

Conducting Health Care-Associated Infection Outbreak Investigations- A Guide for County Health Departments



Health Care-Associated Infection Prevention Program

Bureau of Epidemiology

Division of Disease Control and Health Protection

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Executive Summary

Health care-associated infections (HAI) are a growing concern regarding mortality and morbidity among health care facilities. Health care systems are becoming increasingly complex, with much of the medical care being delivered in outpatient, long-term care, and ambulatory surgery centers. The need for epidemiologists to understand common and novel approaches to investigating outbreaks within health care settings is increasing.

This guide is meant to supplement existing outbreak guidance from the Florida Department of Health. Information provided will help state, county, and local staff involved in investigations to understand and navigate unique challenges within health care systems.

Objectives

1. Provide health care-associated infection outbreak investigation resources to epidemiologists and investigators.
2. Present specific factors related to common health care-associated infections.
3. Provide a framework for public health's role in investigations of health care-associated infections.
4. Enable epidemiologists and investigators to become familiar with health care facility-specific language, quality process improvement, and outbreak investigation from the infection preventionist perspective.

Introduction

Health care-associated infections (HAI) occur in about 1 in 31 patients in the United States due to hospital care according to the 2018 HAI Progress Report (CDC, 2019). The most common infections in the U.S. include pneumonia, gastrointestinal illness, urinary tract infections, bloodstream infections, and surgical site infections from any type of surgery. Since many HAIs are endemic, the challenge includes recognizing the abnormal rise in occurrence. The Florida Department of Health (DOH) should be contacted for any concerns regarding an unusual number of such cases or after the facility has determined that an abnormal increase in cases has occurred. Likewise, DOH should be contacted when organisms with uncommon or novel mechanisms of antibiotic resistance are identified at a health care facility (e.g., *Candida auris*).

Similar to community outbreaks, a (case) patient's underlying conditions and susceptibility to infection can contribute to both initial infection acquisition and transmission. However, unlike community-associated outbreaks, several factors exacerbate outbreaks in health care facilities: the use of invasive devices, procedures, and multiple health care personnel providing care. Procedures include not only surgeries but any interventions or procedures that are physically invasive, for example endoscopy and endotracheal intubation. Another striking difference between community and health care-associated outbreaks is that outbreaks involving an antimicrobial-resistant organism are becoming common.

The looming risk of litigation and the potential reluctance from management and health care personnel to openly discuss the outbreak or potential causes is also unique to HAI outbreaks. This is an important point to keep in mind, since the goal of any outbreak investigation is to expediently control, contain, and prevent future occurrences. Therefore, there may be an unusual amount of pressure to rapidly implement control measures.

Any time DOH needs to assist a facility with HAI rates that are higher than normal, or a novel organism or resistance pattern, start with obtaining the basic information: person, place, time, etc.

To help determine DOH's role in the investigation, gather the information for the basic questions outlined below.

1. Who is the population at risk?
2. Where is the population at risk located?
3. Are patients confined to one floor or unit, one specific cluster of rooms on a floor, several floors/units of the facility, or throughout the facility?

Equally important is noting the location of the infection or colonization. For example, if *Staphylococcus aureus* infections occur:

1. Is it only skin and soft tissue, wound infections, or surgical site infections?
2. When did the first infection or colonization occur?
3. Is the outbreak ongoing or is it diminishing?
4. What is the timeframe under investigation?
5. Also, consider temporal association as appropriate.

Keep these questions in mind as the investigation is initiated and progresses: “What are the possible causes of this outbreak or cluster?” and “Has anything changed in the facility?” They are the basis for inquiry in the endeavor to discover and control the source of the outbreak and ultimately prevent recurrence.

This guide is to be used by county health departments (CHD) when responding to health care-associated infections. While some of the information contained in this document is not specific to the CHD, it is included to provide background of the surveillance and activities that occur in health care facilities. Please use this guide when performing a HAI/AR (antibiotic resistance) outbreak investigation. Understand these investigations are not prescriptive to the steps that follow. Throughout the document, additional references are provided for specific guidance for response. Additionally, since this guide is all encompassing, it will not touch on specific HAIs separately. When investigating HAI outbreaks, please contact the HAI Prevention Program.

Routine CHD Collaboration with Health Care Facilities

County health department epidemiologists are not expected to be experts in the field of health care-associated infections. However, there are steps that can be taken to become familiar with and better prepared to handle a HAI outbreak investigation. Participating in local infection prevention meetings or Association for Professionals in Infection Control and Epidemiology (APIC) chapter meetings will help CHD teams to ascertain emerging threats, issues, and concerns that health care facilities are encountering. Participating in the health care facility infection prevention meetings where infection rates and prevention practices are discussed is another method of collaboration that will aid the CHD in providing support for HAI outbreak investigations.

What is a Health Care-Associated Infection (HAI)?

According to the Centers for Disease Control and Prevention (CDC), a HAI is an infection that occurs while receiving medical care within a health care facility. A health care facility is defined as any location where health care is provided, which can range from a physician’s private practice or small clinic to a large trauma center. www.cdc.gov/hai/surveillance/index.html

What is an Outbreak?

According to Rule 64D-3.028, Florida Administrative Code, an outbreak is an increase in the number of cases of a disease or condition compared to the expected number in a particular period of time and geographical area. For diseases where the expected number is zero, a single case constitutes an outbreak. The isolation of an unusual microbe or a microbe with a certain resistance pattern from a clinical sample could also signify an outbreak.

Why Investigate HAI Outbreaks?

- Protect the public’s health
- Support local health care facilities

- Improve the understanding of an agent, infection, and risk factors
- Ensure control measures are appropriate based on existing literature
- Evaluate effectiveness of control measures
- Support regulatory authorities, who often rely on our findings
- Develop strategies to prevent future outbreaks

Who May Be Involved in an HAI Outbreak?

- Facility Types:
 - Acute-Care Hospitals (ACH)
 - Long-Term Acute-Care Hospitals (LTACH)
 - Rehabilitation Hospitals
 - Dialysis
 - Long-Term Care Facilities (LTCF)
 - Skilled Nursing Facilities (SNF)
 - Ventilator-capable Skilled Nursing Facilities (vSNF)
 - Assisted Living Facilities (ALF)
 - Pharmacies
 - Outpatient Facilities
 - Ambulatory Centers (e.g., outpatient services)
 - Infusion Centers
 - Endoscopy Centers
 - Physician and Dental Offices
- Health Care Facility Staff
 - Infection Prevention Team
 - Quality Management
 - Engineering
 - Administration
 - Health Care Personnel (e.g., physicians, nurses, physician assistants, nurse practitioners, microbiologists, etc.)
 - Allied Health Professionals (e.g., respiratory therapists, occupational therapists, speech therapists, etc.)
 - Environmental Services
 - Licensed Independent Practitioners
 - Contracted Staff
- Florida Department of Health
 - Executive Leadership
 - County Health Department
 - HAI Prevention Program
 - Bureau of Public Health Laboratories (BPHL)
 - Bureau of Epidemiology
 - Medical Quality Assurance (MQA)
- Federal Government
 - Centers for Disease Control and Prevention

- Antibiotic Resistance Lab Network (ARLN)
- Food and Drug Administration (FDA)

Role of the CHD in Response to an HAI Outbreak

CHD epidemiologists play a significant role in a health care-associated outbreak investigation. Depending on the CHDs relationship with health care facilities in the county, CHDs are able to see the big picture and provide epidemiological investigation assistance. Additionally, if reports are received from multiple facilities, the CHD has the ability to bring together the various pieces of information to determine if there is a connection. For instance, Hospital A receives x number of patients from a long-term care facility with infection Z, and Hospital B receives y number of patients from the same long-term care facility with infection Z. If both hospitals report to the local CHD, then common trends can be determined about the patients from the long-term care facility with infection Z.

All investigations will not be handled in the same manner; however, gathering pertinent information and contacting the facility will be instrumental in your investigations. Upon confirmation of laboratory results, the CHD will ensure that proper transmission-based precautions are being followed within the facility, per CDC guidance at www.cdc.gov/infectioncontrol/basics/transmission-based-precautions.html. In addition, an Infection Control Assessment and Response (ICAR) site visit, in coordination with the HAI Prevention Program, may be conducted if agreed upon by the facility. The ICAR will provide insight into the infection prevention program, policies, and practices, and point out gaps in the facility's program (see page 21 for more information). Consulting with the HAI Prevention Program and CDC as necessary, decide on the need for active surveillance culturing (ASC). ASC identifies patients colonized with a particular organism who are not showing symptoms. A few examples of ASC are point-prevalence studies, and admission and discharge screening (see page 24 for more information). Screening and contact investigation will depend on the organism, resistance mechanism, facility type, and consultation with the HAI Prevention Program.

The CHD is the primary facilitator during the outbreak investigation and follow-up; the HAI Prevention Program is a resource for assistance in response. The CHD is responsible for communicating with the facility to collect patient information and to assist with case finding. Using epidemiologic techniques, the CHD will assist in creating a timeline of events and determining the risk of transmission to patients, health care workers, visitors, and facility staff. Based on information provided to the CHD, linkages to outbreaks in the community or in other health care facilities can be made. The CHD may also assist with coordinating laboratory support at BPHL and, if necessary, the ARLN and CDC.

During outbreak investigations, Central Office and the CHD may reach out to the CDC for additional recommendations and guidance for case definitions and case finding. In addition, CDC has guidance for the initial response to contain novel or targeted MDROs that is adhered to by the HAI Prevention Program:

www.cdc.gov/hai/pdfs/containment/Health-Response-Contain-MDRO-H.pdf

Health Care-Associated Infection Surveillance

Surveillance is an important component of any infection prevention program. Surveillance activities aid infection preventionists (IP) to identify outbreaks, target areas of concern, and provide insight if implemented practices lead to improved outcomes (a reduction in infections). Infection prevention programs will conduct surveillance to identify current baseline rates of disease or events, monitor compliance with best practices, and comply with state and federal regulations. Most infection prevention programs perform targeted surveillance with a focus on a facility's particular unit(s), laboratory surveillance of epidemiologically significant organisms (e.g. *Clostridioides difficile*, methicillin-resistant *Staphylococcus aureus*, carbapenem-resistant Enterobacteriaceae, *Candida auris*), specific types of surgery or procedures (e.g., colon and hysterectomy), and specific types of infections associated with medical devices (e.g., catheter-associated urinary tract infections, central line-associated bloodstream infections).

The National Healthcare Safety Network (NHSN) case definitions are used in Infection Prevention Surveillance in acute-care facilities. These definitions are used to define infections based on specific criteria, including clinical and laboratory data. Often, outbreaks of HAIs may not be initially detected. Routine surveillance by infection preventionists (IPs) or quality improvement personnel rely heavily on retrospective review to determine rates of infection. Review of infection prevention measures by trained IPs may reveal unusual trends or patterns that may not be apparent to clinicians treating patients. Infection prevention staff often can detect patterns across units, facilities, and treating physicians, leading to further investigation to determine causes and sources.

IPs in long-term care facilities and smaller acute-care facilities are usually tasked with multiple duties. Not only does this make it difficult to detect an outbreak, the IP with multiple duties will require more support than an acute-care IP in a well-resourced facility.

Surveillance in long-term care may differ from that in Acute-Care due to the Minimum Data Set (MDS) requirements and surveillance definitions used. Some long-term care facilities opt to use the *McGeer Criteria for Long Term Care Surveillance Definitions*, which were developed specifically for this setting but are very different from the NHSN criteria. For more details about the NHSN long-term care surveillance definitions, go to www.cdc.gov/nhsn/LTC/index.html.

Within acute-care hospitals, IPs are often employed to monitor trends and lead HAI outbreak investigations. Since many HAIs are not reportable diseases to DOH (such as *Clostridioides difficile* infection [CDI], central line-associated bloodstream infection [CLABSI], surgical site infection [SSI], catheter-associated urinary tract infection [CAUTI]), immediate notification to public health may not occur. However, facilities should **be reporting any novel organisms and resistance patterns or outbreaks to the CHD**. Facility infection prevention departments may initiate and conduct their own internal investigations. Due to surveillance periods (e.g., surgical procedure-related infections have a surveillance window of 30-90 days), these investigations are often lagging indicators of transmission. Length of stay can be relatively short for certain procedures and episodes as care transitions to a more outpatient-focused model, meaning patients may be discharged or transferred to a step-down facility before anomalous trends are detected by the hospital staff.

Clues and unusual events that may trigger an outbreak investigation include, but are not limited to:

- A significant increase in CLABSI, CAUTI or SSI above usual baseline.
- A significant number of patients in a ward or geographic location placed on contact isolation.
- An unusually elevated number of positive blood cultures for a specific organism.
- An unusual organism detected by blood culture (e.g., carbapenem-resistant Enterobacteriaceae [CRE], multidrug-resistant [MDR] *Acinetobacter baumannii*).
- Elevation or unusual patterns of drug resistance within patient populations.
- Reported breaches in infection control technique leading to infection (e.g., sterilization failure, surgical procedure breaches, equipment malfunction or failure in heating, ventilation, and air conditioning [HVAC]).

In the following sections of this guide, the steps in an outbreak investigation, although not sequential, are detailed with tasks that are imperative during an investigation by the CHD. Some of the information is also presented from the facility perspective, to give the CHD an idea of surveillance methods and processes within a health care setting.

Health Care-Associated Infection Outbreak Characteristics

Health care-associated outbreaks can be multi-causal and are usually associated with lapses in infection prevention or clinical practices, contamination of a device or product during production or during use, or colonization and infection of patients or health care personnel. Visitors to facilities can also be the source of communicable disease outbreaks.

- Diseases not typically seen within the community setting or in common outbreaks
- Occur when there are lapses in infection prevention practices
- May be identified through surveillance data
 - Culture reports
 - Infection surveillance
- May be identified through nationwide outbreak notices and recalls
- Examples:
 - Significant transmission of *Clostridioides difficile* within a skilled nursing facility (SNF)
 - Increase in deep wound infections, above the facility's baseline rate, following cardiac bypass surgery in an ACH
 - Outbreak of drug-resistant bacteria following laparoscopic surgery at an ambulatory surgery center
 - Significant increase in central line-associated bacteremia in a neonatal ICU in an ACH
 - Increase in device-associated infections, above the facility's baseline rate
 - Transmission of CDI after an endoscopy procedure
 - Transmission of hepatitis B in an LTCF
 - Patients with septic knee after receiving joint injections in a physician's office
 - Bacteremia in patients receiving chemotherapy in an outpatient infusion center
 - Recall of medical devices or medicine preparations due to defective or contaminated products or devices
 - Recovery of targeted pathogens above the facility's background rate
 - Unusual organism from a surgical wound culture

Outbreak Investigation

Outbreak investigations in health care settings follow many of the same common steps as community-based outbreaks. The differences may be found in the composition of teams (including quality, clinical, administration, laboratory, and other stakeholders of the facility), the methods of data collection relevant to the specific infection, and the order of the steps. See the Guide to Surveillance and Investigation for more details on general outbreak investigations:

[www.floridahealth.gov/diseases-and-conditions/health-care-associated-infections/ documents/guidelines-for-prevention-and-control-mdro.pdf](http://www.floridahealth.gov/diseases-and-conditions/health-care-associated-infections/documents/guidelines-for-prevention-and-control-mdro.pdf)

HAI outbreak investigations, like any outbreak investigation, can be broken down into multiple components. Each component has numerous steps that usually do not follow a specific order and can potentially occur simultaneously (APIC *Text of Infection Control and Epidemiology Online*, 2016). In most instances, the steps will depend on facility and organism type and can be repeated several times throughout the investigation.

While CHD involvement may not occur until later in the HAI outbreak investigation, it is important to know what steps the facility has gone through to identify cases and to detail their process for conducting surveillance.

There are times when the HAI Prevention Program is alerted by BPHL of isolates coming directly from a health care facility without notification of the CHD. In these cases, upon notification of an isolate being tested or sent out, the HAI Prevention Program will notify the corresponding county of the patient to follow up with the facility. Empiric precautions should be initiated if the patient is at the facility until confirmatory testing is completed (see additional information below). Examples of outbreak investigations are included in Appendix 2.

Key Points During an Outbreak Investigation

Being systematic is important, however not all outbreaks follow the same methodology. It is also important to ask the same questions of everyone interviewed within each outbreak. For example, when interviewing the infection prevention department staff, be sure to ask all members the same questions. This is particularly important since surveillance and other work can be divided very differently from one department to the next. Some facilities assign IPs to specific types of infections; others to cover specific units. An IP assigned to an ICU may be responsible for all surveillance related to that particular unit. Therefore, perspectives may be very different among IPs. Reassess what is known and what is not known frequently throughout the investigation to gain further insights. Line lists and epidemic curves are powerful tools that provide helpful information. In some instances, the investigation may not need to go beyond this point.

CHDs should notify the HAI Prevention Program of any potential HAI or MDRO outbreaks reported to the CHD.

Initial Investigation

The first steps in the initial investigation need to be completed in a timely manner. The steps in determining a method of response will be conducted in collaboration with the HAI Prevention Program. HAI investigations are multifaceted and can be carried out through the CDC's *Interim*

Guidance for a Health Response to Contain Novel or Targeted MDROs, laboratory surveillance, and comparing baseline and current rates in NHSN, etc. The remaining portion of this section will provide context in the approaches used by the HAI Prevention Program in determining a containment strategy.

First, we will use the CDC's *Interim Guidance for a Health Response to Contain Novel or Targeted MDROs* (www.cdc.gov/hai/pdfs/containment/Health-Response-Contain-MDRO-H.pdf) to guide the response plan, which is dependent on the organism(s) of interest.

