

B. For VRE, at minimum 3 cultures are taken within 1 month from the last positive culture.

C. For CPE, a minimum of 3 negatives cultures are needed and taken within a week apart.

D. For ESBL, negative results from all colonized/infected body sites (e.g., 3 consecutive negative cultures taken at least one week apart) in the absence of antibiotic therapy.

Answer

Which answer best reflect discontinuation protocols for AROs?

A. For MRSA, 3 negatives cultures are taken at least 5 days apart.

B. For VRE, at minimum 3 cultures are taken within 1 month from the last positive culture.

C. For CPE, a minimum of 3 negatives cultures are needed and taken within a week apart.

D. For ESBL, negative results from all colonized/infected body sites (e.g., 3 consecutive negative cultures taken at least one week apart) in the absence of antibiotic therapy.

Antibiotic Stewardship in LTCH

Public Health Ontario | Santé publique Ontario

Antimicrobial Stewardship Essentials in Long-Term Care

Antimicrobial Stewardship as Quality Improvement



Primer

October 2018

Public Health Ontario | Santé publique Ontario

CHECKLIST

Antimicrobial Stewardship Essentials Checklist in Long-Term Care

This checklist supports the implementation or expansion of an antimicrobial stewardship program (ASP) in a long-term care (LTC) setting and provides some examples of resources and practical tools. Long-term care homes (LTCH) can use this checklist to track their quality improvement progress or identify gaps in their existing program.

This checklist is a supplement to Public Health Ontario's (PHO) primer on Antimicrobial Stewardship Essentials in LTC. It is recommended to review the primer prior to using this checklist.

How to Use This Checklist

1. Review the five quality improvement steps to build an ASP in your home (Figure 1).
2. Identify gaps to developing an ASP in your LTCH by answering yes or no to items in the checklist.
3. For each quality improvement step with gaps identified, review suggested change ideas, consider feasible changes and develop an implementation plan.

TEAM
- Establish leadership support
- Establish program, medical and nursing leads
- Engage pharmacy and infection prevention and control

AIM
- Establish antibiotic start criteria and treatment guidelines for at least one infection type

CHANGE
- Select at least one strategy for implementation

MEASURE
- Select at least one process measure
- Select at least one outcome measure of antibiotic use

TEST AND SUSTAIN
- Establish mechanisms for testing changes and sustainable feedback

ANTIBIOTIC OVERUSE IN ONTARIO



UP TO **50%** OF ANTIBIOTIC COURSES IN LTC ARE UNNECESSARY.

78% OF RESIDENTS RECEIVE AT LEAST 1 ANTIBIOTIC COURSE EACH YEAR.

63% of prescribed courses of antibiotic treatment in LTC are longer than 10 days.

Antibiotic use varies widely between homes: some facilities use **10×** more antibiotics than others, largely due to prescriber preference rather than resident characteristics.

Higher antibiotic use is associated with increased harm for residents, including a **24%** higher risk of Clostridium difficile infection, diarrhea, allergic reactions, and colonization or infection with AROs.

SouthlakeHealth
Leading Edge Care. Close to Home.

PUBLIC HEALTH ONTARIO, 2016

Antibiotic Use in Ontario LTC Homes (LTCH)

77,000 residents

4620 residents currently receiving antibiotics

2310 are receiving unnecessary or inappropriate therapy right now

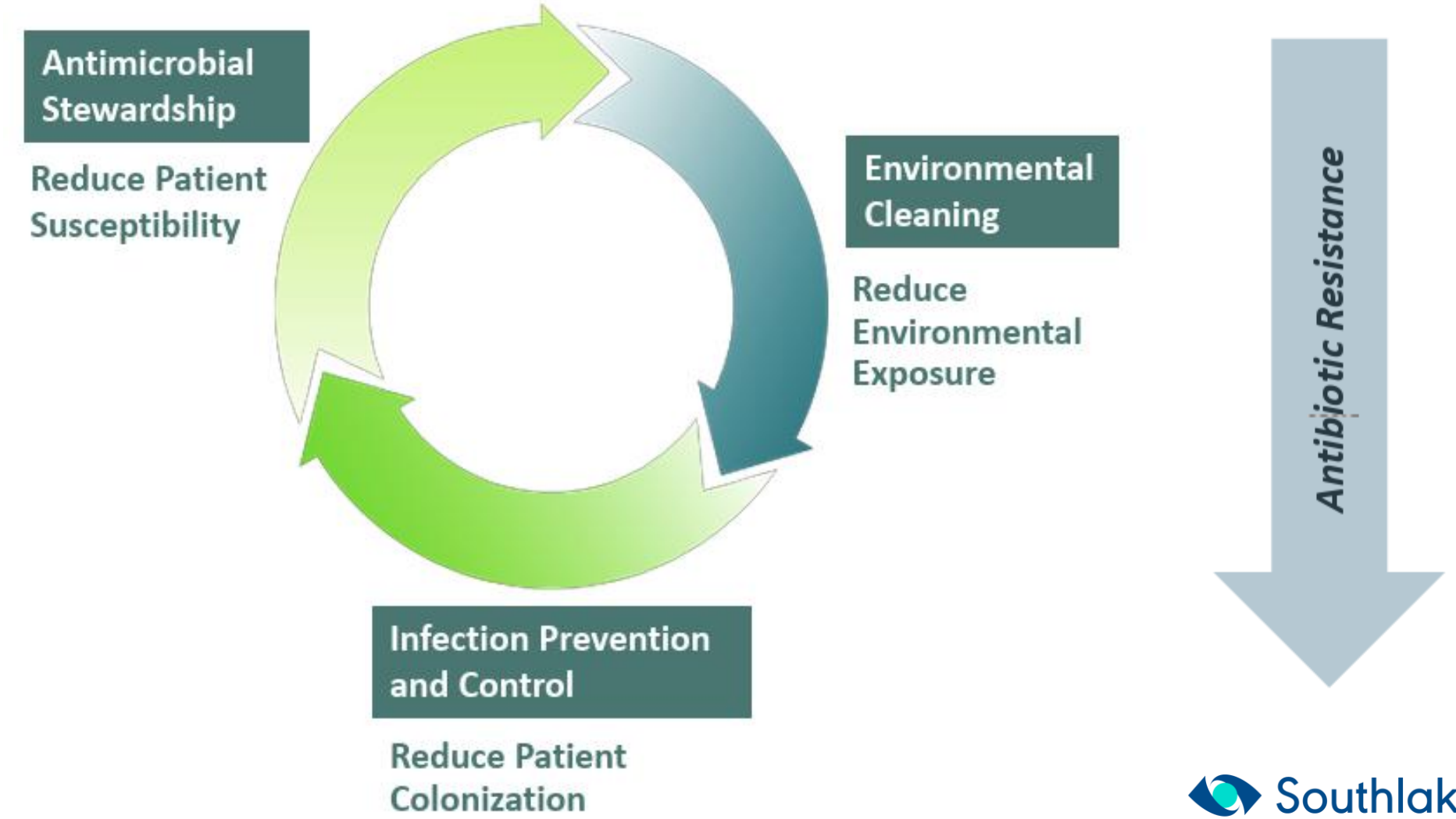
30,000 receive unnecessary or inappropriate therapy every year

