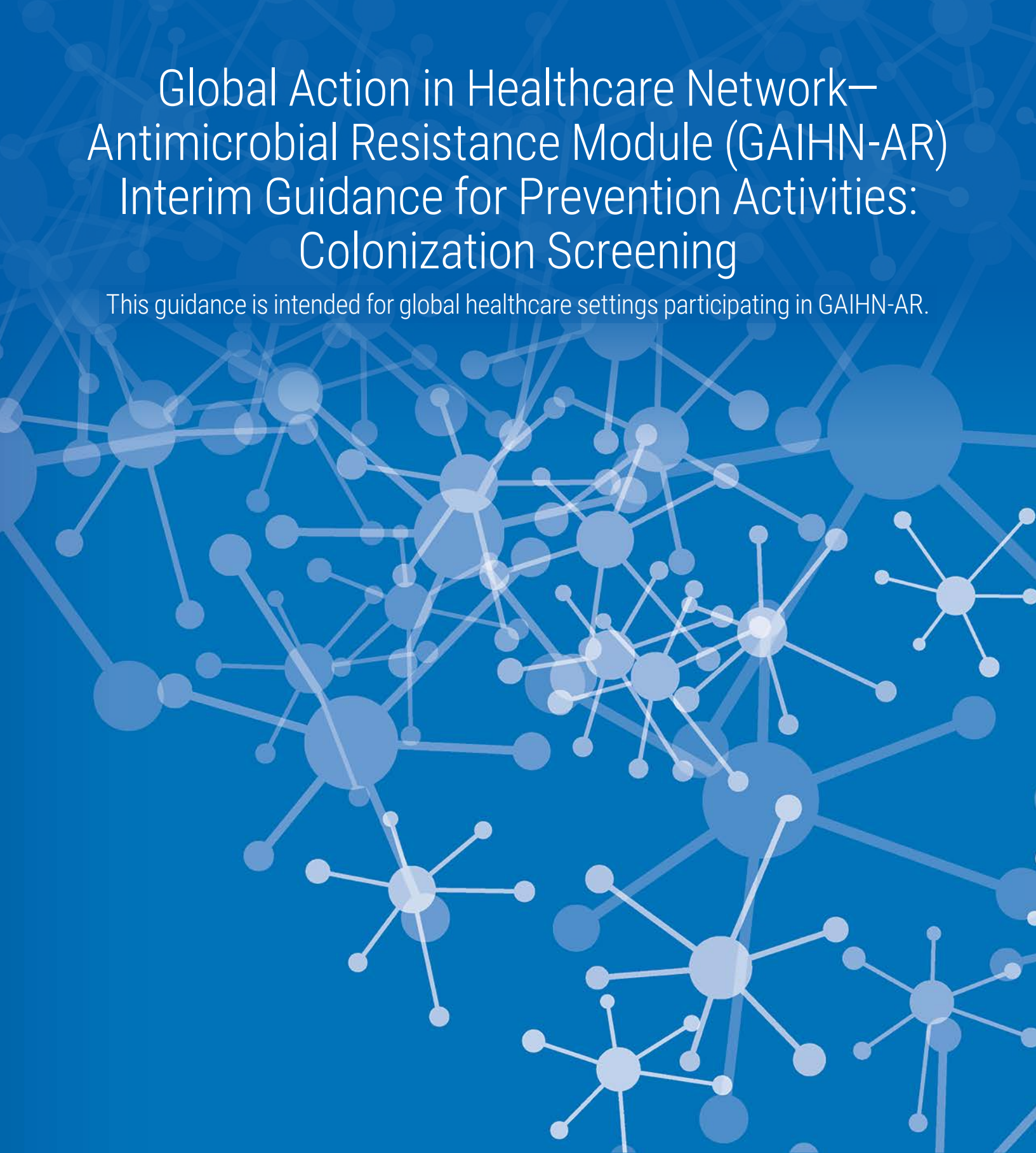
Global Action in Healthcare Network—Antimicrobial Resistance Module (GAIHN-AR) Interim Guidance for Prevention Activities: Colonization Screening

This guidance is intended for global healthcare settings participating in GAIHN-AR.