Confirm Existence of an Outbreak

CHD investigators should work with the facility's IP department (in other settings this could be the director of nursing [DON], medical assistant [MA], or infectious disease [ID] doctor) to ensure that there is a true understanding of an HAI outbreak workup and appropriate steps are taken:

- Initial case review/investigation: Review medical records and remain in contact with the HAI Prevention Program for next steps in the investigation. Notify and explain the situation to the IP.
 - Organism(s)
 - Tier of organism that is prompting response (Appendix 3)
 - Next steps
- Inquire and request patient(s) medical records from the IP or delegated authority, which may consist of the following:
 - Admission notes
 - History and physical (H&P)
 - Microbiology reports from the time of admission to current date
 - Progress notes
 - All units and rooms from which the patient has been moved. Are all rooms the patient has been in single-patient rooms with a private bathroom? If not, identify which locations and dates the patient was not on transmission-based precautions and had a roommate.
 - Date of when the patient was placed on transmission-based precautions (e.g., empiric precautions, contact precautions, droplet precautions, airborne precautions)
 - Any travel or health care exposures outside of the US in the past 12 months
 - Discharge notes (if applicable)

Currently, most MDROs are reported to DOH through laboratory isolates or IPs from facilities. However, future identification of infections may depend on how the facility is defining the infection. For example, are they using the NHSN surveillance definition or clinical criteria? If the facility is using NHSN surveillance definitions to define the cluster or outbreak, then the infection prevention department may have baseline surveillance data for comparison. However, if clinical criteria are used, one option is to perform a retrospective chart review to obtain a baseline for comparison to determine if an outbreak or cluster is occurring. If the concern is infection caused by a particular organism, another option is to obtain an organism-specific report from the microbiology lab for a relevant time

period (to perform retrospective laboratory surveillance), such as 6-12 months prior to the start of the outbreak, to help determine if the perceived increase in infections is borne out by the available data. Lastly, if a baseline is not readily available or feasible to obtain, discuss with the HAI Prevention Program to determine if the initial perception of an increased incidence is agreed upon.

If a clinician initially noted the outbreak and surveillance reports are not available for the type of infection or colonization that is of concern, then a decision must be made about how to proceed. Several options are available and the sense of urgency for the specific investigation may play a role. Options include:

- Initiating an outbreak investigation based on the perception of clinicians.
- Establishing a baseline rate from lab reports or medical records to compare to the current rate.

Alert Key Partners About the Investigation

At the outset of an investigation, it is important to alert key partners of the outbreak and impending investigation and provide as much information about needed resources. If not already looped into the investigation, the HAI Prevention Program should be alerted. Additional key partners that need to be notified of the investigation in a timely manner include but are not limited to:

- Health care facility's administration (note: this can be done by the CHD or the IP)
- Health care facility's microbiology department (e.g., onsite, offsite, or contracted service)
- Regulatory agency (e.g., AHCA)

On the facility side, administration, infection prevention, hospital epidemiology, risk management, and public affairs are all examples of key stakeholders that play a role in the investigation to some degree. The IP will usually alert these entities, as they see fit. Equally important is notifying the facility microbiology lab that: 1) additional cultures may be needed; 2) by way of the IP, if lab work is done in house, request the lab hold isolates for the duration of the investigation, in case additional testing is needed; 3) the lab should notify infection prevention of any additional cultures of the same organism or infection (e.g. positive blood cultures or CRE cultures) to aid in the investigation.

Establish a Preliminary Case Definition

Develop a case definition that is narrow enough to focus investigative efforts, but broad enough to capture the majority of cases. However, case definitions vary on a case-by-case basis. The HAI Prevention Program will assist in the development of the case definition.

Outbreaks of rare pathogens may allow for a broader definition (e.g., any case where *Raotella planticola* were recovered), whereas those outbreaks with more common pathogens will require more stipulations (e.g., *Enterococcus faecalis* joint infection following stem cell injection with product AB).

Contact Investigation

Once findings from the medical record extractions are conveyed to the HAI Prevention Program, the next steps in the containment strategy may require a contact investigation through laboratory

screening. Implementing a contact investigation will depend on the situation (e.g., outbreak of an MDRO or detection of ongoing or “permanent” colonization in patients [endemic rate] that may or may not result in illness). Laboratory screenings for contact investigation vary and may consist of one or several of the following:

- Roommate screening
- Contact screening (e.g., patients who overlap in time and location)
- Point-prevalence screening (e.g., screening of an entire facility, units, departments, etc.)
- Household contact screening
- Admission screening
- Discharge screening

Descriptive Epidemiology

- Name
- Date of birth
- Date of admission
- Date of discharge (if applicable)
- Location of patient(s); room number(s)
- Shared room
- Isolation type (e.g., contact, droplet, airborne)
- Clinical presentation
- Presence of indwelling devices (e.g., urinary catheters, central lines, feeding tubes)
- Treatment regimen
- Dates of invasive procedures
- Micro results, (species, specimen source)

A standard line list template is included in Appendix 4. Please follow this template to begin your line list.

After collecting the necessary information, the CHD should report the findings to the HAI Prevention Program. As the subject matter experts (SME), the HAI Prevention Program can consult with the CHD about the necessary steps to be taken in the investigation, help establish a plan of action and containment strategy, and offer guidance/resources throughout the investigation.

Epidemic Curve

Create an epidemic curve to uncover the type of transmission involved (e.g., common source). Epidemic curves are a type of histogram that plot the date of onset and cases over time. In an HAI investigation, an epidemic curve would plot the date of diagnosis, specimen collection or other agreed upon variable date as the onset date, and the number of cases for each date.

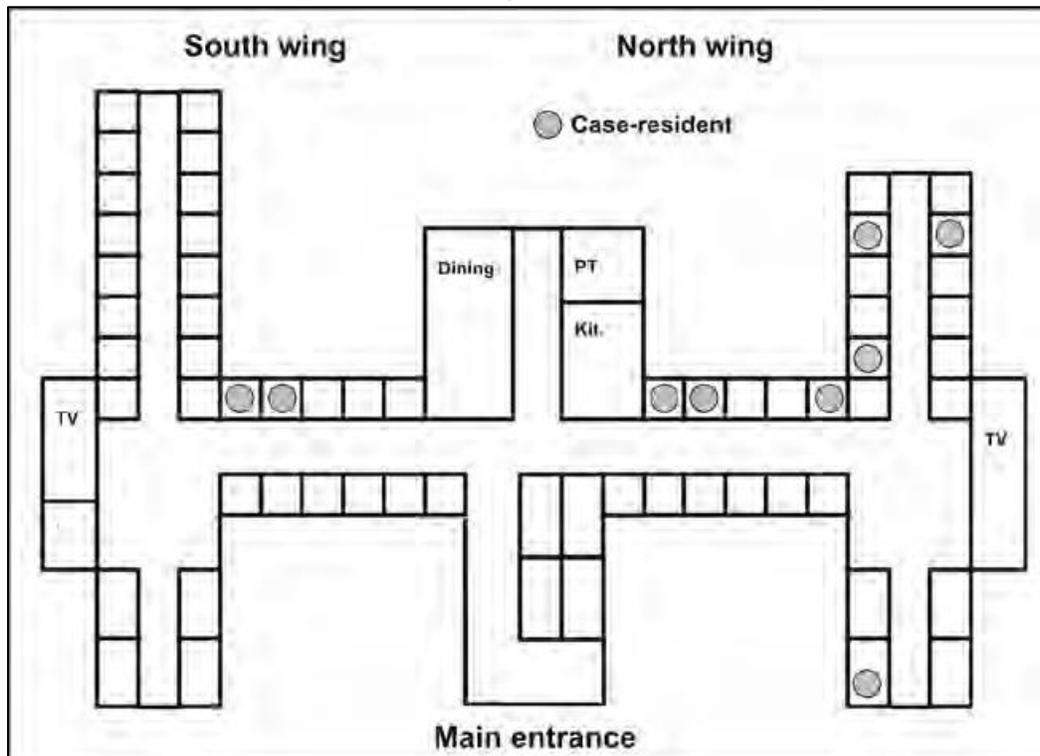
For more information about constructing an epidemic curve, see www.cdc.gov/training/QuickLearns/CreateEpi/.

Geographic Mapping

A helpful tool during an inpatient HAI investigation is a modification of a geographic map frequently used in epidemiology. This type of map is also known as a spot map or a space map. Briefly, draw the unit(s), label the room numbers, and mark the rooms containing cases to get a picture of transmission. This information will provide clues to track spread by water, air, person-to-person, and distribution route of contaminated items.

Example of a Geographic Map:

Cases of Pneumonia by Room, Nursing Home A — New Jersey, 2001 (CDC)



In reference to the figure: As the CDC investigation progressed, they learned that the two affected patients on the south wing spent time on the north wing. This information diminished the need to look at both units for clues. A cluster of cases in a wing or unit suggests a common source or person-to-person spread. Scattered cases throughout the facility suggests a source that is not tied to room assignment or wing, such as a dining hall in long-term care or the water supply. According to the CDC: “To look for clustering in an outbreak of surgical wound infections in a hospital, cases may be plotted by operating room, recovery room, and ward room. In studying ‘sick-building syndrome’ and other disorders related to air-flow patterns in buildings, cases should be plotted by work location.”

Retrospective Laboratory Surveillance

Notify the facility laboratory to save isolates early in the outbreak investigation so additional and/or confirmatory testing (e.g., pulsed-field gel electrophoresis [PFGE] or whole-genome sequencing [WGS]) can be performed, if needed. When speaking with BPHL, find out if they can perform the specific testing that may be required or arrange for specimens to be sent to the CDC or the ARLN in coordination with the HAI Prevention Program.

Prospective Laboratory Surveillance

Prospective laboratory surveillance is an approach to actively screen specimens for the organism of interest for an extended period of time. Some mechanisms of resistance and organisms are not screened/tested for at the health care facilities' laboratories. If this is the case, the CHD may be asked to arrange for isolates of a specific type to be forwarded to BPHL. Please note that forwarding isolates for prospective laboratory surveillance is applied on a case-by-case basis and is upon the request of the HAI Prevention Program Manager.

Active Surveillance Culture (ASC)

ASC is a form of microbiological surveillance used to identify patients **colonized** with a targeted MDRO, particularly if methods to control transmission are failing. ASC was first introduced for methicillin-resistant *Staphylococcus aureus* (MRSA) and vancomycin-resistant *Enterococcus* (VRE), although not commonly surveilled at present. ASC has expanded to include multidrug-resistant *Acinetobacter baumannii* (MDR Ab) and CRE.

Surveillance is targeted and includes various elements:

- Develop a written ASC plan
- Determine a methodology for collecting cultures including specific body sites based on organism(s)
- Define the population to be studied
- Identify outcome or process to monitor
- Select a time period (anticipated length)
- Define screening methods, such as direct specimen PCR or chromogenic agar medium with an ideal turnaround time of <24 hours
- Identify key stakeholders
- Obtain permission from the patient or responsible party
- Implement transmission-based precautions (usually contact precautions) until results are finalized

When should an ASC program be implemented?

Active surveillance cultures are helpful when screening is available for organisms that are difficult to prevent transmitting from patient to patient. ASCs do not require waiting for a culture that was obtained for clinical identification and treatment.

Examples of ASC Programs

- MRSA outbreak in a high-risk setting (e.g. ICU, NICU, surgery patients)
- MRSA endemic rate above acceptable and defined baseline
- Multidrug-resistant *Acinetobacter baumannii* (MDR Ab) outbreak in an ICU setting (e.g., ventilator-associated pneumonia [VAP])
- CRE in high-risk patients (e.g., UTI/sepsis in the bone marrow transplant unit)
- MRSA transmission reduction/prevention program

Who should institute an ASC program?

As a part of the containment strategy, CHD personnel should work with the HAI Prevention Program, facility's IP department, and laboratory (e.g., ARLN and BPHL) to determine the logistics of instituting active surveillance cultures based on the information obtained from the line listing or other key data provided by the facility.

Implementing an ASC program will depend on the situation (e.g., outbreak of an MDRO or detection of ongoing or "permanent" colonization in patients [endemic rate] that may or may not result in illness). For example, a hospital may be struggling with an ongoing colonization rate of MRSA in their NICU. They may have had one infection previously that alerted them to a possible problem and decided to implement ongoing screening. ASC programs will most likely assist the facility and CHD with identifying patients sooner than obtaining lab culture results and necessary precautions can be taken.

Observing and Reviewing Potentially Implicated Patient Activities

Since outbreaks are frequently the result of a failure to follow appropriate infection prevention and control practices, the next logical step is to observe practices. All processes up to this point have prepared the investigator for this step. The line listing, type of infection, and organism can guide the outbreak investigator regarding where to look (location) and the types of activities to observe.

ICAR Assessment

One of the potential next steps in the containment strategy may include conducting an ICAR. The HAI Prevention Program will guide and/or assist the CHD with conducting the ICAR assessment.

The CDC's ICAR tool can be used by CHDs to assess infection control practices, address gaps, determine competency and auditing, and guide CHDs through site visit domains at various facility types. The forms can be found on the CDC's Infection Control Assessment Tools webpage at: www.cdc.gov/hai/prevent/infection-control-assessment-tools.html.

- Policy and Procedures
 - It is important to review facility policies and procedures while keeping infection prevention best practices in mind. Requesting the policies and procedures from the IP prior to conducting the ICAR assessment is vital in receiving the necessary documents to complete the final ICAR report. Helpful infection control policies and procedures to request are:

- Hand hygiene
- Personal protective equipment
- Transmission-based precautions
- Environmental cleaning
 - Patient room cleanings (e.g., daily and terminal)
 - Environmental cleaning policies that apply to the epidemiological findings (e.g., operating room terminal cleaning, etc.)
 - Policies that may apply to the investigation (e.g., bronchoscope/endoscope reprocessing, catheter insertion and maintenance, injection safety, etc.)
- Competency-based trainings: The ICAR assessment form evaluates the health care facility's trainings that are provided annually and upon hire. During the ICAR assessment, the CHD and HAI Prevention Program will inquire about the processes required for infection control trainings.
- Hand Hygiene Observations
 - Hand hygiene should be monitored by using the "5 Moments for Hand Hygiene" criteria developed by the World Health Organization (www.who.int/infection-prevention/campaigns/clean-hands/5moments/en/). Hand hygiene should be conducted before and after the following: 1) before patient contact (i.e., before entering patient room), 2) before any procedure, 3) after contact with the patient's environment, 4) after contact with blood or body fluids (i.e., after changing gloves and removal of PPE), and 5) after patient contact.
 - When conducting hand hygiene observations, the preferred method for recording observations is the iPhone mobile application iScrub Lite (version 1.5.3, 2018, SwipeSense, Inc). iScrub Lite is an approved application through the Florida Department of Health Comp Portal. Please see Appendix 5 for standardization guidance.
- Personal Protective Equipment Observations
 - PPE observations can be done in concurrence with the hand hygiene observations. Using a mobile application, such as iScrub Lite, can be helpful. During these observations, evaluators should observe whether the appropriate PPE is being used and the sequence of donning and doffing. Please see Appendix 6 for standardization guidance.
- Environmental Cleaning
 - The health care facility environment plays a large role in many HAI outbreaks. Understanding the processes for daily and terminal patient room cleanings is vital to the investigation. CHDs and the HAI Prevention Program will observe environmental cleaning.
 - See Appendix 7 for environmental cleaning rubric.
- Observing Environmental Services (EVS) involves looking at the following:
 - Do all EVS workers use the same disinfectant to clean patient rooms? For example, if the policy states bleach should be used for CDIs, is it consistently used by EVS?
 - Is the disinfectant diluted and applied according to manufacturer's instructions? Over- or under-diluting a disinfectant will decrease efficacy, as will not allowing the

disinfectant to remain wet on the surface long enough. In addition, is the EVS worker adhering to the disinfectant's contact time (e.g., the amount of time required for a surface to remain wet in order for germicidal activity to take place).

- Does the EVS staff clean following a top-down method, moving from clean to dirty surfaces?
- Patient Care Observations
 - Other observations may be necessary, but are dependent on epidemiological findings from medical record extractions (e.g., urinary catheter insertion and maintenance, bronchoscopy, endoscopy, surgical technique, device reprocessing, etc.). These observations will be conducted with the assistance from the HAI Prevention Team.
- ICAR Report and Recommendations
 - Upon completion of the ICAR, the CHD will be expected to provide the facility with a written final ICAR report. The HAI Prevention Program is available to provide assistance when writing the report and offering appropriate infection prevention recommendations for the facility.
 - The ICAR can be used to provide insight into initial control measures that should be implemented based on review of policies and observation of practices. Control measures are based on what is known about the outbreak during the investigation, so these may change as additional information becomes available. Do not hesitate to implement several control measures throughout the investigation, since the goal is to halt transmission. Empiric precautions were addressed earlier in this guide; however, once a definitive diagnosis is confirmed, initiating proper transmission-based precautions is important to prevent transmission. The patient(s) may already be on isolation and this should be continued as per facility policy and procedures and recommendations.
 - An example of a control measure that may be implemented based on ICAR observations is the standardization of patient room cleaning procedures. For example, EVS is observed on multiple occasions going from dirty to clean within the patient environment or using one moistened rag for multiple surfaces. This would call for the CHD to provide recommendations on cleaning and disinfection practices. Another example could include gaps in hand hygiene during a procedure. For instance, one observes a respiratory therapist suctioning a patient. During the suctioning procedure, the respiratory therapist steps away from the patient and touches the patient's bedside intravenous (IV) pole. The respiratory therapist then resumes the suctioning procedure with the patient. During the entire process, the observer does not observe the respiratory therapist change gloves or perform hand hygiene when going from areas of high contamination to areas of low contamination (e.g., dirty to clean). This observation would provide the CHD with an opportunity to provide recommendations surrounding the "5 Moments for Hand Hygiene" from the World Health Organization. Both examples are considered control measures and are essential to provide to a health care facility during an investigation.
 - Note: There are no laws or regulations to govern when to close units or departments. However, this may be decided after implementing several rounds of various control

measures and would be at the discretion of the regulatory agency (e.g., ACHA) and/or the facility.