Top 3 Reasons for Antibiotic Use in LTCH

- #3 Skin/Soft Tissue
- #2 Respiratory
- #1 Urinary

SouthlakeHealth
Leading Edge Care. Close to Home.

What is the solution?

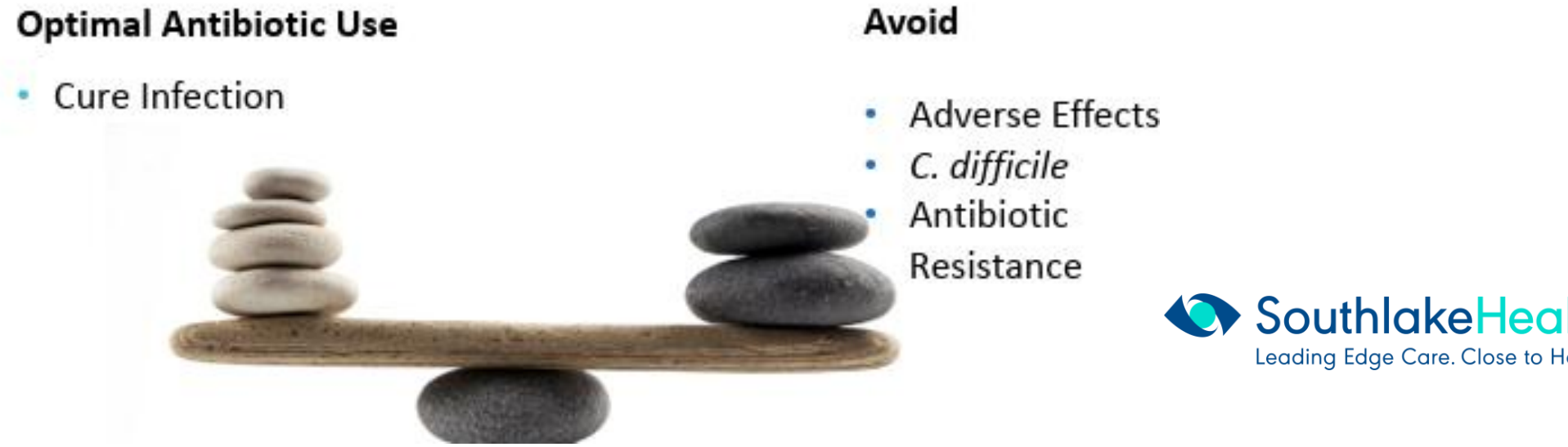


PublicHealthOntario.ca

SouthlakeHealth
Leading Edge Care. Close to Home.

What is antimicrobial stewardship?

"coordinated interventions designed to improve and measure the appropriate use of [antibiotic] agents by promoting the selection of the optimal [antibiotic] drug regimen including dosing, duration of therapy, and route of administration.
Increased antibiotic use in long term-care homes (LTCHs) has also been attributed to limited resources to diagnose infections, lower staff-to-resident ratios and increased dependence on diagnostic tests, such as urinalyses or chest radiographs for suspected infections."



SouthlakeHealth
Leading Edge Care. Close to Home.