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Glossary

Admission screening: Colonization screening that is conducted upon admission to a healthcare facility (HCF) or unit.

Antimicrobial-resistant organisms: Some bacteria and fungi are naturally (intrinsically) resistant to certain antimicrobials. For the purposes of this document, this term refers to bacteria that are resistant to one or more classes of antimicrobials to which they are usually susceptible.

Broad phenotypic carbapenemase production testing: Laboratory testing that detects carbapenemase activity. Examples of phenotypic carbapenemase testing methods include modified carbapenem inactivation method (mCIM), Blue Carba, and Carba NP. These methods cannot identify specific carbapenemase genes/enzymes but may be useful, particularly in areas of low carbapenemase-producing carbapenem-resistant Enterobacterales (CP-CRE) prevalence, to reduce the number of carbapenem-resistant Enterobacterales (CRE) isolates requiring carbapenemase gene or enzyme identification testing and inform infection prevention and control (IPC) actions.

Carbapenemases: Types of beta (β)-lactamase enzymes that can hydrolyze penicillins, cephalosporins, and carbapenem antibiotics. Bacteria that produce carbapenemases can cause difficult-to-treat infections. Carbapenemase genes, which encode these enzymes, are often carried on mobile genetic elements, such as plasmids, and have the potential for rapid spread in healthcare settings.

Carbapenemase-producing carbapenem-resistant Enterobacterales (CP-CRE): Enterobacterales that test resistant to at least one carbapenem agent and produce or carry genes that encode for at least one carbapenemase. CP-CRE are associated with high levels of antimicrobial resistance and difficult-to-treat infections. For more information about CP-CRE, visit https://www.cdc.gov/hai/organisms/cre/technical-info.html.

Colonization: When an organism can be found in or on the body but is not causing any symptoms or disease.

Colonization screening: The use of laboratory testing to determine if a patient is asymptomatically colonized (i.e., a carrier) with antimicrobial-resistant organisms such as CP-CRE to enact appropriate IPC actions during their care to limit transmission to others.

Confirmed novel carbapenemase: A carbapenemase that has never been detected. The epidemiological understanding of these novel carbapenemases is unclear (e.g., populations at risk, modes of transmission, etc.). Identification of a novel carbapenemase requires the use of whole genome sequencing.

Contact Precautions: Contact Precautions are actions intended to prevent transmission of infectious agents, including CP-CRE, that are spread by direct or indirect contact with infected or colonized patients or the patients' environment. A single-patient room is preferred for those who require Contact Precautions. In multi-patient rooms, ≥1-meter spatial separation between beds is advised to reduce the opportunities for inadvertent sharing of items between the infected/colonized patient and other patients. When healthcare workers are caring for patients on Contact Precautions, a gown and gloves should be worn for all interactions involving contact with the patient and the patient's environment. The use of dedicated patient equipment is also recommended; however, when this is not possible, shared equipment should be cleaned and disinfected immediately after each use. High-touch surfaces in rooms or areas housing patients on Contact Precautions should be cleaned and disinfected at least twice daily. Additionally, the transport of patients outside of their room on Contact Precautions should be limited to medically necessary purposes.

Containment response: Activities described in GAIHN-AR Interim Guidance for Containment Activities that are implemented in response to detecting a single antimicrobial-resistant threat. While containment can be used

for various antimicrobial-resistant organisms, GAIHN-AR currently focuses on implementing a containment response for CP-CRE containing a novel carbapenemase or a rare targeted or non-targeted carbapenemase.

Healthcare facility (HCF): In this document, refers to the hospital setting.