Environmental Sampling

Although environmental sampling is frequently seen as a first step, sampling should only be performed if epidemiologically indicated. Environmental sampling will be determined on a case-by-case basis and in collaboration with the HAI Prevention Program.

Implement Initial Control Measures

Transmission-Based Precautions

Empiric Precautions

Empiric precautions are commonly initiated to preemptively place a patient on transmission-based precautions to prevent potential transmission of an illness or condition while a medical diagnosis is pending. Additional factors that may require empiric precautions include clinical signs and symptoms, suspicion of a specific pathogen, or identification of a pathogen. Precautions should be continued as per the definitive diagnosis (if available) or for the duration that the patient is considered at risk of transmitting infection. Precautions can be discontinued on a case-by-case basis in collaboration with the HAI Prevention Program. Upon initial notification, if the patient is not currently on transmission-based precautions, the CHD should initiate empiric precautions that are specific to the pathogen's mode of transmission.

Contact Precautions

Contact precautions are commonly implemented for conditions/MDROs that are transmitted from person to person. Common infections and colonization of MDROs that may require contact precautions include: *Candida auris*, CDI, CRE (e.g., KPC, IMP, NDM, OXA 48, VIM), MDR-*Acinetobacter baumannii*, etc. In health care settings, these MDRO modes of transmission include:

- Direct or indirect contact with the patient or the patient's environment
- Contaminated shared medical equipment
- Lapses in environmental cleaning

When managing and containing the spread of MDROs, patient placement, appropriate signage, adherence to hand hygiene, proper PPE usage, and standardized environmental cleaning procedures are important. See each point below for further explanation. It may be necessary to explain to facilities what they should do with each element and the importance of each.

- Patient placement
 - In general, it is best to place patients requiring contact precautions in a single-patient room.

- When single-patient rooms are not available, cohort patients with the same organism in the same room or patient-care area. However, empiric precautions are initiated when the identity of a disease or organism is not available, and therefore placement should be decided on a case-by-case basis.
 - When cohorting patients with the same disease or organism is not possible, place the affected patients in rooms with patients who are at low risk for acquisition of the specified disease or organism and associated adverse outcomes from infection and are likely to have short lengths of stay.
 - In addition to cohorting patients, staff should be dedicated (staff cohorting) to patients with the same organisms. This assists in preventing the spread of organisms via hand carriage from person-to-person. Staff cohorting is not necessarily providing one-on-one care, but recommending the facility strategically alter the health care worker (HCW)-to-patient ratio to reduce the risk of transmission.
- Travel staff (e.g., contracted services, physical therapy, occupational therapy, speech therapy, etc.) should provide services to patients with the organism of interest last in the day.
- Patient Transport
 - Health care facilities (i.e., ACH, LTACH, LTCF, and others) should be advised to limit transport and movement of patients outside of the room to medically necessary purposes. When transport or movement in any health care setting is necessary, ensure the HCW covers and contains the infected or colonized areas of the patient's body with a clean linen sheet prior to transporting the patient. Additionally, the HCW should doff and dispose of PPE and perform hand hygiene prior to transporting patients on contact precautions. Once the patient and HCW have arrived at the transport destination, the HCW should perform hand hygiene and don the appropriate PPE (i.e., gown and then gloves). HCWs may don additional PPE as it pertains to standard precautions.
 - Appropriate Signage
 - The health care facility must post the applicable transmission-based precaution signage on the patient's door to communicate the patient's isolation status to all staff, visitors, and patients who may enter the room. Signage should clearly identify the type of transmission-based precautions (e.g., contact, droplet, airborne, special enteric, etc.) that an individual must adhere to upon entrance to the room. A "Stop See Nurses Station" sign is not adequate in relaying the type of transmission-based precaution. See Appendix 8 for signage.
- Adherence to Hand Hygiene

- CHDs should remind health care facilities that the CDC recommends HCWs conduct hand hygiene with alcohol-based hand rubs in most instances, but hand washing with soap and water should be conducted in the following instances:
 - When hands are visibly soiled
 - When providing care for a patient with *C. diff* or norovirus
 - Before eating
 - After using the restroom
 - Proper PPE Usage
 - For patients in contact precaution rooms, HCWs are required to wear gowns and gloves when coming in contact with the patient’s environment or providing patient care.
 - Donning of PPE:
 - Guidelines provided by the CDC includes the proper sequence in which HCWs should don PPE. Sequence of donning upon entry to contact precaution rooms **must** occur in the following order: 1) perform hand hygiene, 2) don gown, and 3) don gloves. See Appendix 6 for CDC-recommended sequence for donning and doffing of PPE.
 - Doffing of PPE:
 - Guidelines provided by the CDC include two examples in which HCWs should doff PPE.
 - Example one of doffing PPE prior to exiting a contact precaution room **must** occur in the following order: 1) doff gloves one hand at a time, 2) doff gown, and 3) perform hand hygiene. See Appendix 6 for step-by-step instructions on appropriate doffing using example one.
 - Example two of doffing PPE prior to exiting a contact precaution room **must** occur in the following order: 1) doff gown and then gloves as one piece while rolling inside out and away from the body, and 2) perform hand hygiene. See Appendix 6 for step-by-step instructions on appropriate doffing using example two.

Note: Gowns are to be removed when leaving the patient room, and changed when they become soiled and when moving between patients sharing a room. Gloves should be changed when they become contaminated, compromised (e.g., torn or ripped), and when moving from dirty to clean tasks. Additionally, if a room is shared, gloves are to be changed between providing care to patients.

- Standardized Environmental Cleaning Procedures
 - Health care facilities should be advised to ensure that contact precaution rooms are prioritized for frequent cleaning and disinfection (i.e. at least daily) with a focus on high-touch surfaces (e.g., bed rails, bedside table, bedside commode, lavatory surfaces in patient bathrooms, doorknobs, call light, etc.) and equipment in the immediate vicinity of the patient. Additionally, health care facilities should be reminded that environmental

service workers must adhere to proper PPE usage when cleaning and disinfecting rooms of patients on contact precautions. Hand hygiene should be performed before donning gloves, between glove changes, after doffing gloves, before handling clean linen, after collecting and bagging trash, and after bagging soiled linen.

- Patient-Care Equipment: Health care facilities may use disposable non-critical patient-care equipment (e.g. blood pressure cuffs, stethoscopes, glucometers, etc.) or implement patient-dedicated use of such equipment during an outbreak. If use of non-critical care equipment for multiple patients is unavoidable, clean and disinfect such equipment using hospital-approved disinfectants before use on another patient. In the case of *C. diff* or *Candida auris*, a sporicidal agent must be used to achieved adequate disinfection.

Note: Droplet and airborne precautions require much of the same measures as are required by contact precautions. Hand hygiene should always be practiced as described in the aforementioned section. The major differences are highlighted in each section below.

Droplet Precautions

Droplet precautions are implemented for conditions that are transmitted via respiratory droplets. Common infections and colonization of MDROs and infectious agents that may require droplet precautions include *Neisseria meningitidis* and influenza.

- Patient Placement
 - Follow guidelines in the contact precautions section. Patients sharing the same room must be spatially separated by at least 6 feet.
 - Applicable signage must be posted on the door and the patient's isolation status communicated to all staff who may enter the room.
 - The patient's room door may remain open and special air handling and ventilation are not necessary. The patient should also be educated on respiratory hygiene and cough etiquette.
- Patient Transport

Patient movement and transport must be limited to essential purposes only. If movement or transport becomes necessary, place a mask on the patient to minimize dispersal of droplets.
- PPE
 - Masks
 - Regular isolation or procedure/surgical masks must be worn upon entering the patient-care area (i.e., working within three feet of the patient), in addition to standard precautions. See Appendix 6 for sequence of donning and doffing. Masks must be changed frequently as they can become wet and porous.

Airborne Precautions

Airborne precautions are implemented for conditions that are transmitted by organisms that are able to travel long distances and remain in the air. Common infections and colonization of MDROs and infectious agents that may require airborne precautions include tuberculosis, measles, and varicella-zoster virus.

- Patient Placement
 - Patient must be placed in a private room, preferably a negative-pressure controlled environment (Airborne Infection Isolation Room [AIIR]) with the door closed at all times.
 - If an AIIR room is not available, persons with suspected or confirmed infectious TB disease should wear a surgical or procedure mask, if possible. Patients should be instructed to keep the mask on and to change the mask if it becomes wet. If patients cannot tolerate a mask, they should observe strict respiratory hygiene and cough etiquette procedures. Applicable signage must be posted on the door and the patient's isolation status communicated to all staff who may enter the room.
- Patient Transport
 - Patient(s) should receive as much care as possible in the room.
 - If the patient needs to leave the room, a surgical or procedure mask should be worn at all times and changed if it becomes moist.
- PPE
 - Staff members who enter the room of a patient suspected of having TB must wear an N95 respirator mask that has been fit-tested by a qualified staff member, or a powered air purifying respirator (PAPR). See Appendix 6 for sequence of donning and doffing.

Guidelines for Preventing the Transmission of Mycobacterium tuberculosis in Health Care Settings 2005. www.cdc.gov/mmwr/pdf/rr/rr5417.pdf

Collaborating With Public Health Laboratories

If additional laboratory testing is needed to confirm the diagnosis or provide further characterization of an infectious organism, try to ensure an adequate number of specimens are collected as soon as possible.

According to the CDC's *Interim Guidance for a Public Health Response to Contain Novel or Targeted Multidrug-Resistant Organisms*, clinical laboratories that performed cultures from health care settings that the index patient had been exposed to in the past 3 months, should be targeted for prospective surveillance to identify organisms with similar resistance patterns. Those isolates should be saved and sent for further characterization to determine if they match the organism of interest. Retrospective review of results from these clinical laboratories to identify organisms with similar resistance patterns should also be performed. If available, retrospective isolates should be tested to see if they match the organism of interest.

The *Interim Guidance for a Public Health Response to Contain Novel or Targeted Multidrug-Resistant Organisms (MDROs)* can be viewed at: <https://www.cdc.gov/hai/pdfs/containment/Health-Response-Contain-MDRO-H.pdf>

Florida Bureau of Public Health Labs (BPHL)

BPHL has the capabilities to confirm and further characterize various novel and targeted MDROs. If a health care facility reports or contacts the CHD regarding an MDRO, please contact the HAI Prevention Program to discuss shipment of isolates. Once shipping is approved, please see Appendix 9 for shipment instructions and a pre-filled DH1847 form.

Through the Epidemiology and Laboratory Capacity (ELC) grant, BPHL has added additional testing capability for carbapenem-resistant Enterobacteriaceae (CRE) and other drug-resistant organisms since 2016. This effort is through the CDC's Antimicrobial Resistance Laboratory Network (ARLN), to address microbial resistance that poses a serious public health threat, such as CRE and other MDROs in health care settings where organisms are transmitted from person-to-person, often via hands of health care personnel or contaminated medical equipment. These drug-resistant organisms are difficult to treat; for example, CRE that may be resistant to all beta-lactam antibiotics and frequently co-resistant to other antibiotics, leaving very few treatment options.

Testing Capacity at BPHL

1. Carbapenem-Resistant Organisms
 - a. Carbapenem-resistant *Enterobacteriaceae* (CRE)
 - b. Carbapenem-resistant *Pseudomonas aeruginosa* (CRPA)
 - c. Carbapenem-resistant *Acinetobacter baumannii* (CRAB)

Isolates should be sent to the BPHL for confirmation of carbapenem-resistant organisms. Additional surveillance testing may also be requested but is not performed at BPHL. For this testing, BPHL collaborates with the CDC's Regional ARLN Laboratory, the Tennessee State Public Health Laboratory, that can provide additional or confirmatory testing, surveillance testing, and outbreak support for specific pathogens when needed.

2. Antifungal Resistance
 - a. *Candida auris*
 - b. Other *Candida* species, as appropriate

Candida auris is another globally emerging pathogen that cannot be easily identified in the sentinel clinical laboratory due to similarities with other organisms. Since highly complex methods are required to definitively identify *C. auris*, suspect isolates should be sent to public health laboratories for referral to the ARLN Regional Laboratory in Tennessee for mycology identification and susceptibility testing. In coordination with BPHL and the HAI Prevention Program, samples can be shipped to BPHL. BPHL will ship samples to the appropriate ARLN laboratory for confirmatory testing.

Facilities should always contact their local health department if they have a suspected case or outbreak with a multidrug-resistant organism and require epidemiological and/or laboratory diagnostic assistance from DOH. If an isolate is sent to BPHL without the approval of the CHD, the HAI

Prevention Program will reach out to the specific CHD to inform them of the rule-out isolate. The CHD is then expected to reach out to the submitting facility to gather additional information and provide recommendations for containment. Depending on the location of the patient, empiric precautions can be suggested to the health care facility. The patient should be placed in a single room on contact precautions until results are finalized. It is recommended that the patient's room is cleaned daily and disinfected with an EPA-registered hospital-grade disinfectant effective against *C. diff* spores.

3. Resistant *Staphylococcus aureus*
 - a. Vancomycin-intermediate *Staphylococcus aureus* (VISA)
 - b. Vancomycin-resistant *Staphylococcus aureus* (VRSA)

BPHL performs VISA and VRSA testing. Confirmed resistant isolates are forwarded to CDC.

CHD Continued Follow-Up and Support

There are times when an outbreak is not abated after following all the outlined steps. In that case, rather than repeating all of the steps in the initial outbreak investigation, a follow-up investigation is required. The basic steps of the follow-up investigation may include:

- Continue case finding and surveillance
- Review control measures regularly
- Consider whether an analytical study should be performed
- Communicate findings

Refine Case Definition

As the outbreak continues, the outbreak case definition may need to be refined to specific place, exposure, and time parameters. As previously discussed, the outbreak case definition varies on a case-by-case basis. The HAI Prevention Program will provide assistance in the refinement of the case definition.

Continue Case Finding and Surveillance

Case finding and surveillance should be continued through the duration of the outbreak investigation. Methods of case finding and surveillance will vary for each outbreak, but may consist of one or all of the following: point-prevalence screening, admission screening, discharge screening, retrospective laboratory surveillance, prospective laboratory surveillance, self-report, etc.

Review Control Measures Regularly

All interventions that are implemented during the investigation should be reviewed for necessity and monitored for compliance. Additionally, any interventions that are difficult to maintain or are labor and resource intensive should be reviewed frequently to determine when those interventions can be discontinued. Examples of this type of intervention include cohorting patients on a special unit, using specialized PPE (as in Ebola), or dedicating staff to case patient care only. These interventions cannot be sustained over long periods of time due to disruption of facility workflow and throughput and due to cost in terms of time and resources.

At this point, the CHD may want to follow up with the facility about gaps identified during the ICAR site visit. If the outbreak is ongoing, the CHD may provide a follow-up visit to the facility to verify if recommendations have been put in place and if staff are following the provided guidance.

Consider Whether an Analytical Study Should Be Performed

Sometimes the available evidence clearly demonstrates an association between a source and the outbreak. For example, during a norovirus outbreak in long-term care, a dietary worker with GI symptoms who started feeling ill two days prior to the outbreak is discovered. In this case, the source is easily associated with the outbreak. However, despite collecting all the data and creating a line listing, sometimes a source cannot be identified and control measures are not effective in stopping the outbreak. In that case, consideration should be given to performing an epidemiological analytical study. Although there are many different types of analytical studies, usually a case-control study is performed in infection prevention.

A case-control study involves matching those without the infection (controls) to those with the infection (cases). Ideally, there should be at least two controls for every case, matched as closely as possible for age, underlying medical conditions, gender, and any other variables deemed appropriate for the investigation. According to the CDC, going beyond a 4:1 matching (four controls for every case) does not yield any better results. Controls should resemble cases as closely as possible. For example, if the case patients are 75 years old or older, female, and have a white cell count below 1000, then all controls should be in the same age range, female, and have a white cell count below 1000.

An additional benefit of an analytical study is that they can demonstrate a statistical association between the (hypothesized) source that was determined from medical record review, observation, interviews, and the outbreak. This may be helpful in convincing the facility to change practice or adopt specific interventions long term.

Prior to starting a case-control study, obtain support and direction from the CHD epidemiology program manager and the HAI Prevention Program.

Analytical studies are not always warranted but can be helpful in specific circumstances.

Communicate Findings Throughout the Investigation

Communication is a key element throughout the investigation. Ensure the facility (usually relayed by the IP), the HAI Prevention Program, and possibly the Bureau of Epidemiology are kept informed of progress, resources needed, and any issues obstructing the investigation.

Facility administration, along with the input of DOH, may need to decide if patients should be notified about the outbreak and would benefit from regular updates throughout the investigation.

Hospital administration, including risk management, will typically be notified by the IP department or clinicians with whom the CHD is working.

Public information personnel within the county may need to work with the media and will need to be notified initially and periodically updated.

Additionally, keep staff and providers in the affected unit or department informed of developments, plans, and outcomes, and seek their thoughts about possible contributors or causes of the outbreak. Not only does this go far in building relationships, it will also help allay any fears that their concerns are not being taken into consideration. This approach will also assure them that everything is being done to protect their patients.

If the outbreak requires state notification of providers, the CHD will work with the HAI Prevention Program and, if necessary, the Bureau of Epidemiology, to create a statewide message for delivery to all health care providers.