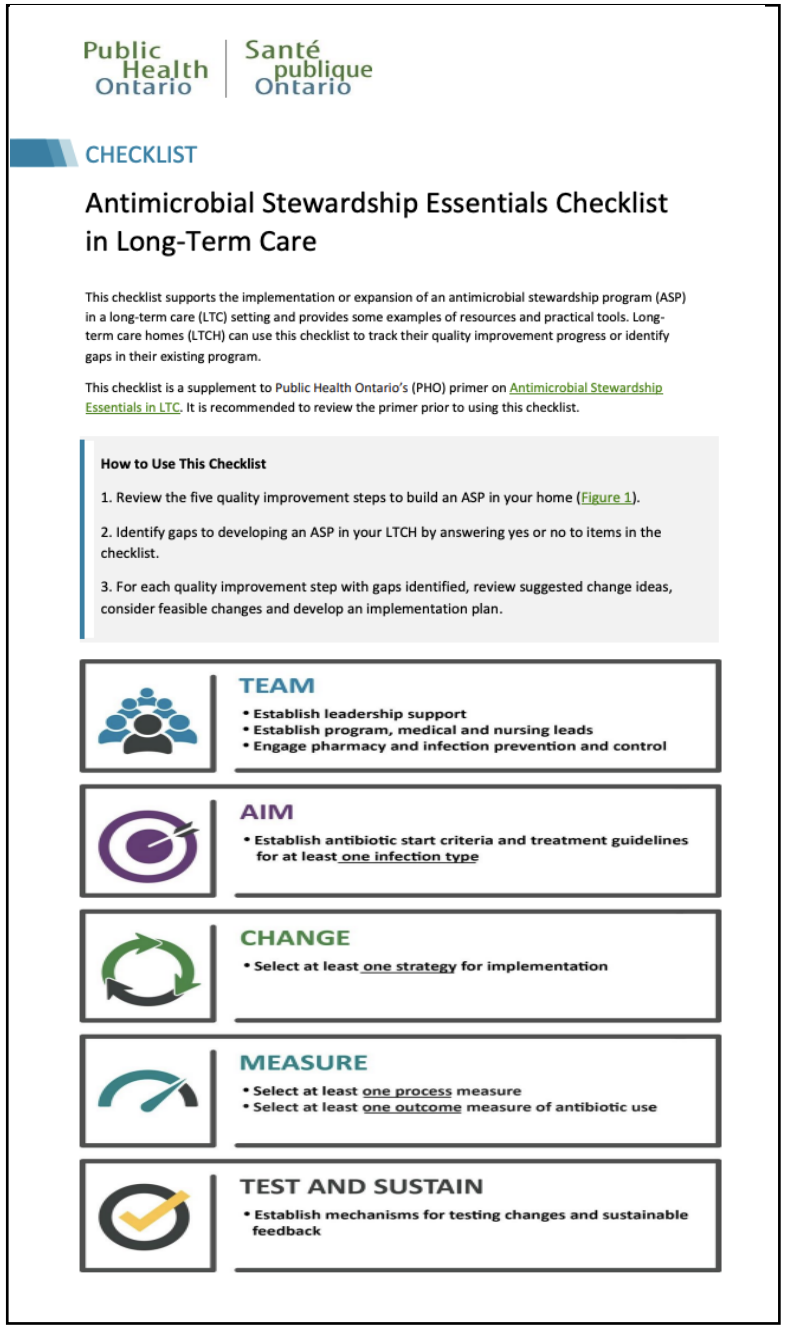
CHECKLIST
Antimicrobial Stewardship Essentials Checklist in Long-Term Care

This checklist supports the implementation or expansion of an antimicrobial stewardship program (ASP) in a long-term care (LTC) setting and provides some examples of resources and practical tools.

How to use this checklist

1. Review the five quality improvement steps to build an asp in your home (figure 1).
2. Identify gaps to developing an ASP in your LTCH by answering YES or NO to items in the checklist.
3. For each quality improvement step with gaps identified, review suggested change ideas, consider feasible changes and develop an implementation plan.

https://www.publichealthontario.ca/-/media/documents/C/2018/checklist-antimicrobial-stewardship-ltc.pdf


Public Health Ontario | Santé publique Ontario

CHECKLIST

Antimicrobial Stewardship Essentials Checklist in Long-Term Care

This checklist supports the implementation or expansion of an antimicrobial stewardship program (ASP) in a long-term care (LTC) setting and provides some examples of resources and practical tools. Long-term care homes (LTCH) can use this checklist to track their quality improvement progress or identify gaps in their existing program.

This checklist is a supplement to Public Health Ontario's (PHO) primer on Antimicrobial Stewardship Essentials in LTC. It is recommended to review the primer prior to using this checklist.

How to Use This Checklist

1. Review the five quality improvement steps to build an ASP in your home (Figure 1).
2. Identify gaps to developing an ASP in your LTCH by answering yes or no to items in the checklist.
3. For each quality improvement step with gaps identified, review suggested change ideas, consider feasible changes and develop an implementation plan.

5-STEP QUALITY IMPROVEMENT FRAMEWORK







1. Forming the Team:	2. Setting Aims:	3. Selecting Changes:	4. Establishing Measures:	5. Sustaining Changes:
Assemble a multidisciplinary group: medical, nursing, pharmacy, and IPAC leads, senior leads.	Define clear objectives and establish clinical criteria for common infections (UTI/Skin). Establish antibiotic start criteria Establish treatment guidelines	Identify feasible interventions: Before the Prescription At the prescription After the Prescription ASP involves strategies that target influences and decisions that can be modified through knowledge and behaviour changes.	Track progress using process indicators and clinical outcomes. Outcome measures provide insight into whether ASP strategies have impacted antimicrobial resistance, abx use and clinical effects in the resident population (DOT, Cost, CDI)	Use PDSA cycles to test small changes and embed feedback into facility culture. Regular feedback Integrate changes

What action items to take?