Healthcare worker (HCW): Any healthcare facility personnel with the potential for direct or indirect exposure to patients or infectious materials (e.g., blood, tissue, body fluids); contaminated medical supplies, devices, and equipment; contaminated environmental surfaces; or contaminated air. These personnel include physicians, nurses, nursing aides, emergency medical personnel, students, laboratory technicians, pharmacists, environmental cleaning staff, hospital volunteers, and administrative staff.

High-risk for antimicrobial-resistant organisms: Refers to patient risk factors that place them at higher risk for becoming colonized or infected with an antimicrobial-resistant organism such as CP-CRE compared to other patients. These risk factors can include but are not limited to being critically ill or immunosuppressed, receiving broad-spectrum antibiotics, requiring high levels of care (e.g., bed-bound), or requiring invasive devices (e.g., ventilators, urinary catheters, central lines, etc.).

Non-targeted carbapenemase: A carbapenemase other than *Klebsiella pneumoniae* carbapenemase (KPC), New Delhi metallo-β-lactamase (NDM), Verona Integron-encoded metallo-β-lactamase (VIM), Imipenemase metallo-β-lactamase (IMP), and oxacillinase (OXA)-48-like. Non-targeted carbapenemase genes may be detected by supplemental PCR, if available, or may require whole genome sequencing.

Non-Tier 1 or 2: Organisms with targeted carbapenemases and antimicrobial susceptibility patterns that are commonly identified in the HCF and for which containment should not be routinely used. This tiered system is described in detail in the document, "Global Action in Healthcare Network - Antimicrobial Resistance Module (GAIHN-AR) Interim Guidance for Containment Activities."

Prevention activities: Continuous and ongoing activities such as IPC assessments, IPC practice monitoring (auditing), and colonization screening such as admission and routine surveillance screening that are used to limit the transmission of antimicrobial-resistant organisms within a facility and, unlike containment, are not deployed specifically in response to the identification of a patient with CP-CRE.

Routine surveillance screening: Colonization screening performed at some predefined and recurrent frequency (e.g., weekly, every 2 weeks, or as determined by local protocol) on the patients currently located in a HCF unit.

Targeted carbapenemases: In this document, the carbapenemases of interest for GAIHN-AR include KPC, NDM, VIM, IMP, and OXA-48-like for which ample epidemiological information is currently known. Targeted carbapenemases may also include others that are of local and/or national importance.

Targeted prevention unit (TPU): A unit within an HCF with a higher likelihood of antimicrobial-resistant organism transmission due to care of many patients at higher risk for antimicrobial-resistant organism acquisition and/or transmission (e.g., multiple invasive devices, prolonged lengths of stay, etc.) such as intensive care units or units with a previous history of antimicrobial-resistant organism outbreaks.

Tier 1: Organisms with a confirmed novel or non-targeted carbapenemase that has never or rarely been identified in the HCF and for which a more extensive investigation is needed to define its epidemiology (e.g., routes of transmission). This tiered system and the recommendations for containment actions for this type of organism is described in detail in the document, "Global Action in Healthcare Network - Antimicrobial Resistance Module (GAIHN-AR) Interim Guidance for Containment Activities."

Tier 2: Organisms with a targeted carbapenemase which is never or rarely detected in the HCF. These "targeted" carbapenemases are KPC, NDM, VIM, IMP, and OXA-48-like. Tier 2 organisms may also include CROs with a targeted carbapenemase, which is commonly detected in a HCF and develops pan-resistance. The pan-resistance and targeted carbapenemase combination should never or rarely be detected in the HCF. This tiered system and the recommendations for containment actions for this type of organism is described in detail in the document, "Global Action in Healthcare Network - Antimicrobial Resistance Module (GAIHN-AR) Interim Guidance for Containment Activities."