In summary, the follow-up investigation is essentially a repeat performance of the initial investigation steps that are appropriate to the outcome of the initial investigation.

Key points:

- Not every initial investigation will lead to a definite source, although the outbreak may subside at that point.
- Do not get discouraged if the investigation steps must be repeated and continuously refined; that is just part of the process and do not hesitate to reach out for help as needed.
- Use the resources available through DOH to assist with the investigation (e.g. HAI Prevention Program).

Investigation Conclusion

Once the investigation is over, continue to check in with the IP (or other designated person) ensuring there are not recurrences or other issues.

Although there is not a textbook answer to the length of time follow-up should continue, some things to consider include:

1. Nature of the outbreak: if this is a serious outbreak (e.g. deaths occurred), the CHD may want to pursue follow-up for a longer period. By contrast, an outbreak related to colonization with an endemic baseline and without infections or morbidity may dictate a much shorter follow-up period.
2. When point-prevalence surveys (PPS) are conducted, the guidance is to continue collecting samples every two weeks until two consecutive negatives with no new cases.
3. There is the need for open communication between the CHD and facility. If there are any new cases, it would be critical for the facility to report them to the CHD.
4. Resources available to the facility: for example, if the facility has a hospital epidemiologist and a well-staffed infection prevention department, early recognition of recurrence is likely.

Follow-up visit (or call):

1. Review plan created at the end of the investigation, baseline rate, and outbreak rate prior to initiating the follow-up.
2. Get a clear picture of facility progress with the plan. Ask specific questions based on the sustainment plan.

3. Discuss any problems or obstacles maintaining the control measures, as well as current status.
4. Check on the progress of staff and provider education, if that was part of the plan.
5. If a unit or department was closed, ensure it is reopened according to the plan.
6. Compare the HAI baseline rate (assuming there was one) and outbreak rate with the current rate.

Final Outbreak Report

The final task is to summarize the investigation, its findings, and its outcome in a report, and communicate this report in an effective manner. An oral report might be requested for Epidemiology Grand Rounds or Epidemiology Biweekly CHD Webinar, depending on the novelty or complexity of the investigation. This oral presentation should briefly describe what was done, what was found, and conclusions or next steps in a manner suitable for the intended audience.

Many HAI organisms are not on the reportable disease list. For this reason, HAI outbreaks and the discovery of novel HAI organisms will be maintained in the Merlin Outbreak Module until further notice. A basic guide for inputting information into the module is available in Merlin; however, the HAI Prevention Program will release a quick-use guide as a supplement to this document. The use of the outbreak module will allow better tracking and documentation of HAI investigations.

A written report is more detailed and should follow the basic scientific format of introduction, background, methods, results, discussion and recommendations. This type of report forms a blueprint for action, serves as a record of performance, and is a document for potential legal issues. A well-written report can find its way into the literature to contribute to the knowledge base of health care-associated infections, outbreak investigations, and prevention and control measures. Written reports are encouraged for complex or important outbreak investigations. Currently, there is not a set template and the reported information would depend on the specific outbreak. In addition to implementing interventions, a plan should be developed in coordination with the facility to sustain the change in practice over time. For example, educating staff or providers may be required. If control measures include closing a unit or department, an exit strategy that clearly defines criteria for reopening should be included in the plan.

References

Florida Administrative Code Chapter 64D-3:

1. www.flrules.org/gateway/ChapterHome.asp?Chapter=64d-3

Literature Review and Prevention and Control Measures

1. CDC infection control guidelines: www.cdc.gov/infectioncontrol/guidelines/index.html
2. Healthcare Infection Control Practices Advisory Committee (HICPAC) contains HAI guidance documents with a link to the CDC guidelines: www.cdc.gov/hicpac/pubs.html
3. CDC multi-drug resistance guidelines for all health care settings: www.cdc.gov/infectioncontrol/guidelines/mdro/index.html
4. CDC: *Interim Guidance for a Public Health Response to Contain Novel or Targeted Multidrug-resistant Organisms* (MDROs): www.cdc.gov/hai/pdfs/containment/Health-Response-Contain-MDRO-H.pdf
5. PubMed, a free literature database: www.ncbi.nlm.nih.gov/pubmed
6. Control of Communicable Diseases Manual: www.apha.org/ccdm
7. Worldwide Database for Nosocomial Outbreaks provides summaries of published outbreak articles: www.outbreak-database.com/Home.aspx
8. CDC: www.cdc.gov
9. Diseases and Organisms in Healthcare Settings contains a brief summary of commonly encountered HAI organisms with links for additional information: www.cdc.gov/hai/organisms/organisms.html
10. CDC 2018 HAI Progress Report: www.cdc.gov/hai/data/portal/progress-report.html
11. Guidelines for the Prevention and Control of Infections Due to Antibiotic-Resistant Organisms: www.floridahealth.gov/diseases-and-conditions/health-care-associated-infections/_documents/guidelines-for-prevention-and-control-mdro.pdf
12. Srinivasan, Arjun. Outbreak Investigation. In: Carrico R, ed. APIC Text of Infection Control and Epidemiology. Third ed. Washington, DC: Association for Professionals in Infection Control and Epidemiology. 2009: 4-1-4-17

Surveillance (NHSN)

1. For NHSN surveillance definition manual (Patient Safety Component), go to www.cdc.gov/nhsn/enrolled-facilities/index.html (click on facility type and then infection type)
2. For the most current NHSN Patient Safety Component surveillance criteria, go to: www.cdc.gov/nhsn/pdfs/pscmanual/pscmanual_current.pdf
 - a. Chapter 4: Bloodstream Infection Event (Central Line-Associated Bloodstream Infection and non-central line-associated Bloodstream Infection)
 - b. Chapter 7: Urinary tract infection, including CAUTI, non-catheter-associated urinary tract infection, and other urinary system infection events
 - c. Chapter 9: Surgical site infection (SSI) events
 - d. Chapter 10: Ventilator-associated events (VAE)
 - e. Chapter 12: Multidrug-resistant organism and *Clostridioides difficile* infection (MDRO/CDI) module

- f. Chapter 17: CDC/NHSN Surveillance Definitions for Specific Types of Infections (not listed above)
3. NHSN Long-term care surveillance definitions: www.cdc.gov/nhsn/LTC/index.html
4. NHSN data analysis information: www.cdc.gov/nhsn/PS-Analysis-resources/reference-guides.html

Training Links

1. CDC HAI webpage contains toolkits based on type of facility, organism or device: www.cdc.gov/hai/
2. HAI Compendium updated 2014—In 2014, SHEA, IDSA, APIC, TJC, and AHA partnered to update the popular science-based compendium of strategies to reduce or prevent common health care-associated infections. The following link provides access to the various articles, which contain evidence-based recommendations: www.shea-online.org/index.php/practice-resources/priority-topics/compendium-of-strategies-to-prevent-hais

Long-Term Care

1. CDC website for HAI prevention and control in LTC and assisted living facilities contains reports on outbreaks and serious infections, CDC presentations, and guidance: www.cdc.gov/longtermcare/staff.html

Appendix 1

Useful Definitions

- **Active Surveillance Cultures:** A form of microbiological surveillance used to identify patients **colonized** with a targeted multi-drug resistant organism (MDRO), particularly if methods to control transmission are failing.
- **Airborne Precautions:** Implemented to prevent the transmission of infectious agents which are spread by respiratory droplet nuclei that are smaller than five microns in size and suspended in the air for long periods of time. Airborne precautions require placement in a specially monitored Airborne Infection Isolation Room (AIIR) and the use of respirator masks upon room entry.
- **Carbapenem-Resistant Enterobacteriaceae (CRE):** Gram-negative, rod-shaped bacillus that displays high resistance to antibiotics. Some common Enterobacteriaceae that may be carbapenem-resistant are *Klebsiella pneumoniae*, *Escherichia coli*, and *Enterobacter cloacae*. CRE organisms employ mechanisms that result in the production of carbapenemases. A carbapenemase is a beta-lactamase enzyme that confers resistance to carbapenem antibiotics and extended-spectrum cephalosporins. The Centers for Disease Control and Prevention (CDC) defines CRE as Enterobacteriaceae that are resistant to imipenem, meropenem, doripenem, or ertapenem **or** documentation that the isolate possesses a carbapenemase.
- **Carrier:** An individual who is persistently colonized at one or more body sites with a multidrug-resistant organism or other pathogen of epidemiologic importance. Carriers are capable of spreading disease.
- ***Clostridioides difficile*:** Gram-positive, spore-forming anaerobic bacillus that produces two large toxins: A and B. The toxins are responsible for irritating the bowel, which causes diarrhea and colitis. A more virulent strain, BI/NAP1/027, has become widespread in North America and Europe. *Clostridioides difficile* infection (CDI) is associated with prior antibiotic use. Some studies have found CDI among patients with a very short antibiotic exposure. Another important aspect of this organism is its spore-forming ability, which allows it to remain viable in the environment for several months. Signs and symptoms of CDI include watery diarrhea, fever, loss of appetite, nausea, and abdominal pain/tenderness. Repeat infection is common. Additionally, CDI can result in pseudomembranous colitis (PMC), toxic megacolon, perforations of the colon, sepsis, and death. Lab tests commonly used to test for CDI include polymerase chain reaction (PCR) and a rapid test that detects the presence of antigen and toxin. Due to the lower sensitivity of the antigen/toxin test, some facilities will follow up discordant results (e.g. positive antigen, negative toxin) with a PCR test. However, some facilities only use PCR tests due to availability of rapid results with high sensitivity.
- **Cluster:** An excess occurrence of disease in a particular time and place that lacks a documented cause. According to the CDC, a cluster “refers to an aggregation of cases

grouped in place and time that are suspected to be greater than the number expected, even though the expected number may not be known.” The CDC also indicates that a cluster may be a grouping of cases over a particular time and in a specific location without regard to the expected number. For example, an infection preventionist may become concerned with four methicillin-resistant *Staphylococcus aureus* (MRSA) cases on an inpatient unit. According to the Association for Professionals in Infection Control and Epidemiology (APIC), a cluster may also refer to a small outbreak.

- **Cohort:** Two or more patients colonized or infected with the same antibiotic-resistant organism, physically separated from other patients not known to be infected or colonized with an antibiotic-resistant organism. Staff caring for infected patients can also be cohorted. In this sense, certain staff only cares for the infected patients in a designated area and does not care for uninfected patients. Staff cohorting is usually only used during an outbreak.
- **Colonized:** Any person who is culture-positive for an antibiotic-resistant organism but has no signs or symptoms of infection.
- **Colonization vs. Infection:** A colonized patient does not exhibit signs or symptoms of disease nor will a colonized patient have a positive immune reaction. Infected patients have signs or symptoms and may have a positive immune reaction.
- **Contact Precautions:** In addition to standard precautions, contact precautions or the equivalent are used with specified patients known or suspected to be infected or colonized with epidemiologically important microorganisms that can be transmitted by direct contact with the patients or indirect contact with environmental surfaces or patient-care items in the patient environment. Contact precautions include proper patient placement, the use of personal protective equipment (PPE), and environmental measures as recommended in the Health Care Infection Control Practices Advisory Committee/Centers for Disease Control and Prevention Isolation Guidelines. Generally, PPE for contact precautions consists of gown and gloves.
- **Droplet Precautions:** Used when an infectious agent can be transmitted by droplets (coughing or sneezing, performing procedures that can cause contact with mucous membranes). Droplets are larger than five microns in size and can be generated by the patient during coughing, sneezing, talking, or the performance of procedures (such as suctioning and bronchoscopy). Droplets do not remain suspended in the air and generally travel only short distances, usually three feet or less. Because of this, special air handling and ventilation are not required.
- **Empiric Precautions:** Applied to patient situations where the clinical syndrome and likely etiologic agents suggest that transmission-based precautions should be implemented and then modified when the pathogen is identified or transmissible infectious etiology is ruled out. Use of appropriate transmission-based precautions at the time a patient develops symptoms

or signs of transmissible infection, or arrives at a health care facility for care, reduces transmission opportunities. While it is not possible to identify prospectively all patients needing transmission-based precautions, certain clinical syndromes and conditions carry a sufficiently high risk to warrant their use empirically while confirmatory tests are pending.

- **Extended-Spectrum Beta-Lactamases:** Bacteria including the multi-drug resistant gram-negative bacilli that produce a beta-lactamase enzyme capable of hydrolyzing penicillin, and the extended-spectrum cephalosporin and monobactam groups of antimicrobials, allowing for increased resistance to these agents (e.g., *Klebsiella* spp., *E. coli*, *Pseudomonas aeruginosa*, *Enterobacter* spp., *Acinetobacter* spp.).
- **Health Care-Associated Infection (HAI):** Infection associated with a hospital or health care setting, usually secondary to the patient's original condition.
- **Methicillin-Resistant *Staphylococcus aureus* (MRSA):** A strain of *Staphylococcus aureus* that is gram-positive. Only about 10% of *S. aureus* isolates are sensitive to penicillin in the U.S. However, many strains are sensitive to penicillinase-resistant penicillins such as oxacillin, nafcillin, or methicillin. Strains that are resistant to oxacillin or methicillin are usually resistant to all beta-lactam antibiotics except for the newest generation of cephalosporins that are active against MRSA, such as ceftaroline. Resistance patterns vary based on whether the infection is health care-associated or community-acquired, due to the multiple virulence factors of this organism. According to the CDC, "Strains of MRSA causing health care-associated (HA) infections are also often resistant to other commonly used antimicrobial agents, including erythromycin, clindamycin, fluoroquinolones, and tetracycline. Strains causing community-associated (CA) infections are often only resistant to beta-lactam agents and erythromycin and may be resistant to fluoroquinolones. Common HA MRSA infections include bacteremia, urinary tract infections, endocarditis, osteomyelitis, wound infections, and pneumonia. MRSA is acquired either endogenously since it can be carried in the nares or exogenously from contaminated hands, equipment, or surfaces."
- **Minimum Inhibitory Concentration (MIC):** The minimum amount of antimicrobial that is required to inhibit the organism.
- **Multi-Drug Resistant Organism (MDRO):** Typically defined as microorganisms that are resistant to two or more classes of antimicrobial agents. For more information about multi-drug resistant organisms, see the Resources section.
- **National Healthcare Safety Network (NHSN) Terms for Acute-Care Facilities:** NHSN surveillance definitions are constructed to identify health care-associated infections and should not be confused with clinical criteria. NHSN definitions should not be used for clinical diagnosis.
 - **Date of Event:** The date the *first* element used to meet the NHSN site-specific criterion occurs for the *first* time within the seven-day infection window period or

Surgical Site Infections (SSI) surveillance period. This definition does not apply to LabID Event, PedVAE or VAE.

- **Infection Window Period (IWP):**
 - For surveillance purposes, the infection window period is defined as the 7 days during which all site-specific infection criteria must be met. It includes the collection date of the first positive diagnostic test – examples include, laboratory specimen collection, imaging test, procedure or exam, that is used as an element to meet the site-specific infection criterion, the 3 calendar days before, and the 3 calendar days after. For site-specific infection criteria *that do not include a diagnostic test*, the date of the first documented *localized* sign or symptom that is used as an element of the site-specific infection criterion is used to define the infection window period for example, diarrhea, site-specific pain, purulent drainage. Note that a non-specific sign or symptom for example, fever is not considered to be localized and therefore is not to be used to define the infection window period.
 - Example: Patient has a positive culture on day 3, fever and suprapubic pain on day 4. Using the positive culture on day 3 as the starting point, the infection window period would be the three days before the culture (even though this is prior to admission), the day of the culture, and three days after the culture.

- **Repeat Infection Timeframe (RIT):**
 - For surveillance purposes, the RIT is a 14-day timeframe during which no new infections of the same type are reported.
 - The RIT applies to both present on admission (POA) and HAI determinations.
 - The date of event is day one of the 14-day RIT.
 - If criteria for the same type of infection are met and the date of event is within the 14-day RIT, a new event is not identified or reported.
 - Additional pathogens recovered during the RIT from the same type of infection are added to the event and the original date of event is maintained as is the original 14-day RIT.
 - Additionally, device association determination is not amended during the RIT.
 - Does not apply to SSI, VAE or LabID Events.

- **Health Care-Associated Infection:** An infection is considered a HAI if the date of event of the NHSN site-specific infection criterion occurs on or after the 3rd calendar day of admission to an inpatient location where day of admission to an inpatient location is calendar day 1.

- **Present on Admission (POA):** An infection is considered Present on Admission (POA) if the date of event of the NHSN site-specific infection criterion occurs during the POA time period, which is defined as the day of admission to an inpatient location (calendar day 1), the 2 days before

admission, and the calendar day after admission (POA time period). Does not apply to SSI, VAE, or LabID Events.