Don't treat non-infectious conditions	Re-assess empiric therapy	Reduce duration of treatment
• EX. Collect urine cultures only when residents have the indicated clinical signs and symptoms of a UTI. • Collect and store urine cultures properly. Prescribe antibiotics only when specified criteria have been met	• Re-Assess Initial Antibiotic Therapy • Often antibiotics are started before all information is obtained • A "time-out" at 48-72 h is recommended to reassess the situation • Stop antibiotics? • Streamline therapy? • Escalate therapy? • Re-assess duration?	• Another way to reduce patient exposure • Dispel the myth: shorter duration = more resistance • Wide variability in prescribing practices in Ontario, linked to prescriber rather than patient characteristics • Uncomplicated urinary tract infections (UTI) in elderly females can be treated for as short as 3 days



Southlake Health Antibiogram:

- Antibiograms are a summary of the cumulative susceptibility of bacterial isolates to specific antibiotics in a given hospital or region.
- Antibiograms are an antimicrobial stewardship strategy used to guide choice of empiric therapy and track resistance patterns.
- The information in the antibiograms is only a guide for the Southlake Catchment area. Culture and susceptibility testing are required for accurate determination of etiology and antimicrobial susceptibility.

SouthlakeHealth
Leading Edge Care. Close to Home.

HTTPS://WWW.PUBLICHEALTHONTARIO.CA/-/MEDIA/DOCUMENTS/O/2019/ONTARIO-HOSPITAL-ANTIBIOGRAM-TECHNICAL-NOTES.PDF

SOUTHLAKE REGIONAL HEALTH CENTRE

2023 % Susceptibility

= antibiotic not effective for this organism

Gram Negative Organisms	Ampicillin	Amoxicillin/Clavulanic acid	Cefazolin	Ceftriaxone	Ceftazidime	Piperacillin/Tazobactam	Ertapenem	Meropenem	Gentamicin	Tobramycin	Trimethoprim/Sulfamethoxazole	Ciprofloxacin
Escherichia coli (non ESBL)	67	88	92	98	98	97	100	100	95	95	83	77
Escherichia coli (ESBL)	*	*	*	*	*	*	99	100	73	66	46	7
Klebsiella pneumoniae (non ESBL)	*	97	97	99	99	97	99	99	100	100	96	95
Klebsiella oxytoca	*	96	68	96	96	98	100	100	96	96	96	94
Klebsiella aerogenes	*	*	*	*	*	*	91	98	100	100	98	94
Enterobacter spp	*	*	*	*	*	*	74	98	99	99	96	98
Proteus mirabilis	83	98	87	100	100	100	100	100	97	98	88	94
Pseudomonas aeruginosa	*	*	*	*	91	93	*	93	99	100	*	92
Citrobacter freundii complex	*	*	*	*	*	*	97	100	98	98	91	87

***Note:** ESBL = Extended spectrum beta-lactamase producing*

Gram Positive Organisms	Ampicillin	Amoxicillin/ Clavulanic acid	Cloxacillin	Cefazolin	Clindamycin	Erythromycin	Trimethoprim/ Sulfamethoxazole	Ciprofloxacin	Tetracycline	Vancomycin
Staph aureus (MSSA)	*	100	100	100	79	75	100	92	99	100
Staph aureus (MRSA)	*	*	*	*	82	44	98	41	91	100
Enterococcus species	80	78	*	*	*	*	*	65	27	100
Enterococcus faecalis	100	100	*	*	*	*	*	71	28	100
Enterococcus faecium	0	0	*	*	*	*	*	11	20	100

Antibiogram compiled with data from Dynacare; Microbiology Laboratory: Hamilton Health Sciences Centre

Call ext. 2143 (Antimicrobial Stewardship) with questions/comments.

Selection of Southlake Formulary Antibiotics	Usual Adult Dose - normal renal function	May need adjustment		May Prolong QT
		in renal failure	for weight	
Amoxi-clav IV	1g IV q8h	x		
Azithromycin	500 mg IV daily			x
Azithromycin	250-500 mg PO daily			x
Cefazolin	2 g IV q8h	x	x	
Cefixime	400 mg PO daily	x		
Ceftazidime	2 g IV q8h	x	x	
Ceftriaxone	1-2 g IV q24h		x	
Ciprofloxacin	400 mg IV q12h	x		x
Ciprofloxacin	500 mg PO BID	x		x
Cloxacillin	2 g IV q4-6h			
Ertapenem	1 g IV q24h	x		
Fluconazole	200 mg IV/PO daily	x	x	x
Gentamicin (non-synergy)	100 mg IV q8h	x	x	
Meropenem	500 mg IV q6h	x	x	
Metronidazole	500 mg IV q12h			
Metronidazole	500 mg PO q8h			
Moxifloxacin	400 mg PO q24h			x
Penicillin G	2-4 million units IV q6h	x		
Piperacillin / Tazobactam	3.375 – 4.5 g IV q6h	x	x	
Tobramycin	100 mg IV q8h	x	x	
Vancomycin	1 g IV q12h	x	x	
Vancomycin oral	125 mg PO QID			

Re-order # SL2454_07 Nov. '24, Review Nov. '27 ©Southlake Regional Health Centre, 2024.