Acronyms

Acronym	Definition
CDC	U.S. Centers for Disease Control and Prevention
CP-CRE	Carbapenemase-producing carbapenem-resistant Enterobacterales
GAIHN-AR	Global Action in Healthcare Network - Antimicrobial Resistance Module
HCF	Healthcare Facility
HCW	Healthcare Worker
IMP	Imipenemase metallo-β-lactamase
IPC	Infection Prevention and Control
KPC	*Klebsiella pneumoniae* carbapenemase
NDM	New Delhi metallo-β-lactamase
OXA	Oxacillinase
PPE	Personal Protective Equipment
WHO	World Health Organization
TPU	Targeted Prevention Unit
VIM	Verona Integron-encoded metallo-β-lactamase

Introduction

The Global Action in Healthcare Network - Antimicrobial Resistance Module (GAIHN-AR) is a global network of healthcare facilities (HCFs), laboratories, and infection prevention and control (IPC) teams at the forefront of identifying critical and emerging antimicrobial-resistant bacteria in HCFs and implementing rapid IPC actions to limit their spread and protect patients. It is focused on a continuous cycle of prevention activities, laboratory detection, communication, and real-time response to antimicrobial-resistant bacterial threats, including containment strategies for novel or rarely identified threats (Figure 1).

This guidance is one of two documents focused on prevention activities to reduce the spread of antimicrobial-resistant bacteria in non-US healthcare settings. This document reviews the role and considerations for colonization screening surveillance (i.e., admission and routine surveillance screening) while the other document, "Global Action in Healthcare Network - Antimicrobial Resistance Module (GAIHN-AR) Interim Guidance for Prevention Activities: Infection Prevention and Control" focuses on IPC activities. Additionally, laboratory guidance for colonization screening to support containment and prevention activities can be found in the document, "Global Action in Healthcare Network - Antimicrobial Resistance Module (GAIHN-AR) Interim Laboratory Guidance for Colonization Screening for Carbapenem-Resistant Organisms."

Figure 1. GAIHN-AR's cycle of real time action against antimicrobial-resistant threats

Colonization screening

More patients are colonized with antimicrobial-resistant organisms (i.e., asymptomatic carriers) than develop signs and symptoms of a clinical infection. However, both colonized and infected patients can be a source for transmission of antimicrobial-resistant organisms to other people largely via healthcare workers (HCWs) and the HCF environment. Detecting colonized individuals via laboratory screening may help reduce the spread of antimicrobial-resistant organisms in HCFs if it is paired with the timely and successful implementation of IPC actions. The goal of colonization screening is to identify possible reservoirs for transmission of antimicrobial-resistant organisms in a HCF and to use that information to prevent their spread .

As described in other guidance documents, GAIHN-AR's primary focus is the detection and subsequent actions for a subset of carbapenem-resistant Enterobacterales (CRE) and carbapenemase-producing carbapenem-resistant Enterobacterales (CP-CRE). This guidance is directed at colonization screening efforts for these organisms; however, many of these same concepts can be applied to other antimicrobial-resistant organisms.

For GAIHN-AR, different types of colonization screening can be utilized:

Contact screening: Refers to colonization screening used during an acute IPC response, such as a containment response, to identify contacts of the index patient who may also be colonized with the organism that triggered the response. For details, please refer to the "Global Action in Healthcare Network – Antimicrobial Resistance Module (GAIHN-AR) Interim Guidance for Containment Activities."

Colonization screening surveillance (focus of this document): Refers to colonization screening used as a prevention activity to reduce the spread of carbapenemases in a HCF. Colonization screening surveillance helps identify colonized people who might later become infected or who will never develop clinical infection but who may be a source of transmission. When used on a continuous, scheduled basis, this type of screening has several benefits including enabling the implementation of IPC actions which may not have otherwise been taken, such as the initiation of Contact Precautions for colonized people. For GAIHN-AR, this type of screening includes both admission screening and routine surveillance screening as described further in below sections.