- **Standardized Infection Ratio (SIR):** the primary summary measure used by the NHSN to track HAIs, at a national, state, or local level over time. The SIR adjusts for various facility and patient level factors that contribute to HAI risk within each facility. In HAI data analysis, the SIR compares the actual (observed) number of HAIs reported to what would be predicted, given the standard population (i.e. NHSN baseline 2015 national HAI aggregate data), adjusting for several risk factors that have been found to be significantly associated with differences in infection incidence.

$$\text{SIR} = \frac{\text{Observed (O)HAIs}}{\text{Predicted (P)HAIs}}$$

For more information, visit: www.cdc.gov/nhsn/pdfs/ps-analysis-resources/nhsn-sir-guide.pdf

- **Catheter-Associated Urinary Tract Infection (CAUTI):**
 - A UTI where an indwelling urinary catheter was in place for more than 2 consecutive days in an inpatient location on the *date of event*, with day of device placement being Day 1*, AND
 - an indwelling urinary catheter was in place on the date of event or the day before. If an indwelling urinary catheter was in place for more than 2 consecutive days in an inpatient location and then removed, the date of event for the UTI must be the day of device discontinuation or the next day for the UTI to be catheter-associated.
 - If the IUC was in place prior to inpatient admission, the catheter day count that determines device –association begins with the admission date to the first inpatient location. This allows for consistency with device denominator count
 - An indwelling urinary catheter or Foley (excludes suprapubic tubes, nephrostomy tubes, in/out or straight catheters) that is inserted into the urinary bladder through the urethra, is left in place, and is connected to a drainage bag. A Foley catheter used for irrigation would be included in this definition.
 - Highlights of the NHSN CAUTI (symptomatic) surveillance definition in any age patient population include:

Patient must meet all three (3) criteria defined below:

- Patient had an indwelling urinary catheter that had been in place for more than 2 consecutive days in an inpatient location on the date of event AND was either:
 - Present for any portion of the calendar day on the date of event, OR
 - Removed the day before the date of event
- Patient has at least one of the following signs or symptoms:

- fever (>38.0°C): Reminder: To use fever in a patient > 65 years of age, the IUC needs to be in place for more than 2 consecutive days in an inpatient location on date of event and is either still in place OR was removed the day before the DOE.
 - suprapubic tenderness
 - costovertebral angle pain or tenderness
 - urinary urgency
 - urinary frequency
 - dysuria
 - Patient has a urine culture with no more than two species of organisms identified, at least one of which is a bacterium of $\geq 10^5$ CFU/ml. All elements of the SUTI criterion must occur during the IWP.
 - For additional information and for the criteria for patients ≤ 1 year old, go to www.cdc.gov/nhsn/enrolled-facilities/index.html, click on facility type, then infection type for a more complete surveillance definition.
- **Central Line-Associated Blood Stream Infection (CLABSI):**
 - POA and health care-associated infection definitions apply to CLABSI.
 - Primary bloodstream infection: lab-confirmed bloodstream infections that are not secondary to an infection at another body site.
 - Secondary bloodstream infection: Lab-confirmed bloodstream infections that are related to an infection at another site. This definition becomes quite complicated as it involves defining relatedness, meeting criteria for the other site, and will not be included in this brief description. For more information related to secondary bloodstream infections, go to www.cdc.gov/nhsn/pdfs/pscmanual/pcsmanual_current.pdf and consult the section on secondary bloodstream infections in Chapter 4.
 - Central line:
 - An intravascular catheter that terminates at or close to the heart or in one of the great vessels which is used for infusion, withdrawal of blood, or hemodynamic monitoring. The following are considered great vessels by NHSN:
 - Aorta, pulmonary artery, superior vena cava, inferior vena cava, brachiocephalic veins, internal jugular veins, subclavian veins, external iliac veins, common iliac veins, or femoral veins. In neonates, the umbilical artery/vein.
 - The following devices are not considered central lines: arterial catheters, arteriovenous fistula or graft, extracorporeal life support (ECMO), hemodialysis reliable outflow (HERO) dialysis catheters, intra-aortic balloon pump (IABP) devices, peripheral IV or midlines, or ventricular assist device (VAD). Other non-lumened devices – for example, non-lumened pacemaker wires inserted into central blood vessels or the heart are not considered central lines because fluids are not infused, pushed, or withdrawn through these types of devices.

- Central line-associated BSI (CLABSI): A laboratory-confirmed bloodstream infection (LCBI) where an eligible BSI organism is identified and an eligible central line is present on the LCBI DOE or the day before.
- Eligible Central Line: A CL that has been in place for more than two consecutive calendar days (on or after CL day 3), following the first access of the central line, in an inpatient location, during the current admission. Such lines are eligible for CLABSI events and remain eligible for CLABSI events until the day after removal from the body or patient discharge, whichever comes first.
- Eligible BSI Organism: Organism that is eligible for use to meet LCBI or mucosal barrier injury (MBI) -LCBI criteria.
- LCBI (either of the two criteria below would meet the definition):
 - Patient of any age has a recognized bacterial or fungal pathogen identified (i.e., an organism which is not on the NHSN common commensal list) from one or more blood specimens by a culture- or to the genus or species level by non-culture-based microbiologic testing method **and** organism(s) identified in blood is not related to an infection at another site.
 - Patient of any age has at least one of the following signs or symptoms: fever (>38.0°C or 100.4°F), chills, or hypotension **and** organism(s) identified from blood is not related to an infection at another site (See Appendix B: Secondary BSI Guide) **and** the same NHSN common commensal is identified by a culture from two or more blood specimens drawn on separate occasions d.
 - For the surveillance definition in patients 1 year of age or younger, refer to the NHSN Patient Safety Manual, Chapter 4: www.cdc.gov/nhsn/pdfs/pscmanual/pcsmanual_current.pdf
 - There is also a definition for mucosal barrier injury MBI– LCBI which is applicable if only gastrointestinal organisms are identified and the patient was either an allogeneic hematopoietic stem cell transplant recipient within the past year or is neutropenic within a defined timeframe. For more information about this type of LCBI, see the Patient Safety Manual, Chapter 4 at: www.cdc.gov/nhsn/pdfs/pscmanual/pcsmanual_current.pdf
- **Surgical Site Infection (SSI):**
 - The infection window period (IWP), present on admission (POA), hospital associated infection (HAI) and repeat infection timeframe (RIT) definitions do not apply to SSI.
 - SSI are classified as superficial, deep incisional, or organ/space infections based on the specific location.

- Date of Event (DOE): For an SSI, the date of event is the data when the first element used to meet the SSI infection criterion occurs for the first time during the SSI surveillance period. The date of event must fall within the SSI surveillance period to meet SSI criteria. The type of SSI (superficial incisional, deep incisional, or organ/space) reported and the date of event assigned must reflect the deepest tissue level where SSI criteria are met during the surveillance period.
- NHSN Operative Procedure is a procedure:
 - That is included in the ICD-10-PCS or CPT NHSN operative procedure code list, which is in Chapter 9 of the *NHSN Patient Safety Component Manual*: www.cdc.gov/nhsn/pdfs/pscmanual/pcsmanual_current.pdf. The surveillance definition is applicable to NHSN procedures.
 - That takes place during an operation where at least one incision (including laparoscopic approach and cranial burr holes) is made through the skin or mucous membrane, or re-operation via an incision that was left open during a prior operative procedure.
 - That takes place in an operating room (OR), defined as a patient care area that met the Facilities Guidelines Institute's (FGI) or American Institute of Architects' (AIA) criteria for an operating room when it was constructed or renovated. This may include an operating room, cesarean section room, interventional radiology procedural suite/room, or a cardiac catheterization lab.
- Surveillance continues for either 30 days or 90 days after a procedure. The amount of time a surgery should be followed is listed in Chapter 9 in the *NHSN Patient Safety Component Manual* www.cdc.gov/nhsn/pdfs/pscmanual/pcsmanual_current.pdf.
- Superficial incisional SSI: Patient must meet the following criteria:
 - Date of event occurs within 30 days after any NHSN operative procedure, where day 1 = the procedure date **and** involves only skin and subcutaneous tissue of the incision **and** patient has at least **one** of the following:
 - Purulent drainage from the superficial incision.
 - organism(s) identified from an aseptically obtained specimen from the superficial incision or subcutaneous tissue by a culture or non-culture based microbiologic testing method which is performed for purposes of clinical diagnosis or treatment.
 - superficial incision that is deliberately opened by a surgeon, physician or physician designee and culture or non-culture based testing of the superficial incision or subcutaneous tissue is not performed **and** patient has at least one of the following signs or symptoms: localized pain or tenderness; localized swelling; erythema; or heat.
 - diagnosis of a superficial incisional SSI by a physician or physician designee.

Complication (IVAC); and 3) Possible Ventilator-Associated Pneumonia (PVAP).

- Inpatient locations eligible to participate in VAE surveillance are those adult locations in acute-care hospitals, long-term acute-care hospitals (LTACH), and inpatient rehabilitation facilities where denominator data (ventilator and patient days) can be collected for patients such as intensive care units, specialty care areas, step-down units and wards.
 - VAEs are identified by using a combination of objective criteria: deterioration in respiratory status after a period of stability or improvement on the ventilator, evidence of infection or inflammation, and laboratory evidence of respiratory infection.
 - DOE: The date of onset of worsening oxygenation.
 - VAE Window Period: is usually a 5-day period – includes the 2 days before, the day of, and the 2 days after the VAE event data.
 - Positive End-Expiratory Pressure (PEEP): A technique used in respiratory therapy in which airway pressure greater than atmospheric pressure is achieved at the end of exhalation by the introduction of a mechanical impedance to exhalation.
 - Fraction of inspired oxygen (FiO₂): In patients on mechanical ventilation, the FiO₂ is one of the key parameters that can be adjusted depending on the patient's oxygenation needs, and is typically in the range of 0.30 to 1.0.
 - Location of attribution: The inpatient location where the patient was assigned on the date of the VAE, which is further defined as the date of onset of worsening oxygenation.
 - Some key points:
 - Patient must be mechanically ventilated for at least 4 days to fulfill the VAE criteria.
 - VAEs are defined by a 14-day period, starting on the day of onset of worsening oxygenation – the event date as day 1.
 - Patients on high-frequency ventilation, extracorporeal life support or paracorporeal membrane are **excluded** from VAE surveillance.
 - Initial assessment for the VAE algorithm is based on Fraction of inspired Oxygen (FiO₂) and Positive End-Expiratory Pressure (PEEP).
 - Antimicrobial use is also a key element for IVAC and PVAP in addition to some signs and symptoms.
 - VAE is a fairly complicated surveillance definition. For a good overview, go to the algorithm in Chapter 10 page 18 of the Patient Safety Manual at www.cdc.gov/nhsn/pdfs/pscmanual/pcsmanual_current.pdf.
 - Excluded organisms include *Blastomyces*, *Histoplasma*, *Coccidioides*, *Paracoccidioides*, *Cryptococcus* and *Pneumocystis*. Additionally, microbiology results indicating normal oral flora are generally excluded.
- **Outbreak:** The Florida Department of Health, Division of Disease Control and Health Protection under Rule 64D-3.028 defines an outbreak as an increase in the number of cases

of a disease or condition compared to the expected number in a particular period of time and geographical area. For diseases where the expected number is zero, a single case constitutes an outbreak.

- **Standard Precautions:** Basic infection control precautions designed for the care of all patients in hospitals, regardless of their diagnosis or presumed infection status. These include: hand hygiene; use of gloves, gown, mask, eye protection or face shield, depending on the anticipated exposure; and safe injection practices. Also, equipment or items in the patient environment likely to have been contaminated with infectious body fluids must be handled in a manner to prevent transmission of infectious agents.
- **Transmission-Based Precautions:** Transmission-based precautions are designed for patients documented as or suspected to be infected or colonized with highly transmissible or epidemiologically important pathogens for which additional precautions beyond standard precautions are necessary. These include airborne precautions, droplet precautions, and contact precautions. www.cdc.gov/infectioncontrol/basics/transmission-based-precautions.html.
- **Vancomycin-Resistant *Enterococcus* (VRE):** *Enterococcus* species are gram-positive non-spore forming cocci that normally colonize the gastrointestinal tract and biliary tract. They can also colonize the female genital tract, and male urethra, the perineum, the oral cavity, and the skin, although this is less common. The most commonly encountered species of *Enterococcus* in the health care setting are *E. faecium* and *E. faecalis*. Enterococci can survive on dry, inert environmental surfaces such as lab coats and clothing, anywhere from days to weeks. VRE is resistant to vancomycin, which is the antimicrobial frequently used to treat *Enterococci* infections, although there are other options available. In health care, VRE can cause infections of the urinary tract, the bloodstream, or wounds associated with catheters or surgical procedures. If a urinary catheter is present, removal when the catheter is no longer needed will help to curb the urinary tract or bladder infection.
- **Vancomycin-Intermediate *Staphylococcus aureus* (VISA):** *Staphylococcus aureus* with a vancomycin minimum inhibitory concentration (MIC) of 4–8µg/ml is classified as VISA. According to the CDC, there are several FDA-approved antimicrobials that are effective against VISA.
- **Vancomycin-Resistant *Staphylococcus aureus* (VRSA):** *Staphylococcus aureus* with a vancomycin minimum inhibitory concentration (MIC) of ≥16µg/ml is classified as VRSA. According to the CDC, there are several FDA-approved antimicrobials that are effective against VRSA.

Appendix 2

Types of Investigations and Examples

Colonization

In addition to outbreaks of infection, it is possible for an increase in colonization to be considered an outbreak. The following scenario should clarify the concept.

A bone marrow transplant unit conducts admission and weekly patient screening for MRSA (active surveillance culture or ASC – see below for details). Five patients are positive on November 12. All patients have been hospitalized for at least seven days and all were negative on admission. The infection preventionist becomes concerned because the MRSA screening results are usually negative with only two positive MRSA screening results over the last six months. Although no infections have occurred at this point, an outbreak could be occurring since five positive MRSA screening results in a short period of time is abnormal for this unit. The next logical step would be to confer with the laboratory to ensure nothing has changed, such as testing methodology or a new microbiology technician. For example, if the lab used cultures previously and started using PCR testing earlier in November, that may account for the apparent increase in MRSA-colonized patients.

Example of a Clinical Outbreak

Acinetobacter baumannii Outbreak in a Long-Term Care Facility

On November 5, two clinical cultures obtained from wounds were confirmed for carbapenem-resistant *Acinetobacter baumannii* (CRAB). Immediately upon identification, the IP implemented contact precautions. By November 14, an additional 10 clinical cultures confirmed CRAB. In response to the increase of laboratory-confirmed CRAB cases, the IP called and notified the CHD. In turn, the CHD called the HAI Prevention Program to receive guidance and assistance on responding to CRAB. On November 15, the CHD and HAI Prevention Program conducted an ICAR assessment to evaluate infection control policies and procedures at the long-term care facility (LTCF). During the assessment, several alarming infection control breaches were identified and consisted of the following: 1) wound care nurse was observed wearing one pair of gloves for all wound care procedures; however, the nurse performed hand hygiene on top of the gloves with ABHR after each procedure, 2) wound care supplies were unwrapped and stored near patient hand washing sinks, 3) environmental cleaning procedures were sub-optimal and used one cloth for cleaning all items in the patient room, 4) environmental services were also observed using one cotton-string mop for all assigned rooms throughout the shift, and 5) certified nursing assistants were observed with artificial nails greater than one-quarter inch and were not performing hand hygiene between patient procedures. The CHD and HAI Prevention Program provided immediate recommendations to the LTCF to address major infection control breaches identified during assessment. In addition, prospective laboratory surveillance was initiated along with bi-weekly point prevalence screenings. From November 15 to March 30, an additional 15 cases were identified. After two negative subsequent bi-weekly point prevalence surveys were obtained, the CHD and HAI Prevention Program officially closed the outbreak investigation.

Appendix 3

Tiered Organisms

Tier 1: Organisms in this group include those with resistance mechanisms novel to the United States (i.e., never previously or only very rarely identified in the United States) or organisms for which no current treatment options exist (pan-resistant) and that have the potential to spread more widely within a region. This category also includes organisms and resistance mechanisms for which reports and therefore experience in the United States is extremely limited and a more extensive evaluation might better define the risk for transmission. Examples of organisms in this category include *Candida auris* (*C. auris*).

Tier 2: Organisms in this group include MDROs primarily found in health care settings but not believed to be found regularly in the region; these organisms might have been found more commonly in other areas in the United States. For these organisms, information is available about how transmission occurs and the groups primarily at risk. Examples include carbapenem-resistant Enterobacteriaceae with novel mechanisms (e.g., New Delhi Metallo- β -lactamase), carbapenemase-producing *Pseudomonas* spp.

Tier 3: Organisms in this group include MDROs targeted by the facility/region that are already established in the United States and have been identified before in the region but are not thought to be endemic; information is available about transmission. Examples include carbapenem-resistant Enterobacteriaceae producing *Klebsiella pneumoniae* carbapenemase in regions where these organisms are more regularly identified; if only rarely identified in the region, these should be considered Tier 2 organisms.

Source CDC: Interim Guidance for a Public Health Response to Contain Novel or Targeted Multidrug-resistant Organisms (MDRO)

Appendix 4

HAI Line List Template

An example for the HAI line list template has been made available for your use. This document can be accessed through the direct link on the GSI web page.

Appendix 5

Instructions for iScrub Lite Mobile Application

iScrub Lite Mobile Application Standard Operating Procedure

1. Overview of Hand Hygiene and Personal Protective Equipment Observation Procedure

The Health Care-Associated Infection Prevention Program has developed this procedure guide to assist in standardizing hand hygiene and personal protective equipment (PPE) observations made during infection control assessments. This guide will provide the methods in which observations should be recorded in the iScrub Lite (version 1.5.3, 2018, SwipeSense, Inc.) mobile phone application.

1.1 Downloading iScrub Lite Mobile Phone Application on Florida Health Device

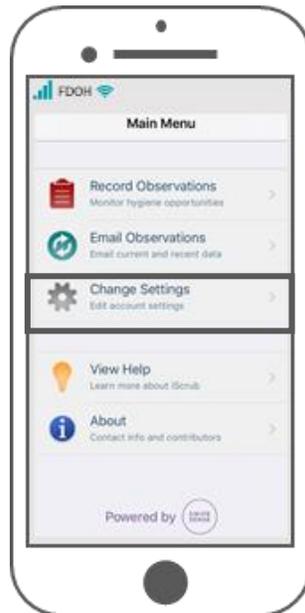
iScrub 1.5.3 Lite is compatible with Apple products and is approved through the Florida Department of Health Comp Portal store. In order to use the iScrub 1.5.3 Lite mobile phone application, it must be downloaded through the Comp Portal store. Once downloaded, proceed to Section 1.2 iScrub Lite Mobile Phone Application Set-up.