Treatment of *C difficile*:

- **Stop other antimicrobials** and Proton Pump Inhibitors where possible
- Extend duration of C diff treatment beyond other antibiotics
- Do not use antiperistaltic agents (e.g. loperamide (Imodium))
- PO metronidazole is more effective than IV unless treating for fulminant *C. difficile* infection
- Vancomycin IV is not effective for the treatment of C difficile
- Vancomycin capsules are covered on ODB formulary through Limited Use Program. Prolonged taper exceeding 114 capsules may require written Exceptional Access Program (EAP) request.
- Fidaxomicin (non-formulary) is covered through EAP via telephone request.

Repeat C difficile testing is not indicated for a test of cure, or to guide duration of therapy. Discontinuing precautions is based on resolution of symptoms.

SEVERITY		FIRST EPISODE
Mild to Moderate	WBC up to 15 x 10^9/L **AND** Cr less than 1.5 times the premorbid level (or under 130 mcmol/L if baseline Cr unknown)	Vancomycin 125 mg PO q6h x 10 days (preferred) **OR** metro**NIDAZOLE** 500 mg PO TID x 10 days (consider in mild diarrhea only, if patient will be unable to afford vancomycin at discharge)
Severe	WBC 15 x 10^9/L or higher **OR** Cr 1.5 times premorbid level or higher (or over 130 mcmol/L if baseline Cr unknown)	Vancomycin 125 mg PO q6h x 10 days
Fulminant	Hypotension or shock, ileus, megacolon	Vancomycin 500 mg PO q6h x 14 days **WITH** metroNIDAZOLE 500 mg IV q8h x 14 days If ileus, add Vancomycin 500 mg PR q6h x 14 days
Recurrence (use C difficile Order Set to order tapering regimen)		
First Recurrence: Vancomycin 125 mg PO q6h x 10 days or prolonged tapered regimen.		
Second or subsequent recurrence: Vancomycin prolonged tapered regimen		

Ref: C diff Clinical Practice Guidelines- IDSA/SHEA 2017; AMMI 2018

Anaerobic coverage for suspected aspiration pneumonia is not routinely recommended unless lung abscess or empyema is suspected.

Bacterial co-infection is uncommon in COVID-19 pneumonia at presentation. Do not add empiric antibiotics for bacterial pneumonia unless bacterial infection is strongly suspected.

Choosing Ertapenem and Amoxi-clav IV more often may slow the rise of Pseudomonas resistance at Southlake.

Note: Amoxiclav IV cannot be given in the community.

Top 3 isolated organisms by culture site in 2023 at Southlake:

RESPIRATORY	URINE	BLOOD
Staphylococcus aureus (MSSA)	*Escherichia coli (non-ESBL)*	*Coagulase negative Staphylococci*
Pseudomonas aeruginosa	*Enterococcus species*	*Escherichia coli (non-ESBL)*
Enterobacter cloacae complex	*Klebsiella pneumoniae (non-ESBL)*	*Staphylococcus aureus (MSSA)*

- Of all *Staphylococcus aureus* in clinical isolates, 16% are MRSA (methicillin- resistant Staph aureus) in 2023.
- Of all *E. coli* in clinical isolates, 8% are ESBL + (extended- spectrum beta-lactamase +) in 2023.
- Of all K. *pneumoniae* clinical isolates, 5% are ESBL + in 2023.

Empiric IV Vancomycin Dosing:

Dosing depends on the diagnosis and the MIC of the organism.
Empiric dosing: 15 mg/kg actual body weight, rounded to nearest 250 mg. (consider loading dose of 25-30 mg/kg in seriously ill patients)
Frequency: q12 h (consider q8h if estimated CrCl is over 60 mL/min, consider q24h if estimated CrCl is under 30 mL/min and patient age is over 65)
Trough before the 4th dose. Ref: ASHP/IDSA/ SIDP 2009.

Some **SPICE organisms** (Hafnia alvei, Enterobacter cc, Citrobcter freundii, C. youngae, Klebsiella aerogenes and Yersinia enterocolitica) have higher risk for significant ampC production (a resistance gene that is inducible under antibiotic pressure). This means these organisms can develop resistance during a course of therapy. For severe infections and seriously ill patients, a carbapenem is the antibiotic of choice.

Hamilton Microbiology Lab Contact # 1-905-527-4322, ext. 46175

Question

What statement best describes the definition of anti-microbial stewardship?

A. Coordinated interventions used to promote optimal antibiotic regimen, dosing, duration and route.

B. Restricting all antibiotic use.

C. A series of actions we as healthcare professionals take to lower antibiotic prescriptions being filled.

D. The diagnostic testing of antibiotics.

Answer

What statement best describes the definition of anti-microbial stewardship?

A. **Coordinated interventions used to promote optimal antibiotic regimen, dosing, duration and route.**

B. Restricting all antibiotic use.

C. An expert on anti-microbials.

D. The diagnostic testing of antibiotics.

Question

What is the most common reason antibiotics are prescribed in LTCHs, and what infections are they intended to treat?