Targeted Prevention Units

The implementation of colonization screening surveillance can be resource intensive, and thus facilities may choose to focus these efforts initially on prioritized units referred to as Targeted Prevention Units (TPUs) in this guidance for non-US hospitals. A HCF should select TPUs based on the high likelihood of antimicrobial-resistant organism transmission, usually due to the care of many patients at high-risk for antimicrobial-resistant organism acquisition and/or transmission (e.g., multiple invasive devices, prolonged length of stay, etc.), such as Intensive Care Units (ICUs) and/or units with a previous history of antimicrobial-resistant organism outbreaks. Refer to "Global Action in Healthcare Network - Antimicrobial Resistance Module (GAIHN-AR) Interim Guidance for Prevention Activities: Infection Prevention and Control" for more information on TPU selection. For the purposes of this guidance, colonization screening is described within a TPU, but additional units may be included depending on the HCF and resources available.

Colonization Screening Surveillance

Prior to the initiation of colonization screening surveillance, IPC teams should coordinate closely with the laboratory performing the colonization screening to understand:

- Current capacity to support colonization screening efforts, including availability of necessary staffing and supplies for detection and characterization of priority organisms and targeted antimicrobial resistance genes.
- Logistics for specimen collection (i.e., supplies and timing for specimen collection to align with laboratory processes/workflows).
- Testing turnaround times especially for admission screening results.

Then the protocol/system should be established on:

- Proper specimen collection, labeling, and handling.
- Communication/reporting of positive colonization screening results between the laboratory and clinical decision makers such as IPC focal people and other clinicians.
- Tracking of screened patients and their results (tools available at GAIHN-AR External SharePoint site).
- Capacity for IPC actions upon screening results.

Benefits of colonization screening surveillance

Colonization screening surveillance is time consuming and resource intensive, but it can offer several benefits to the HCF, depending upon the laboratory workup performed (e.g., performing broad phenotypic carbapenemase production testing and/or carbapenemase gene or enzyme identification), including:

1. Initiation of IPC actions for colonized individuals (also see the suggested action section):
    - This can be accomplished by performing broad phenotypic carbapenemase production testing or carbapenemase identification; however, HCFs must first decide which IPC actions they will implement based upon the results. For instance, HCFs need to determine if they will institute Contact Precautions after the detection of all CP-CRE identified by broad phenotypic carbapenemase production testing or possibly only for less commonly encountered carbapenemase enzymes or genes. See the IPC capacity section below for implementation considerations of Contact Precautions in HCFs.
2. Rapid identification of carbapenemases for which containment efforts may be indicated:
    - This requires the identification of carbapenemase enzymes or genes from screening specimens.
    - Although this may not be a primary purpose of colonization screening surveillance, if a HCF aims to detect novel (Tier 1 carbapenemases) or non-targeted carbapenemases from screening, a culture-based testing method where both broad phenotypic carbapenemase production testing and carbapenemase gene or enzyme detection must be used as described in the document "Global Action in Healthcare Network Antimicrobial-Resistance Module (GAIHN-AR) Interim Laboratory Guidance for Colonization Screening for Carbapenem Resistant Organisms."
    - More information on containment can be found in the document "Global Action in Healthcare Network—Antimicrobial Resistance Module (GAIHN-AR) Interim Guidance for Containment Activities."

3. Identification of when CP-CRE are imported into a TPU and from what locations:
    - This can be accomplished by admission screening with broad phenotypic carbapenemase production testing or carbapenemase identification; however, carbapenemase identification will provide a more detailed picture of the carbapenemase landscape within the HCF and possibly a geographic region (e.g., a certain region or HCF that has different characteristics of CP-CRE epidemiology) possibly allowing for more targeted interventions.
    - This information could also help determine new locations beyond the TPUs to focus GAIHN-AR efforts if patients colonized are being transferred from other units in the HCF and based on resource availability. For instance, if CP-CRE colonized patients are frequently detected upon admission to the TPU from the same specific units in the HCF, these units may also benefit from instituting GAIHN-AR prevention activities in them.
4. Measurement of a unit's IPC effectiveness in preventing CRE transmission when admission screening is paired with routine surveillance screening (e.g., patients who are not colonized on admission but become colonized on routine surveillance screening can suggest healthcare-associated transmission):
    - This can be accomplished by performing broad phenotypic carbapenemase production testing or carbapenemase identification.
    - See the Routine surveillance screening section below for additional information.