1.2 iScrub Lite Mobile Phone Application Set-up

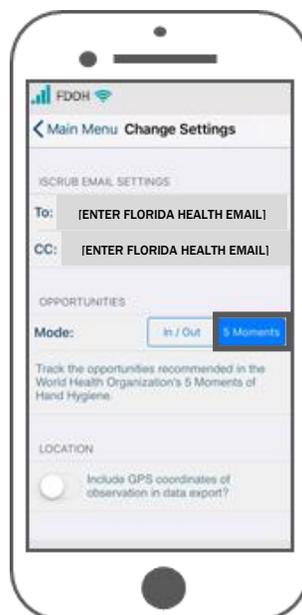
Step 1: To open, select iScrub Lite mobile application in your Florida Health mobile device



Step 2: The “Main Menu” of iScrub will appear. Select “Change Settings” option



Step 3: Insert your Florida Health approved email address in the “To:” criteria box. If you would like to carbon copy (CC) another Florida Health employee, insert their Florida Health in the “CC:” criteria box. Next, select the “5 Moments” mode under the “OPPORTUNITIES” section. The “mode” selected will be highlighted in blue. Note, if you are recording observations using the “In/Out” criteria, you will need to come back to the “Change Settings” menu to change the mode.

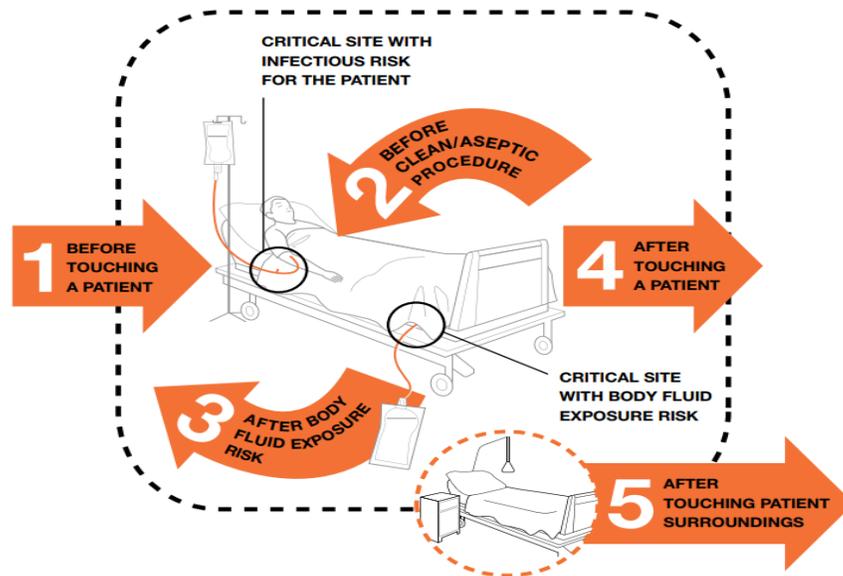


2. Methods for Collecting Observations

This section will provide an overview of the two methods to collect hand hygiene and PPE observations. Florida Health’s HAI program’s preferred method of collection is using the “5 Moments for Hand Hygiene.” For additional guidance on transmission-based precautions, please refer to the HAI program’s Guide to Surveillance and Investigation (GSI) chapter.

2.1 “5 Moments for Hand Hygiene”

YOUR 5 MOMENTS
FOR HAND HYGIENE*



*NOTE: Hand hygiene must be performed in all indications described regardless of whether gloves are used or not.

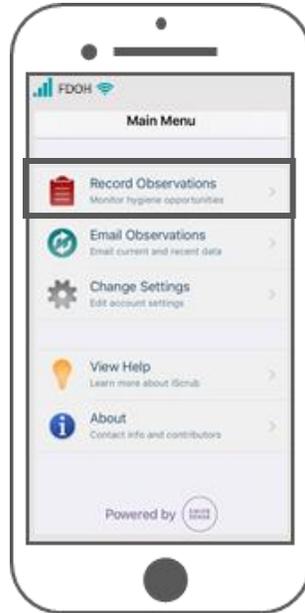
OPPORUTNITY	INDICATION	EXAMPLE(S)
1. Before touching a patient	<p>When? Clean hands before touching a patient when approaching him/her</p> <p>Why? To protect the patient against harmful germs carried on hands</p>	<p>A health care personnel (HCP) or environmental services staff, etc. entering the room to provide patient care or clean patient room.</p> <p>Note: If the patient is on any type of transmission-based precaution (e.g., contact, airborne, droplet) this step should be performed before donning any PPE.</p>
2. Before clean/aseptic procedure	<p>When? Clean hands immediately before performing a clean/aseptic procedure</p>	<p>A HCP is already in the room and is preparing to conduct a procedure. For instance, cleaning a tracheostomy, providing</p>

	<p>Why? To protect the patient against harmful germs, including the patient's own from entering his/her body</p>	<p>urinary catheter care, entering a central venous catheter, etc.</p>
<p>3. After body fluid exposure risk</p>	<p>When? Clean hands immediately after an exposure risk to body fluids AND after glove removal (between tasks)</p> <p>Why? To protect oneself and the health care environment from harmful patient germs</p>	<p>A HCP is draining and measuring urine from the patient's urinary catheter bag and then proceeds to give the patient his/her medication.</p>
<p>4. After touching a patient</p>	<p>When? Clean hands after touching a patient and his/her immediate surroundings, when leaving the patient's side</p> <p>Why? To protect oneself and the health care environment from harmful patient germs</p>	<p>A HCP exiting a patient room after administering medication and moving the patient bedside table.</p> <p>Note: If the patient is on contact precautions for <i>Clostridioides difficile</i> the HCP MUST use soap and water as the method for hand hygiene.</p>
<p>5. After touching patient surroundings</p>	<p>When? Clean hands after touching any object or furniture in the patient's immediate surroundings, when leaving the room—even if the patient HAS NOT been touched</p> <p>Why? To protect oneself and the health care environment from harmful patient germs</p>	<p>A HCP exiting a patient room after silencing an alarm on the patient's IV pole.</p> <p>An environmental services employee completing a daily clean in a patient room.</p> <p>Note: If the patient is on contact precautions for <i>Clostridioides difficile</i> the HCP MUST use soap and water as the method for hand hygiene.</p>

Source: World Health Organization. My 5 moments for hand hygiene. Geneva, Switzerland: World Health Organization. www.who.int/infection-prevention/campaigns/clean-hands/5moments/en/

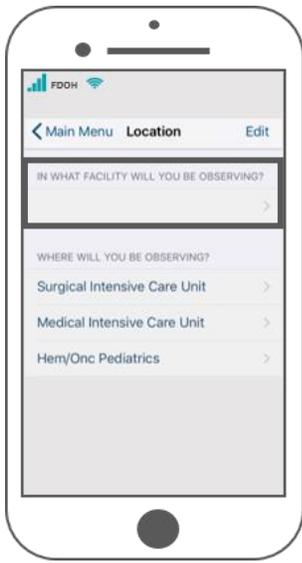
3. Getting Started in iScrub Lite

Step 1: Open iScrub Lite mobile application in your Florida Health mobile device and select the “Record Observations” option

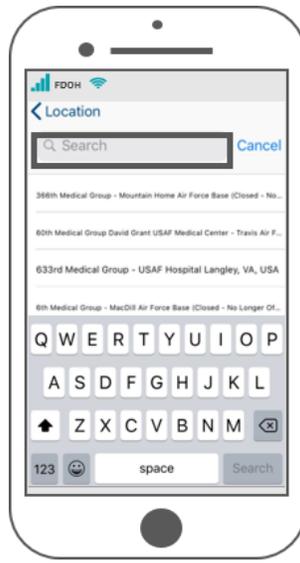


iScrub mobile application records each hand hygiene observation with a facility name, location, and job role. Both the facility name and location can be edited by the user to be specific to the facility and location in which observations are being recorded. The job role is entered each time an observation is recorded.

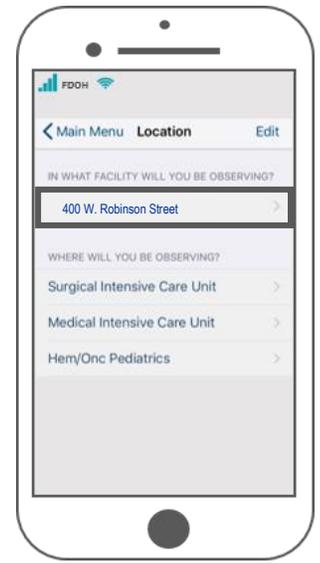
Step 2: A) Select the box under the “IN WHAT FACILITY WILL YOU BE OBSERVING?” option. iScrub will then display a search box with addresses listed below. B) Select the search box and type in your Florida Health office address; then select “Search” and select the resulted address. C) iScrub will then re-display the “Location” screen with the selected address.



A)

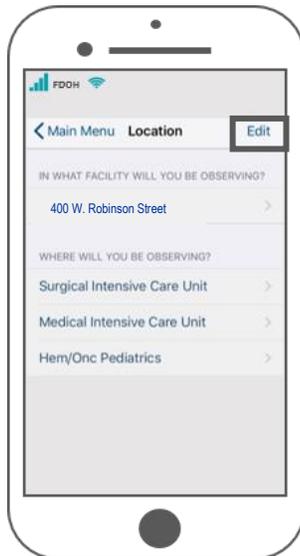


B)

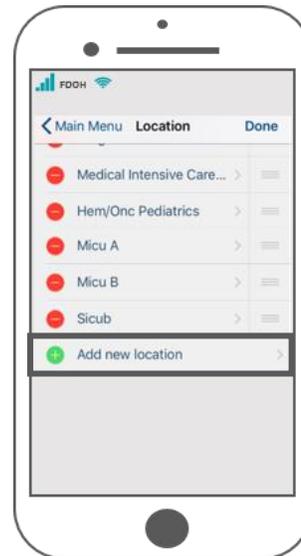


C)

Step 3: A) To input the facility name or unit in which you are collecting hand hygiene and PPE observations, select “Edit” in the upper right corner of the “Location” screen. B) Select “Add New Location,” and C) type in the preferred facility name and/or unit name; select “Save.” D) iScrub will then re-display the “Location” screen, select “Done.”



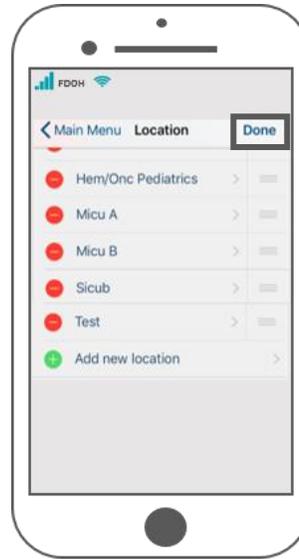
A)



B)

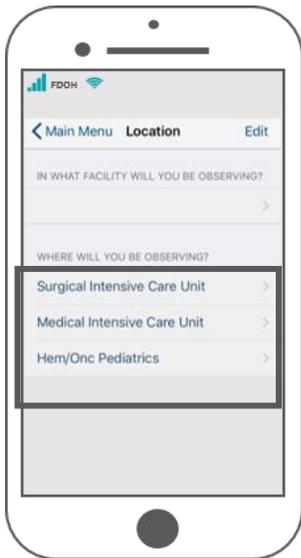


C)

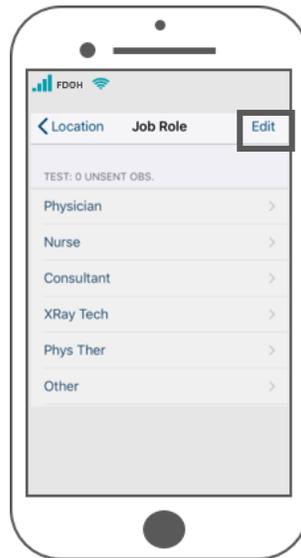


D)

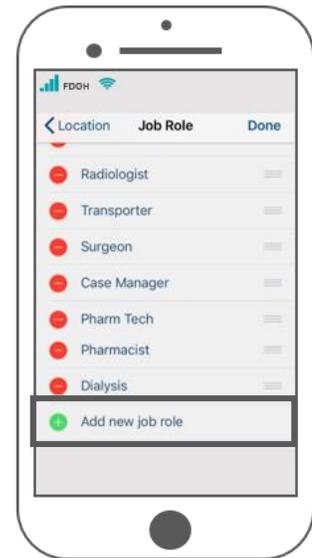
Step 4: A) From the “Location” screen, select the location in “WHERE WILL YOU BE OBSERVING?” A “Job Role” selection list will be displayed on your screen. B) To add additional job roles, select “Edit” in the upper right corner of the “Job Role” screen, C) select “Add new job role” and D) type the preferred job title. Select “Save”; E) and then “Done.”



A)



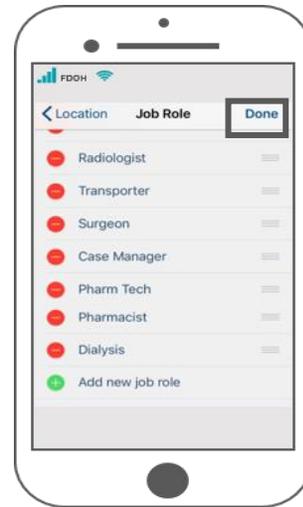
B)



C)



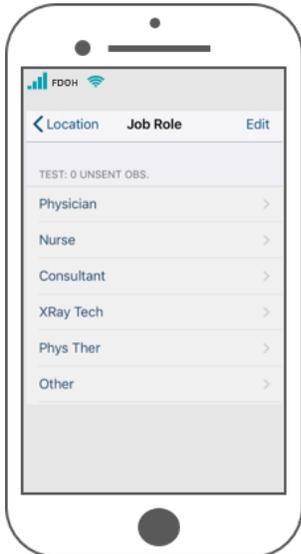
D)



E)

4. Observation Procedure

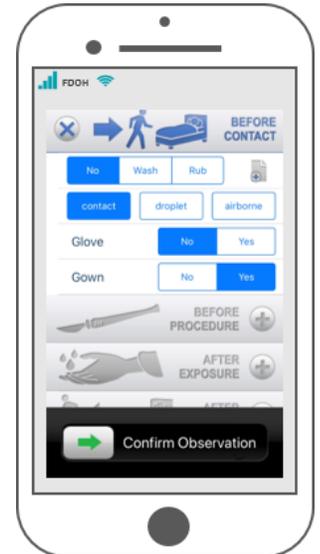
This section will provide an overview of how to record hand hygiene and PPE observations in the iScrub Lite mobile application using the “5 Moments for Hand Hygiene” and the “In/Out” criteria. Regardless of the mode (i.e., “5 Moments for Hand Hygiene” or “In/Out”) you are entering your observations, the user input is handled exactly the same. To record an observation, A) select the “Job Role” of the individual you are observing and B) select the opportunity you are observing. C) Once you have inputted the observation at the bottom of the screen slide your finger on top of the “green” arrow to the right.



A)



B)



C)

For additional guidance on how to input observations by opportunity, please refer to the table below (Note: the opportunities denoted in the table are labeled as they are displayed in iScrub).