A. Skin and wound infections

B. UTIs

C. Respiratory infections

D. GI-related infections

Answer

What is the most common reason antibiotics are prescribed in LTCHs, and what infections are they intended to treat?

A. Skin and wound infections

B. UTIs

C. Respiratory infections

D. GI-related infections

Public Health Ontario:
ARO Risk Factor Screening Tool

Antibiotic Resistant Organism (ARO) Risk Factor-Based Screening Guidance for All Health Care Settings

Screening Checklists

Public Health Ontario | Santé publique Ontario

Published: June 2024

Introduction

Risk factor-based screening identifies clients / patients / residents at increased risk of having an antibiotic resistant organism (ARO).

When risk factors are identified, the client / patient / resident is tested for AROs from specific body sites that are known to become colonized by specific organisms. The goal of ARO screening is to identify all clients / patients / residents who are colonized or infected with an ARO as early as possible, in order to implement infection prevention and control measures to reduce the risk of transmission to others.

This resource is intended for use by all health care settings, including hospitals, long-term care and retirement homes, and ambulatory care settings.

Additional Resources:

- Management of a Single New Case of Candida Auris (*C. auris*)
- Management of a Single New Case of MRSA
- Management of a Single New Case of VRE
- Management of a Single New Case of CPE

A. Methicillin-Resistant *Staphylococcus aureus* (MRSA), Vancomycin Resistant Enterococci (VRE) and Carbapenemase-Producing *Enterobacteriaceae* (CPE) Risk Factor-Based Screening Guidance

Has the patient / resident spent time in a health care facility outside of Canada (including the United States) within the previous 12 months? • If yes, initiate Contact Precautions in a private room with dedicated toileting facilities, and dedicate all equipment and supplies as able.	☐ Yes	☐ No
Has the patient / resident been transferred from a unit in a health care facility with an ongoing outbreak of MRSA, VRE, or CPE? • If yes, initiate Contact Precautions in a private room with dedicated toileting facilities, and dedicate all equipment and supplies as able.	☐ Yes	☐ No
Does the patient / resident have a prior history of colonization or infection with MRSA, VRE, or CPE, or is the patient / resident chart flagged with a history of MRSA, VRE, or CPE? • If yes, initiate Contact Precautions in a private room with dedicated toileting facilities, and dedicate all equipment and supplies as able.	☐ Yes	☐ No
Is the patient / resident chart flagged with a history of exposure to another case of MRSA, VRE, or CPE? • If yes, and the exposure was to a case of CPE only, initiate Contact Precautions in a private room with dedicated toileting facilities, and dedicate all equipment and supplies as able. Contact Precautions for MRSA or VRE exposures may be implemented depending on your local risk assessment.	☐ Yes	☐ No
Has the patient / resident been admitted, or spent >12 hours in any health care facility (including this one) within the previous 12 months?	☐ Yes	☐ No
Has the patient / resident been directly transferred from another health care facility (e.g., hospital-to-hospital, long-term care home-to-hospital)?	☐ Yes	☐ No
Does the patient / resident belong to a high-risk population as identified by Infection Prevention and Control or Public Health (e.g., admission to ICU, travel to high-risk areas, or resides in an area with high rates of community transmission)?	☐ Yes	☐ No

SouthlakeHealth
Leading Edge Care. Close to Home.

Follow-up Actions for a Positive MRSA, VRE or CPE Screen

See indications for initiating Additional Precautions within **Section A**. If the patient or resident answers 'yes' to any of the previous questions, or is unable then test according to the following guidance:

Test for MRSA, VRE and CPE.

Sites to swab for **MRSA** include:	Sites to swab / specimens to collect for **VRE** include:	Sites to swab / specimens to collect for **CPE** include:

• Anterior nares **AND**
• Perineal / perianal (preferred) or groin area **AND**
• Skin lesions, wounds, incisions, ulcers and exit sites of indwelling devices **AND**
  • For newborns only, include umbilicus
	• Stool (preferred) **OR**
	• Rectal swab
	  • If a patient / resident has a colostomy, the VRE specimen may be taken from the colostomy output
		• Stool (preferred) **OR** rectal swab
		• **AND**, as indicated:
		  • Urine
		  • Open wounds
		  • **In ICU:** Sputum, endotracheal tube, exit sites

SouthlakeHealth
Leading Edge Care. Close to Home.

B. *Candida auris* Risk Factor-Based Guidance

Has the patient / resident been admitted to a health care facility outside of Canada (including the United States) within the previous 12 months?	☐ Yes	☐ No
Has the patient / resident been transferred from a Canadian health care facility with an ongoing outbreak or transmission of *C. auris*?	☐ Yes	☐ No
Does the patient / resident have a prior history of colonization or infection with *C. auris*?	☐ Yes	☐ No
Is the patient / resident chart flagged with a history of *C. auris*, or *C. auris* exposure?	☐ Yes	☐ No

Follow-up Actions for a Positive *C. auris* Screen

If the patient or resident answers 'yes' to any of the questions in **Section B**, or is unable to answer any of the screening questions in **Section A**:

Initiate Contact Precautions in a private room with dedicated toileting facilities, and dedicate all equipment and supplies as able.