Considerations prior to implementing colonization screening

For the purposes of GAIHN-AR, at a minimum, laboratory workup for both admission and routine surveillance screening should include broad phenotypic carbapenemase production or carbapenemase gene or enzyme identification on CRE isolates; however, some HCFs may choose to do both. This decision should be based on available resources and how the results will be used, as outlined in the section below and in the document "Global Action in Healthcare Network Antimicrobial-Resistance Module (GAIHN-AR) Interim Laboratory Guidance for Colonization Screening for Carbapenem Resistant Organisms."

A HCF must first decide which type of colonization screening will be performed in the TPU: admission and/or routine surveillance. Admission screening is colonization screening that is conducted upon admission to a HCF or unit. It helps identify where patients colonized with CP-CRE are being admitted from (e.g., community setting, long-term care facility, or a separate HCF). Ideally, admission screening occurs as soon as possible or within 24 hours upon admission to a HCF or unit, when feasible.

Routine surveillance screening is a colonization screening performed at some predefined and recurrent frequency (e.g., weekly, every 2 weeks, or as determined by local protocol) on currently admitted patients to a HCF unit. Whether used in conjunction with admission screening or alone, routine surveillance screening can be used as a marker of IPC effectiveness, suggesting possible healthcare-associated transmission (i.e., the patient had a previously negative admission or routine surveillance screening sample, but a subsequent routine surveillance sample detects CP-CRE).

Ideally, both admission and routine surveillance screening should be conducted; however, that is not always feasible given local context and resources. Should HCFs need to limit the type of colonization screening implemented, HCFs should base their decision on their local epidemiology as well as feasibility. The following must also be considered prior to implementation:

1. **Screening prioritization:** Which patients will be screened and when they will be screened (e.g., all admissions, a subset of admissions based on risk factors, patients who have previously tested positive for CP-CRE, frequency of routine colonization screening).
2. **IPC capacity:** What IPC actions will be taken for a positive result, i.e., a sample that identified CP-CRE.
3. **Laboratory capacity:** What the current capacity to support colonization screening efforts is (consider supplies and staffing) and what laboratory methods and workflows will be performed on colonization screening samples and subsequent priority organisms identified (e.g., broad phenotypic carbapenemase production testing and/or carbapenemase gene or enzyme identification).

Screening prioritization

Prioritization of who is screened and when they are screened may differ based on the type of screening performed: admission or routine surveillance.

Admission screening

If resources are available, all patients upon entry to a TPU should undergo admission screening, regardless of whether the patient is admitted from the Emergency Department, a different HCF, or transferred from another unit within the same HCF. However, limited resources may not allow admission screening to be performed or may only allow it for a subset of patients based on risk factors. Selection criteria for admission screening may include:

- Those at highest likelihood of being colonized with a CP-CRE such as patients who have a history of frequent hospitalizations, were hospitalized in the prior 30 days of admission, are chronically exposed to invasive devices (e.g., central lines), have compromised immune systems, or require help with most activities of daily living.
- Those transferred from another unit in the same HCF or from a different HCF, especially a HCF with known CP-CRE transmission or detection of Tier 1 or 2 organisms.

Considerations when Admission Screening is Performed:

- Empirically place patients on Contact Precautions while awaiting screening results if
  - The turnaround time for admission screening results is long (e.g., > 4 days), especially in areas where CP-CRE prevalence is high.
  - The patient is transferring from another unit or different HCF with ongoing CP-CRE transmission.
  - The patient is more likely to transmit CP-CRE such as those with uncontainable secretions or excretions (e.g., incontinent of stool, draining wounds, etc.).