OPPORTUNITY	HAND HYGIENE (HH)	PPE
<p>Before contact / “In room”</p>	<p>Dictate the type of hand hygiene the staff member performed.</p> <p>No indicates the staff member DID NOT perform HH before entering the room</p> <p>Wash indicates the staff member performed HH using soap and water before entering the room</p> <p>Rub indicates the staff member performed HH with alcohol-based hand rub before entering the room</p>	<p>Dictate the type of transmission-based precaution the patient is on.</p> <p>The type of PPE will appear. Select either “No” or “Yes.”</p> <p>No indicates the staff member did not don the type of PPE before to entering the room.</p> <p>Yes indicates the staff member did don the type of PPE before to entering the room.</p> <p>Note if the patient is on more than one transmission-based precaution (e.g., droplet and contact), select ALL that apply.</p>

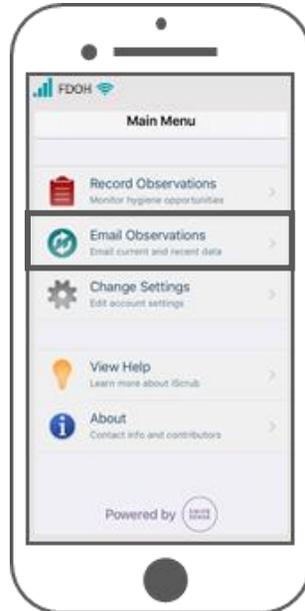
<p>Before procedure</p>	<p>Dictate the type of hand hygiene the staff member performed.</p> <p>No indicates the staff member DID NOT perform HH before starting a clean/aseptic/sterile procedure.</p> <p>Wash indicates the staff member performed HH using soap and water before starting a clean/aseptic/sterile procedure.</p> <p>Rub indicates the staff member performed HH with alcohol-based hand rub before starting a clean/aseptic procedure.</p>	<p>Dictate the type of transmission-based precaution the patient is on.</p> <p>The type of PPE will appear. Select either “No” or “Yes.”</p> <p>No indicates the staff member did not don the type of PPE before starting a clean/aseptic procedure.</p> <p>Yes indicates the staff member did don the type of PPE before starting a clean/aseptic procedure.</p> <p>Note: if the patient is on more than one transmission-based precaution (e.g., droplet and contact), select ALL that apply.</p>
<p>After exposure</p>	<p>Dictate the type of hand hygiene the staff member performed.</p> <p>No indicates the staff member DID NOT perform HH after exposure to a patient. This includes 1. bodily fluids (e.g., blood, urine, stool, etc.); and 1. in between patient care (e.g., dirty task to clean task, administering oral medication through feeding tube and then proceeding to insert medication into central venous catheter).</p>	<p>Dictate the type of transmission-based precaution the patient is on.</p> <p>The type of PPE will appear. Select either “No” or “Yes.”</p> <p>No indicates the staff member did not doff the type of PPE after exposure to a patient.</p>

	<p>Wash indicates the staff member performed HH using soap and water after exposure to a patient. This includes 1. bodily fluids (e.g., blood, urine, stool, etc.); and 1. in between patient care (e.g., dirty task to clean task, administering oral medication through feeding tube and then proceeding to insert medication into central venous catheter).</p> <p>Rub indicates the staff member performed HH with alcohol-based hand rub after exposure to a patient. This includes 1. bodily fluids (e.g., blood, urine, stool, etc.); and 1. in between patient care (e.g., dirty task to clean task, administering oral medication through feeding tube and then proceeding to insert medication into central venous catheter).</p> <p>Note: if the staff member's gloves or hands are visibly soiled, the staff member is caring for a patient with <i>C. diff</i> and/or Norovirus the correct method of HH is by washing with soap and water.</p>	<p>Yes indicates the staff member did doff the type of PPE after exposure to a patient.</p> <p>Note if the patient is on more than one transmission-based precaution (e.g., droplet and contact), select ALL that apply.</p>
<p>After contact/ "Out of room"</p>	<p>Dictate the type of hand hygiene the staff member performed.</p> <p>No indicates the staff member DID NOT perform HH after contact with a patient.</p>	<p>Dictate the type of transmission-based precaution the patient is on.</p> <p>The type of PPE will appear. Select either "No" or "Yes."</p>

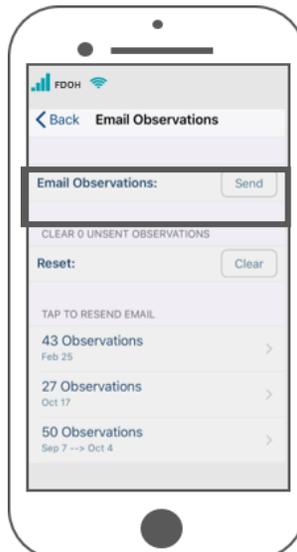
	<p>Wash indicates the staff member performed HH using soap and water after contact with a patient.</p> <p>Rub indicates the staff member performed HH with alcohol-based hand rub after contact with a patient.</p>	<p>No indicates the staff member did not doff the type of PPE after contact with a patient.</p> <p>Yes indicates the staff member did doff the type of PPE after contact with a patient.</p> <p>Note if the patient is on more than one transmission-based precaution (e.g., droplet and contact), select ALL that apply.</p>
<p>After environment/ “Out of room”</p>	<p>Dictate the type of hand hygiene the staff member performed.</p> <p>No indicates the staff member DID NOT perform HH after leaving the patient room/environment.</p> <p>Wash indicates the staff member performed HH using soap and water indicates the staff member DID NOT perform HH after leaving the patient room/environment.</p> <p>Rub indicates the staff member performed HH with alcohol-based hand rub indicates the staff member DID NOT perform HH after leaving the patient room/environment.</p>	<p>Dictate the type of transmission-based precaution the patient is on.</p> <p>The type of PPE will appear. Select either “No” or “Yes.”</p> <p>No indicates the staff member did not doff the type of PPE after leaving the patient room/environment.</p> <p>Yes indicates the staff member did doff the type of PPE after leaving the patient room/environment.</p> <p>Note if the patient is on more than one transmission-based precaution (e.g., droplet and contact), select ALL that apply.</p>

5. Emailing Observations

Step 1: Go to the “Main Menu” and click on “Email Observations.”



Step 2: Select “Send.”



6. Calculating Compliance Rates

Step 1: Download and open your observations in Microsoft Excel.

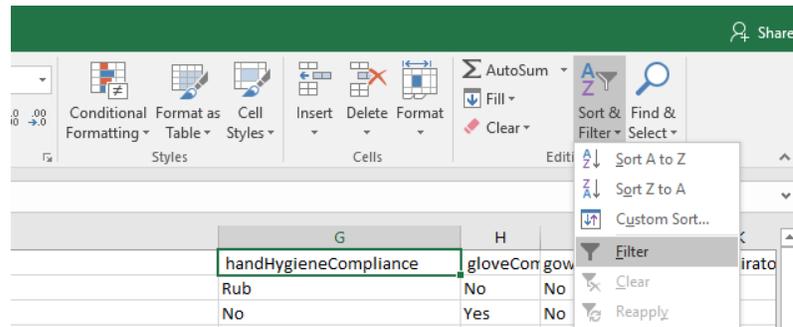
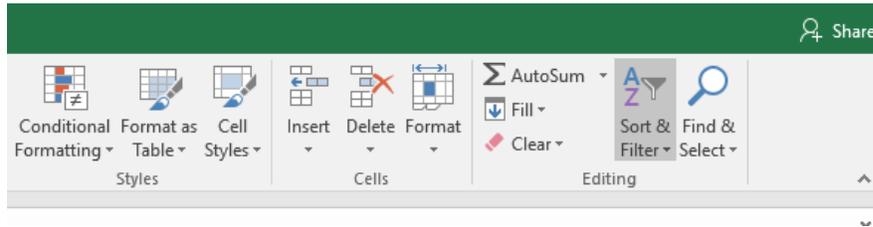
timestamp	location	HCW	opportun	deviceNa	note	handHygieneCompliance	gloveCom	gownCom	maskCom	respirato
2/22/2019 9:38	Hospital Name	EVS	Before Toi	iPhone		Rub	No	No	N/A	N/A
2/22/2019 9:42	Hospital Name	CNA	After Bodi	iPhone		No	Yes	No	N/A	N/A
2/22/2019 9:43	Hospital Name	RT	After Touc	iPhone		Rub	N/A	N/A	N/A	N/A
2/22/2019 9:59	Hospital Name	Nurse	Before Toi	iPhone		Wash	N/A	N/A	N/A	N/A
2/22/2019 9:59	Hospital Name	Nurse	Before Cl	iPhone		Wash	N/A	N/A	N/A	N/A
2/22/2019 9:59	Hospital Name	Nurse	After Bodi	iPhone		Wash	N/A	N/A	N/A	N/A
2/22/2019 10:01	Hospital Name	PT	Before Toi	iPhone		No	No	No	N/A	N/A
2/22/2019 10:05	Hospital Name	Nurse	Before Toi	iPhone		Rub	N/A	N/A	N/A	N/A
2/22/2019 10:07	Hospital Name	EVS	After Touc	iPhone		Rub	N/A	N/A	N/A	N/A
2/22/2019 10:17	Hospital Name	Nurse	After Bodi	iPhone		Wash	N/A	N/A	N/A	N/A
2/22/2019 10:35	Hospital Name	Rehab	After Touc	iPhone	Wearing Mask Outside The Room And Removed It When She Saw Us	No	N/A	N/A	N/A	N/A
2/22/2019 11:59	Hospital Name	RT	Before Toi	iPhone		No	Yes	Yes	N/A	N/A
2/25/2019 7:58	Hospital Name	CNA	After Touc	iPhone		No	N/A	N/A	N/A	N/A
2/25/2019 7:59	Hospital Name	RT	After Touc	iPhone		No	N/A	N/A	N/A	N/A
2/25/2019 8:00	Hospital Name	RT	After Touc	iPhone	Wearing Mask Outside The Room	No	N/A	N/A	N/A	N/A
2/25/2019 8:01	Hospital Name	CNA	Before Toi	iPhone		No	N/A	N/A	N/A	N/A
2/25/2019 8:18	Hospital Name	Physician	After Touc	iPhone		Rub	N/A	N/A	N/A	N/A
2/25/2019 8:20	Hospital Name	RT	Before Toi	iPhone		No	No	No	N/A	N/A
2/25/2019 8:20	Hospital Name	RT	After Touc	iPhone		No	No	No	N/A	N/A
2/25/2019 8:21	Hospital Name	RT	After Touc	iPhone		Rub	No	No	N/A	N/A
2/25/2019 8:23	Hospital Name	RT	Before Toi	iPhone	Repeat offender	No	N/A	N/A	N/A	N/A
2/25/2019 8:37	Hospital Name	Nurse	After Touc	iPhone		No	N/A	N/A	N/A	N/A

Step 2: Select all the observations and in the right side you will find the count (this will be your denominator, the total number of observations).

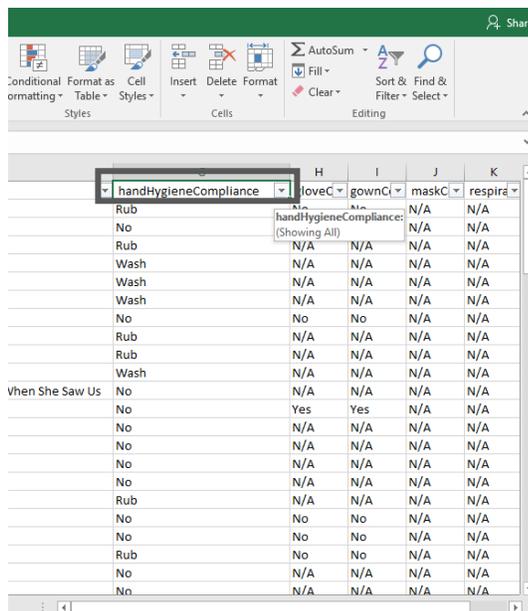
G	H	I	J	K	L
No	N/A	N/A	N/A	N/A	Fdoh
No	N/A	N/A	N/A	N/A	Fdoh
No	N/A	N/A	N/A	N/A	Fdoh
Rub	N/A	N/A	N/A	N/A	Fdoh
No	N/A	N/A	N/A	N/A	Fdoh
No	N/A	N/A	N/A	N/A	Fdoh
Rub	N/A	N/A	N/A	N/A	Fdoh
No	N/A	N/A	N/A	N/A	Fdoh
No	N/A	N/A	N/A	N/A	Fdoh
No	N/A	N/A	N/A	N/A	Fdoh
Rub	N/A	N/A	N/A	N/A	Fdoh
Rub	N/A	N/A	N/A	N/A	Fdoh
Rub	N/A	N/A	N/A	N/A	Fdoh
Rub	N/A	N/A	N/A	N/A	Fdoh
No	N/A	N/A	N/A	N/A	Fdoh
No	N/A	N/A	N/A	N/A	Fdoh
Rub	N/A	N/A	N/A	N/A	Fdoh
No	N/A	N/A	N/A	N/A	Fdoh
Rub	N/A	N/A	N/A	N/A	Fdoh
No	N/A	N/A	N/A	N/A	Fdoh

Count: 91

Step 3: Calculate the compliance rate. To filter, click on Sort & Filter and select filter



Step 4: Click on the arrow next to “handHygieneCompliance”



Step 7: Now follow the formula to calculate the hand hygiene/PPE compliance rate. enter in the number of observations where hand hygiene occurred and divide by the total number of observations.

$$\frac{\text{\# of observations where compliance occurred}}{\text{total \# of observations}} * 100$$

Appendix 6

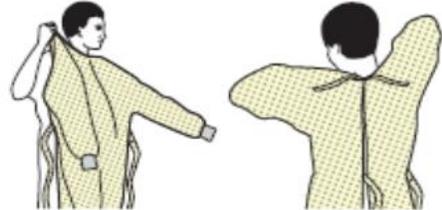
CDC Sequencing for Donning and Doffing PPE

SEQUENCE FOR PUTTING ON PERSONAL PROTECTIVE EQUIPMENT (PPE)

The type of PPE used will vary based on the level of precautions required, such as standard and contact, droplet or airborne infection isolation precautions. The procedure for putting on and removing PPE should be tailored to the specific type of PPE.

1. GOWN

- Fully cover torso from neck to knees, arms to end of wrists, and wrap around the back
- Fasten in back of neck and waist



2. MASK OR RESPIRATOR

- Secure ties or elastic bands at middle of head and neck
- Fit flexible band to nose bridge
- Fit snug to face and below chin
- Fit-check respirator



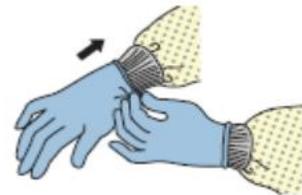
3. GOGGLES OR FACE SHIELD

- Place over face and eyes and adjust to fit



4. GLOVES

- Extend to cover wrist of isolation gown



USE SAFE WORK PRACTICES TO PROTECT YOURSELF AND LIMIT THE SPREAD OF CONTAMINATION

- Keep hands away from face
- Limit surfaces touched
- Change gloves when torn or heavily contaminated
- Perform hand hygiene



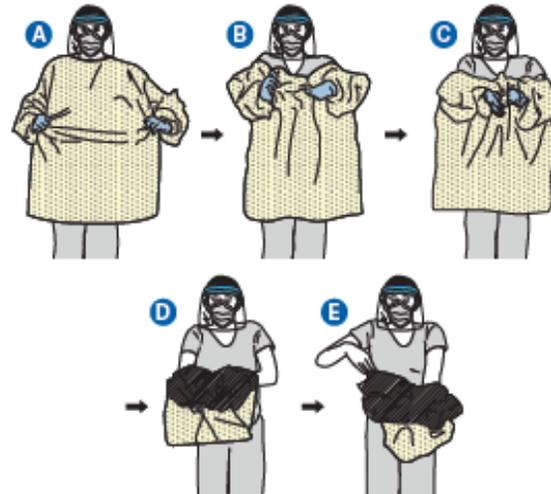
02200672-0

HOW TO SAFELY REMOVE PERSONAL PROTECTIVE EQUIPMENT (PPE) EXAMPLE 2

Here is another way to safely remove PPE without contaminating your clothing, skin, or mucous membranes with potentially infectious materials. **Remove all PPE before exiting the patient room** except a respirator, if worn. Remove the respirator after leaving the patient room and closing the door. Remove PPE in the following sequence:

1. GOWN AND GLOVES

- Gown front and sleeves and the outside of gloves are contaminated!
- If your hands get contaminated during gown or glove removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp the gown in the front and pull away from your body so that the ties break, touching outside of gown only with gloved hands
- While removing the gown, fold or roll the gown inside-out into a bundle
- As you are removing the gown, peel off your gloves at the same time, only touching the inside of the gloves and gown with your bare hands. Place the gown and gloves into a waste container



2. GOGGLES OR FACE SHIELD

- Outside of goggles or face shield are contaminated!
- If your hands get contaminated during goggle or face shield removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Remove goggles or face shield from the back by lifting head band and without touching the front of the goggles or face shield
- If the item is reusable, place in designated receptacle for reprocessing. Otherwise, discard in a waste container

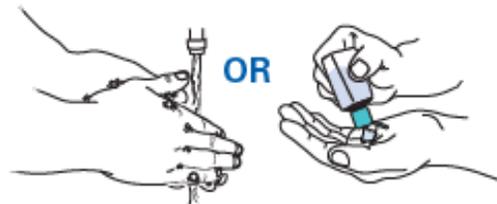


3. MASK OR RESPIRATOR

- Front of mask/respirator is contaminated — **DO NOT TOUCH!**
- If your hands get contaminated during mask/respirator removal, immediately wash your hands or use an alcohol-based hand sanitizer
- Grasp bottom ties or elastics of the mask/respirator, then the ones at the top, and remove without touching the front
- Discard in a waste container



4. WASH HANDS OR USE AN ALCOHOL-BASED HAND SANITIZER IMMEDIATELY AFTER REMOVING ALL PPE



**PERFORM HAND HYGIENE BETWEEN STEPS IF HANDS
BECOME CONTAMINATED AND IMMEDIATELY AFTER
REMOVING ALL PPE**



CG250673-E

Appendix 7

CDC Environmental Cleaning Checklist

EVS Cleaning Checklist

1. HEALTH CARE ZONE

- Door knobs
- Light switches
- Window sills
- Sharps container
- Soap dispenser
- Paper towel dispenser
- Counter surface area
- Handwashing sink in patient room
- Faucet appliance/handles
- Sink perimeter/surface area
- Inside sink basin
- Patient closet
- Stationary computer designated in patient room
- Visitor chair or couch

2. PATIENT ZONE

- Bed controls
- Bed-side railings
- Bedside table
- Bedside commode
- Blood pressure cuff
- Call light/television control
- IV pole
- Monitoring equipment
- Telephone

3. BATHROOM

SINK ZONE

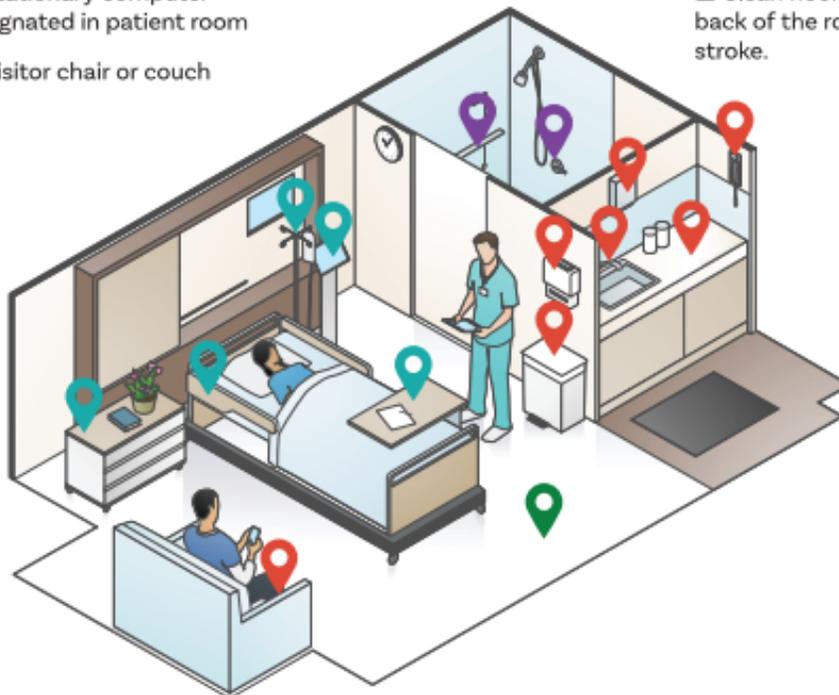
- Mirror
- Paper towel dispenser
- Soap dispenser
- Light switches
- Door knob
- Sink perimeter
- Sink basin
- Stop with drain and discard cleaning cloth

SHOWER ZONE

TOILET ZONE

4. FLOORS

- Clean floors last. Start in the back of the room using the "S" stroke.