Test for *C. auris*

Sites to swab for ***Candida auris*** include:

- Combined bilateral axilla **and** groin
- Nares
  - Previously colonized, or clinically relevant sites (e.g., wounds, exit sites, external ear canal) may also be indicated

SouthlakeHealth
Leading Edge Care. Close to Home.

CASE STUDY 1: Mrs. Smith

RESIDENT:

Mrs. Smith is a 76-year-old resident returning to her long-term care home following a stay on a hospital unit experiencing a VRE outbreak. She was known to be VRE-negative before her hospital admission. She uses a wheelchair, requires assistance with personal care and toileting, and participates in communal activities. Before her hospital admission, she shared a room and bathroom with another resident.

CASE STUDY 1: Mrs. Smith

1. Based on the **ARO Risk Factor-Based Screening Guidance for All Health Care Settings**, what screening and IPAC measures should be implemented while awaiting Mrs. Smith's results?

SouthlakeHealth
Leading Edge Care. Close to Home.

CASE STUDY 1: Mrs. Smith

1. Based on the **ARO Risk Factor-Based Screening Guidance for All Health Care Settings**, what screening and IPAC measures should be implemented while awaiting Mrs. Smith's results?
    - Initiate Contact Precautions.
    - Place Mrs. Smith in a private room, if available.
    - Dedicate toileting facilities.
    - Dedicate all equipment and supplies.
    - Swab for MRSA, VRE, and CPE.

SouthlakeHealth
Leading Edge Care. Close to Home.

CASE STUDY 1: Mrs. Smith

2. While awaiting Mrs. Smith's screening results, what practices should staff follow when providing care and managing her environment?

SouthlakeHealth
Leading Edge Care. Close to Home.

CASE STUDY 1: Mrs. Smith

2. While awaiting Mrs. Smith's screening results, what practices should staff follow when providing care and managing her environment?

- Reinforce hand hygiene for staff and residents.
- Perform a point-of-care risk assessment (PCRA) before each interaction.
- Wear gloves and a gown when providing **direct care.**
- Dedicate equipment to Mrs. Smith when possible.
- Clean and disinfect shared equipment (including transport equipment).
- Environmental service (EVS) to use fresh supplies and equipment when cleaning the residents room/bed space.
- EVS to consider double cleaning the resident's room/bed space.

SouthlakeHealth
Leading Edge Care. Close to Home.

CASE STUDY 1: Mrs. Smith

3. Mrs. Smith's screening result is positive for VRE. There are no private rooms available, and she must return to her previously shared room. What risk assessment and screening measures should be considered for her VRE-negative roommate?

SouthlakeHealth
Leading Edge Care. Close to Home.

CASE STUDY 1: Mrs. Smith

3. Mrs. Smith's screening result is positive for VRE. There are no private rooms available, and she must return to her previously shared room. What risk assessment and screening measures should be considered for her VRE-negative roommate?

- Complete a local risk assessment that considers:
  - Hand hygiene practices
  - Environmental Cleaning processes
  - Shared bathroom and equipment use
- Obtain baseline VRE screening for the roommate.
- If room-sharing continues, consider ongoing screening based on the local risk assessment and observed practices.
- Strong hand hygiene and environmental cleaning audit results may support less frequent screening.
  - Example of a graduate screening schedule based on local risk assessment:
    - Biweekly for the first 1-2 months
    - Monthly for the following 1-2 months
    - Quarterly thereafter

  There is no formally established screening frequency. Adjust the schedule based on ongoing exposure, audit findings, and the effectiveness of IPAC practices.

CASE STUDY 2: Mr. T

RESIDENT:

Mr. T is an 82-year-old long-term care home resident returning from hospital after treatment for pneumonia. **During his admission to the hospital, routine screening identified CPE colonization**; however, he has no symptoms of infection and is clinically stable. Mr. T requires a two-person assist with activities of daily living and toileting. He uses incontinence briefs but can use a commode with staff assistance. Prior to his hospital admission, Mr. T shared a room and bathroom with another resident.

CASE STUDY 2: Mr. T

1. If a private room is unavailable, what room placement and bathroom arrangements should be considered for Mr. T upon his return?

SouthlakeHealth
Leading Edge Care. Close to Home.

CASE STUDY 2: Mr. T

1. If a single room is unavailable, what room placement and bathroom arrangements should be considered for Mr. T upon his return?
    - A private room with dedicated toileting is **preferred**.
    - If unavailable, cohort Mr. T with a resident who has CPE with the same confirmed resistance gene.
    - If cohorting is not possible, complete a risk assessment before placing the resident back in their previous room. Avoid placing him with residents that are at an increased risk of serious outcomes if they were to acquire CPE (e.g., immunosuppressive therapy, indwelling devices)
    - Provide a dedicated commode, with disposable liners.
    - If a bathroom must be shared, it must be cleaned and disinfected with the appropriate health care disinfectant before it is used by roommate.

CASE STUDY 2: Mr. T

2. Mr. T's previous roommate is identified as a CPE contact. What screening, precautions, and follow-up should be considered?

SouthlakeHealth
Leading Edge Care. Close to Home.

CASE STUDY 2: Mr. T

2. Mr. T's previous roommate is identified as a CPE contact. What screening precautions and follow-up should be considered?