Routine surveillance screening

Ideally, all patients on the TPU not already known to be colonized or infected with a GAIHN-AR priority CP-CRE should undergo routine surveillance screening at some predefined frequency (e.g., every 2 weeks). If resources do not allow for repeat screening of all patients, the HCF could prioritize screening resources for certain patients such as:

- Those at highest risk for CP-CRE acquisition.
- Those who present the highest risk of transmitting CP-CRE to others (e.g., those with incontinence or draining wounds) if they were to be colonized.
- Those who are roomed near or who share equipment or HCWs with a patient with known CP-CRE infection or colonization.

It is important to note that the ideal frequency (e.g., weekly, every 2 weeks, monthly) at which routine surveillance screening should occur is not known but will likely depend upon multiple factors such as available laboratory and unit staffing and resources, average unit length of stay, and baseline CP-CRE prevalence in the HCF. For instance, on units with longer lengths of stay or lower CP-CRE prevalence, less frequent surveillance screening may be needed compared to units with shorter lengths of stay or higher CP-CRE prevalence.

For patients for whom a GAIHN-AR targeted CP-CRE is identified upon admission or routine surveillance screening or by clinical culture, repeat screening for a GAIHN-AR priority CP-CRE is not always necessary. However, for HCFs whose colonization screening laboratory workflow includes the detection of carbapenemase genes or enzymes, repeat screening may be considered for patients with prolonged TPU stays (e.g., greater than 2 weeks). This may be particularly important in areas of high CP-CRE prevalence with multiple carbapenemases in circulation, especially for TPUs with multiple gaps in recommended IPC practices.

If a patient with a history of CP-CRE colonization or infection undergoes colonization screening with subsequent negative results, this does not necessarily indicate they are no longer colonized. Care should be taken when deciding if Contact Precautions can be discontinued based upon these results. Further consideration for the discontinuation of Contact Precautions can be found in Appendix C of the "Global Action in Healthcare Network-Antimicrobial Resistance Module (GAIHN-AR) Interim Guidance for Containment Activities."

IPC capacity

A HCF must decide what IPC actions they are able to undertake in response to a colonization screening sample positive for CP-CRE. These actions are dependent on the capacity of the HCF as well as the epidemiology of CP-CRE in their facility. Ideally, all patients colonized with CP-CRE would be placed on Contact Precautions. However, if resources do not allow for all patients or if the prevalence of CP-CRE is high resulting in a large proportion of patients colonized, the following may be considered when deciding which actions to take:

- For HCFs where CP-CRE is common and the utilization of Contact Precautions for all patients with CP-CRE detected is impractical due to resources, they could consider prioritizing Contact Precautions only for less commonly encountered carbapenemases. For instance, for a HCF where KPC is commonly encountered but NDM is not, Contact Precautions could preferentially be utilized for patients following NDM detection to prevent it from spreading more widely in the HCF. However, this strategy requires laboratory detection to the carbapenemase gene or enzyme level which could strain available laboratory resources.
- Additional considerations for the implementation of Contact Precautions can be found in the "Global Action in Healthcare Network-Antimicrobial Resistance Module (GAIHN-AR) Interim Guidance for Prevention Activities: Infection Prevention and Control."

Laboratory capacity

A HCF must decide the laboratory methods and workflows they will perform on screening samples based upon resources and desired use of the results. For instance, laboratories could identify CP-CRE with broad phenotypic carbapenemase production testing or carbapenemase identification.

HCFs also need to define their goals for use of their screening results (also see above Benefits of colonization screening surveillance section) and then determine how extensive of a laboratory workup to pursue (e.g., detecting CP-CRE using broad phenotypic carbapenemase production testing and/or identifying specific carbapenemase genes or enzymes).