FL Dept. of Health 4/19

Appendix 8

Isolation Precaution Signage

Contact Precautions

IN ADDITION TO STANDARD PRECAUTIONS



All family and visitors:

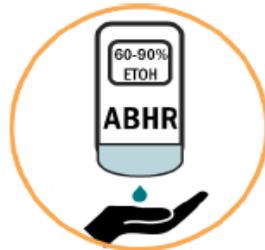
Please report to nurses station or see staff
BEFORE entering room

ANTES de entrar los visitantes deben presentarse al la estación de enfermeras

Everyone **MUST:**

Perform hand hygiene

With alcohol-based hand rub (ABHR) or soap and water before entering and exiting



Wear gown

Before entering and remove upon exiting



Wear gloves

Before entering and remove upon exiting



Todos **DEBEN:**

Realizar higiene de manos

Con un desinfectante para manos a base de alcohol (ABHR) o agua y jabón antes de entrar o salir

Usar bata

Antes de entrar y retirar al salir

Usar guantes

Antes de entrar y retirar al salir

Special Contact Precautions

IN ADDITION TO STANDARD PRECAUTIONS



All family and visitors:

Please report to nurses station or see staff

BEFORE entering room

ANTES de entrar los visitantes deben presentarse al la estación de enfermeras

Before entering, everyone

MUST:

Perform hand hygiene

With alcohol-based hand rub (ABHR) or soap and water



Wear gown

Before entering and remove upon exiting



Wear gloves

Before entering and remove upon exiting



Before exiting, everyone

MUST:

Wash hands

With soap and water



Antes de entrar, todos

DEBEN:

Realizar higiene de manos

Con alcohol a mano (ABHR) o agua y jabón

Usar bata

Antes de entrar y retirar al salir

Usar guantes

Antes de entrar y retirar al salir

Antes de salir, todos

DEBEN:

Lavarse las manos

Con agua y jabón antes de salir de la habitación

Droplet Precautions

IN ADDITION TO STANDARD PRECAUTIONS



All family and visitors:

Please report to nurses station or see staff

BEFORE entering room

ANTES de entrar los visitantes deben presentarse al la estación de enfermeras

Everyone MUST:

Perform hand hygiene

With alcohol-based hand rub (ABHR) or soap and water before entering and exiting



Wear mask

Before entering and remove upon exiting



Todos DEBEN:

Realizar higiene de manos

Con un desinfectante para manos a base de alcohol (ABHR) o agua y jabón antes de entrar o salir

Máscarilla desechable

Antes de entrar y retirar al salir

Airborne Precautions

IN ADDITION TO STANDARD PRECAUTIONS



All family and visitors:

Please report to nurses station or see staff

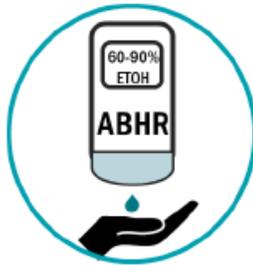
BEFORE entering room

ANTES de entrar los visitantes deben presentarse al la estación de enfermeras

Everyone MUST:

Perform hand hygiene

With alcohol-based hand rub (ABHR) or soap and water before entering or exiting

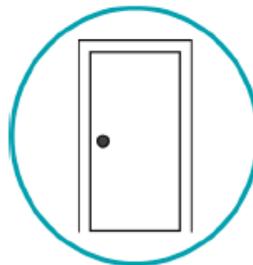


Wear N-95 or higher-level respirator

Before entering room and remove outside of room or in anteroom



Keep door closed



Todos DEBEN:

Realizar higiene de manos

Con un desinfectante para manos a base de alcohol (ABHR) o agua y jabón antes de entrar o salir

Usar un respirador de nivel N-95 o superior

Antes de entrar a la habitación y retirar fuera de la habitación o en la antesala

Mantenga la puerta cerrada

Appendix 9

Instructions for Submitting Clinical Isolates to BPHL-Jacksonville

1. Consult with facilitating laboratory to ensure isolate of interest is available
2. Receive approval for submission from HAI Prevention Program
3. Complete highlighted sections of pre-filled DH-1847 form
 - Specimen Collection Date
 - Send Facility Laboratory Accession Number
 - Patient Information
 - Health Care Provider Information
 - Microbiology Specimen Type(s) (i.e., “Organism Type” [e.g., blood, urine, BAL, etc.])
 - Comment/Additional Information
 - Suspected Organism
 - Source (e.g., blood, urine, BAP sputum, etc.)
 - Method of Detection (e.g. Vitek, CarbaR, etc.)
 - CHD
 - CHD Epidemiologist Contact Information
 - Contact Number
 - Approved by HAI Prevention Program
4. Forward the DH-1847 form to facilitating laboratory to include with the isolates being sent to BPHL-Jacksonville
5. Advise facilitating laboratory to ship the isolates to the following address:

Bureau of Public Health Laboratories-Jacksonville
Microbiology Department
ATTN: Kendra Edwards
1217 N. Pearl Street
Jacksonville, FL 32202
6. Send a confirmation email to notify the HAI Prevention Program of the date in which the facilitating laboratory plans to ship out the isolate and include a copy of the DH-1847 form



DH1847, 13/05



Bureau of Public Health Laboratories

FOR LAB USE ONLY

Patient Information

Local Patient Identifier (Chart, Jail, Prison ID, etc.): _____

Last Name: _____ First Name: _____ MI: _____

DOB (MM/DD/YYYY): _____ County: _____

SSN: _____ Sex: _____

Street Address: _____

City: _____ State: _____ Zip: _____

Race: _____ Ethnicity: _____

Parent/Guardian Name: _____

ICD9 Diagnosis Codes: _____

Health Care Provider Information

Provider Name: _____ Physician UPIN: _____

Street Address: _____

City: _____ State: _____ Zip: _____ County: _____

Contact Name: _____ Phone: _____

Insurance Information

Medicare #: _____ Medicaid #: _____

HMO/Ins Name #: _____ MedPass #: _____

Programs: _____ Special Project ID: _____ Program Component: _____

HCP/DAU Number: _____

Note: For more information or to see a complete list of available tests, visit www.doh.state.fl.us/lab

SEROLOGY

Circle Specimen Type(s): Blood Serum Urine Cervical
Urethral Other _____

0430 Amplified GC/CT
0380 Chronic Hepatitis Panel (HBsAg, HBsAb, HBeAb, HAVAb, HCVAb)
0390 HCV RNA NAAT
0350 Hepatitis A Total Ab (HAVAb)
0360 Hepatitis A IgM
0340 Hepatitis B Panel (Includes HBsAg, HBsAb, HBeAb)
0320 Hepatitis BcAb
0370 Hepatitis BcAb IgM
0310 Hepatitis BsAb
0300 Hepatitis BsAg
0330 Hepatitis C Antibody Screen (HCVAb)
0250 Syphilis screen (RPR) w/Confirmation if Reactive
4000 Rubella Screen
0240 Syphilis Confirmation EIA (Total Antibody)
0210 Syphilis Confirmation FTA-Abs

For HIV-1/2 related services use DH1628

VIROLOGY

Circle Specimen Type(s): CSF Acute Serum Convalescent Serum
Stool Swab _____ Other _____
(for swabs indicate specimen source, eg NP, throat, vulva, etc.)

1510 Arbovirus Antibody**
1670 Arbovirus Culture**
1500 Arbovirus IgM**
1680 Arbovirus PCR**
1540 CMV IgG
1870 CNS Panel (Arbovirus/Enterovirus) CSF
1500 Dengue**
1710 Ehrlichia IgG IFA**
1800 Enterovirus Culture
1810 Enterovirus PCR*
0900 Herpes Simplex Culture
0800 Herpes Simplex Smear DFA
0835 Herpes Simplex Smear DFA Type 1/2
0838 Herpes Simplex Type 1/2 IgG
9100 Influenza AB RT-PCR
1610 Influenza Culture
1714 Lyme**

1740 Measles IgG
1750 Measles IgM*
1755 Measles PCR*
1660 Mumps IgG
1664 Mumps IgM*
1668 Mumps PCR*
1830 Norovirus PCR
9500 Q Fever*
1620 Respiratory Virus Culture
1770 Respiratory Virus PCR*
1716 Rickettsia (RMSF) IgG**
1720 Rubella IgM*
1300 Toxoplasma IgG
1570 Varicella Zoster IgG
0920 Varicella Zoster PCR*
0910 Varicella Zoster Smear
Other: _____

MICROBIOLOGY/PARASITOLOGY

List Specimen Type(s): isolate: organism source ()

2600 Aerobic Culture, miscellaneous
2300 Aerobic Isolate Identification
2500 Anaerobic Culture
2400 Anaerobic Isolate ID
2100 Beta Strep Culture
0700 Gonorrhea Culture
3000 Legionella Culture
2700 Pertussis Smear
2800 Pertussis Culture
2810 Pertussis PCR
1900 Stool Culture
2000 Typing, Salmonella

1200 Blood Parasite***
1000 Intestinal O & P
1410 Parasitic Microscopy
1400 Parasitic Serology
1100 Pinworm Slide

***Provide recent travel history below (Include Dates): _____

* Tests are only available through prior arrangement with the Virology Laboratory
** Complete the following Mandatory Information:

Date of Onset: ____/____/____ Tick Bite? Yes No Mosquito Bites? Yes No

Clinical Symptoms: _____

Recent Travel History (Include Dates): _____

MYCOBACTERIOLOGY

Circle Specimen Type(s): CSF Sputum Bronchial Wash Tissue
Other _____

Specimen: Processed Not processed

3100 AFB Smear/TB Culture
3140 Nucleic Acid Amplification for TB (Real-Time PCR), Respiratory specimens only
3200 AFB Culture for Identification (Referred isolate)
3300 TB Drug Susceptibilities (Referred isolate)

MYCOLOGY

List Specimen Source: _____

3500 Mycology Referred Isolate ID
3510 Mycology Serology

Comments/Additional Information: _____ Method of Detection: (e.g., Vitek, CarbaR, etc.)
Suspected Organism: _____
Source: _____
CHD: _____ CHD Contact Number: _____
CHD Epidemiologist Name: _____

Appendix 10

Multidrug-Resistant Organisms (MDRO) Testing Capabilities at the Bureau of Public Health Laboratories (BPHL)

Organism	BPHL Testing Capabilities	Send to Regional Lab – ARLN (TN)	Send to CDC—ARLN
Carbapenem-Resistant <i>Enterobacteriaceae</i> (CRE)	Genotypic: GeneXpert CARBA-R real-time PCR assay Phenotypic: MALDI-TOF for identification, mCIM, Etest on positives	Novel mechanisms (negative Carba-R/positive mCIM)	Non-KPC+ organism alerts by request. If novel mechanisms continue from Regional Laboratory.
Carbapenem-Resistant <i>Pseudomonas aeruginosa</i> (CRPA)	Genotypic: GeneXpert CARBA-R real-time PCR assay Phenotypic: MALDI-TOF for identification, mCIM, Etest on positives	Novel mechanisms (negative Carba-R/positive mCIM)	Non-KPC+ organism alerts by request. If novel mechanisms continue from Regional Laboratory.
MDR <i>Acinetobacter</i> spp	Genotypic: GeneXpert CARBA-R real-time PCR assay Phenotypic: MALDI-TOF for identification, Carba NP, Etest on positives	Novel mechanisms (negative Carba-R/positive Carba NP)	Any GeneXpert CARBA-R+ organism alerts by request. If novel mechanisms continue from Regional Laboratory.
Extended-Spectrum β -Lactamase (ESBL)	ESBL testing is not performed at BPHL	N/A	N/A
Methicillin-Resistant <i>Staphylococcus aureus</i> (MRSA)	Oxacillin Etest (μ l/ml) $\leq 2 \rightarrow$ susceptible (reportable)	N/A	N/A

	<p>≥4 → resistant</p> <p>Cefoxitin Kirby Bauer (mm)</p> <p>≥22 → susceptible (reportable)</p> <p>≤21 → resistant</p>		
<p>Vancomycin-Intermediate <i>Staphylococcus aureus</i> or Vancomycin-Resistant <i>Staphylococcus aureus</i> (VISA/VRSA)</p>	<p>Vancomycin Etest (µl/ml)</p> <p>≤4 → susceptible (reportable)</p> <p>4—8 → intermediate or VISA (reportable)</p> <p>≥16 → resistant and forward to CDC for confirmation</p>	N/A	If MIC is ≥8 µl/ml
Suspected <i>Candida auris</i>	Currently not tested – subcultured and accessioned before forwarding to Regional Laboratory	Suspected <i>C. auris</i> which may be misidentified as: <i>C. glabrata</i> , <i>C. duobushaemulonii</i> , <i>C. haemulonii</i> , etc.	If MALDI-TOF or PCR cannot provide an accurate identification of genus and species from Regional Laboratory.
<i>Clostridioides difficile</i> (C. diff)	C. diff testing is not performed at BPHL	N/A	N/A
Vancomycin-Resistant <i>Enterococcus</i> (VRE)	VRE testing is not performed at BPHL	N/A	N/A
Suspected Multi-Drug Resistant Tuberculosis Complex (MDR-TB)	<p>Molecular testing by Hain MTBDR_{plus} line probe assay (“MDR Screen”) or by GeneXpert for rifampin resistance (special request).</p> <p>Phenotypic testing by MIC</p>	Send to National TB Genotyping Laboratory at Michigan Bureau of Laboratories for genotyping by mycobacterial interspersed repetitive unit (MIRU)-variable number tandem repeat (VNTR)	<p>Refer MDR-TB to CDC’s MDDR program for molecular testing</p> <p>Refer TB isolates to CDC for spoligotyping if necessary after MIRU-VNTR</p>

<i>Neisseria gonorrhoeae</i>	Culture testing, Accuprobe (nucleic acid hybridization test), GC testing by RT-PCR directly from urine and swabs	N/A	Only for MIC susceptibilities
<i>Enterobacteriaceae</i>	N/A	N/A	Send to CDC NARMS

Note: Send to National Tuberculosis Molecular Surveillance Center in Michigan for genotyping: Mycobacterial interspersed repetitive unit (MIRU) VNTR analysis.

Appendix 11

MDRO & *Candida auris* Screening Talking Points

- Different MDRO/*C. auris* screening strategies offer different benefits and are more appropriate for certain scenarios. Admission screening can identify new introductions to a facility as well as identify other facilities that may *unknowingly* have MDRO/*C. auris* cases. Point prevalence surveys can identify new transmission events within a facility or can provide a snapshot into the current prevalence at a facility. These screening strategies are tools that can be used depending on the situation and resources available. We are constantly learning more about the best and most efficient ways to do MDRO/*C. auris* screening, but it should be targeted based on risk and adapted for the current situation. Screening is most efficient when informed by local and facility-level epidemiology, so facilities are encouraged to use the results of their admission screenings and point prevalence surveys to identify patient, unit, or facility risk factors to further target screening.
- Screening resources through ARLN are limited and grounded in public health need, so should be used to provide the greatest benefit to the region. Containment is easiest when case counts are low, so the greatest impact of screening is to identify introductions early and prevent spread in new areas. Facilities with highest risk of new introductions and spread (based on facility type and patient movement patterns) should be prioritized for screening and other containment activities. Ultimately, reducing the MDRO/*C. auris* spread into new areas in the region will benefit *all* facilities by decreasing the likelihood of future introductions and the number of outbreak facilities requiring screening resources. Also, consider other opportunities to streamline and improve efficiency of MDROs/*C. auris* testing by targeting specific populations or units at highest risk of MDROs/*C. auris*, but the populations and areas in most need of screening may shift over time as the regional epidemiology of MDROs/*C. auris* changes.
- Because they are often transmitted in similar settings and screening for both can improve efficiency of detection, when screening is performed, we recommend screening for both *C. auris* using axilla/groin swabs and CRE (and other relevant CPOs based on local epidemiology) using rectal swabs, especially in facilities known to have one of these pathogens.
- We encourage non-ARLN labs to do species identification of *Candida* spp. from all body sites (not just sterile sites or invasive specimens) and to consider validating *C. auris* colonization testing, so that they can also provide this service to affiliated or local facilities.
- Screening is just one part of an effective containment strategy, in addition to infection control. Improving infection control is essential and should be the top priority. Without effective infection control, screening alone will not prevent MDRO/*C. auris* spread. If appropriate, adjustments in frequency of screening should be considered while infection control improvements are made and point prevalence surveys should be conducted along with demonstrated improvements in infection control practices. Even facilities that haven't yet had

a case should evaluate and improve infection control practices, not wait until there is an introduction (and likely spread) before they start making improvements.