- Notify local Public Health Unit and follow recommendations.
- A CPE contact is a resident who shared a room or bathroom with a person confirmed to have CPE for an extended period (e.g., 24 hours).
- Initiate Contact Precautions and obtain baseline CPE screening.
- Consult the IPAC team and local Public Health regarding follow-up screening and discontinuation of precautions.
- Ongoing CPE exposure: If room-sharing continues, consider ongoing screening based on a local risk assessment. There is no standard screening frequency; consider hand hygiene, environmental cleaning, shared bathroom use and other observed IPAC practices.

- CPE Contacts (not ongoing exposure): Precautions may be discontinued for the following a comprehensive assessment and 3 consecutive negative specimens collected at least 7 days apart.

CASE STUDY 2: Mr. T

3. What additional measure can the home implement to reduce the risk of CPE transmission?

SouthlakeHealth
Leading Edge Care. Close to Home.

CASE STUDY 2: Mr. T

3. What additional measure can the home implement to reducethe risk of CPE transmission?

Hand hygiene and personal care

- Reinforce hand hygiene for residents, staff and visitors, particularly after toileting, before eating, and before and after resident contact.
- Ensure Mr. T performs hand hygiene and wears clean clothing before entering communal areas.
- Ensure briefs are changed as needed and body fluids or drainage are appropriately contained.

Environmental cleaning

- Clean and disinfect high-touch and horizontal surfaces at least daily and when soiled using a Health Canada-approved disinfectant, following the manufacturer's instructions and contact time.
- Complete terminal cleaning after transfer, discharge or discontinuation of Additional Precautions. Discard single-use supplies stored in the room and restock with fresh supplies.
- Use handwashing sinks only for hand hygiene. Dispose of body fluids, food and other liquids through the appropriate designated disposal system.
- Reduce contamination associated with sinks and drains through appropriate sink use, splash prevention and routine maintenance.

Activities and visitors

- Encourage activities that minimize direct contact and use items that can be cleaned and disinfected after use.
- Instruct visitors not to use the resident's bathroom and to perform hand hygiene before and after visiting.


Q&A

THANK YOU FOR ATTENDING

Please write your email address in the chat box to receive your IPU towards your CIC/LTC CIP recertification.

SouthlakeHealth
Leading Edge Care. Close to Home.



References

General AROs and Antimicrobial Stewardship

Public Health Agency of Canada. (2024). *About antimicrobial resistance.* https://www.canada.ca/en/public-health/services/antimicrobial-resistance/about.html

Public Health Agency of Canada. (2019). *Preserving antibiotics now and into the future.* https://www.canada.ca/content/dam/phac-aspc/documents/corporate/publications/chief-public-health-officer-reports-state-public-health-canada/preserving-antibiotics/Final_CPHO_Report_EN_June6_2019.pdf

Public Health Ontario. (2018). *Antimicrobial stewardship essentials in long-term care.* https://www.publichealthontario.ca/-/media/Documents/P/2018/primer-antimicrobial-stewardship-ltc.pdf

Public Health Ontario. (2017). *Antibiotic overuse in Ontario's long-term care homes.* https://www.publichealthontario.ca/-/media/Documents/A/2017/antibiotic-overuse-ltc.pdf

Public Health Ontario. (2018). *Duration of antibiotic treatment for uncomplicated urinary tract infection in long-term care residents.* https://www.publichealthontario.ca/-/media/Documents/E/2018/eb-duration-antibiotics-ltc-uti.pdf

Fishman, N. (2012). Policy statement on antimicrobial stewardship by SHEA, IDSA, and PIDS. *Infection Control & Hospital Epidemiology, 33*(4), 322–327. https://doi.org/10.1086/665010

York Region Public Health. (n.d.). *Antibiotic-resistant organisms.* https://www.york.ca/media/121871/download?attachment

Screening and Organism-Specific Guidance

Public Health Ontario. (2013). *Annex A: Screening, testing and surveillance for antibiotic-resistant organisms.* https://www.publichealthontario.ca/-/media/documents/a/2013/aros-screening-testing-surveillance.pdf

Public Health Ontario. (2024). *Antibiotic-resistant organism risk factor-based screening guidance for all health care settings.* https://www.publichealthontario.ca/-/media/Documents/A/24/antibiotic-resistant-organism-risk-factor-screening-guide.pdf

Public Health Ontario. (2019). *Interim guide for infection prevention and control of Candida auris.* https://www.publichealthontario.ca/-/media/documents/P/2019/pidac-ipac-candida-auris.pdf

Public Health Ontario. (2023). *Information about CPE for long-term care home residents, families and visitors.* https://www.publichealthontario.ca/-/media/Documents/C/2023/cpe-residents-family-visitors-ltc-information-faq.pdf

Public Health Ontario. (n.d.). *Vancomycin-resistant enterococci (VRE).* https://www.publichealthontario.ca/en/Diseases-and-Conditions/Health-Care-Associated-Infections/VRE

Public Health Agency of Canada. (n.d.). *Carbapenemase-producing Enterobacterales: Infection prevention and control recommendations for Canadian health care settings.* https://www.canada.ca/en/services/health/publications/diseases-conditions/carbapenemase-producing-enterobacterales-infection-pevention-control-canadian-health-care-settings.html

Ontario Ministry of Health. (2022). *Clostridium difficile infection outbreaks in public hospitals.* https://files.ontario.ca/moh-ophs-clostridium-difficile-infection-en-2022.pdf