For laboratory screening guidance, please refer to "Global Action in Healthcare Network - Antimicrobial Resistance Module (GAIHN-AR) Interim Laboratory Guidance for Colonization Screening for Carbapenem-Resistant Organisms."

Suggested actions based upon admission and routine surveillance screening results

Prior to the initiation of admission and routine surveillance screening, HCF and IPC teams should decide and clearly document what actions will be taken based upon the screening results, have a plan to implement these actions, and ensure HCWs are aware of these plans and have the necessary resources available to implement the actions. HCFs should also ensure they have a way to track screening results for the patients on the unit to aid in processes such as determining which patients should be screened and calculating healthcare-associated transmission rates (a tracking tool is available at GAIHN-AR External SharePoint site.)

The below sections provide suggested actions following the identification of CP-CRE on a screening specimen. However, HCFs will need to adapt these recommendations based upon current resources and capacities. For simplicity, this guidance assumes that all admission and routine surveillance screening will have at least broad phenotypic carbapenemase testing conducted but not necessarily routine carbapenemase gene or enzyme identification.

Identification of CP-CRE on admission screen or routine surveillance screen

- If not already on Contact Precautions, Contact Precautions should be initiated to include the use of gowns and gloves during the patient's care and placement in a single-patient room with dedicated equipment.
  - If resources are limited, considerations regarding Contact Precaution implementation can be found in the "Global Action in Healthcare Network-Antimicrobial Resistance Module (GAIHN-AR) Interim Guidance for Prevention Activities: Infection Prevention and Control."
- If carbapenemase identification is conducted, the HCF should determine if the identified carbapenemase meets Tier 1, Tier 2, or non-Tier 1 or 2 criteria.
  - If Tier 1 or Tier 2 criteria are met, then containment activities should be initiated as described in the document "Global Action in Healthcare Network-Antimicrobial Resistance Module (GAIHN-AR) Interim Guidance for Containment Activities."
    - Note: Not all HCFs in GAIHN-AR will be conducting Tier 2 containment due to limited resources or already high baseline prevalence of the targeted carbapenemases. Although unlikely to occur, HCFs should be prepared to conduct a Tier 1 containment response (with the support of GAIHN-AR partners if requested).
    - Note: If a Tier 1 or 2 carbapenemase was identified in a patient *upon admission* to the TPU from another unit within the HCF, then containment activities should primarily be focused upon the transferring unit provided the patient was placed on Contact Precautions upon admission to the TPU. If the Tier 1 or 2 carbapenemase was identified upon admission from another HCF, notification and further action should be dictated by national or local public health policies.
  - If multiple patients with the same carbapenemase gene or enzyme are detected, TPUs could consider the establishment of cohorting units with dedicated HCWs and equipment as a way to further reduce the risk of transmission to other patients.

Identification of suspected healthcare-associated transmission (i.e., patient was not colonized on admission or on a previous routine surveillance screen but becomes colonized or infected based upon subsequent testing)

- If not already completed, consider carbapenemase gene or enzyme identification testing for CP-CRE positive isolates. This could allow the TPU to better understand what types of CP-CRE are being transmitted and to possibly take measures to limit further transmission such as cohorting patients with the same known carbapenemases or the initiation of a containment response if appropriate.
- Whenever suspected healthcare-associated transmission occurs, intensified IPC actions (i.e., increased education and training, assessments, and auditing to mitigate gaps identified) should be considered.

If a patient acquires one or more carbapenemases during their hospital stay, this suggests a possible gap in IPC practices to limit healthcare transmission. Current IPC practices should be assessed to determine what gaps in practices may be contributing to this with immediate actions taken to correct them.

- IPC practice assessment tools are available on the GAIHN-AR External SharePoint site.
- Recommended IPC best practices to limit the spread of antimicrobial resistance in HCFs are available in the "Global Action in Healthcare Network-Antimicrobial Resistance Module (GAIHN-AR) Interim Guidance for Prevention Activities: Infection Prevention and Control."

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