Containment Strategy for Targeted Antibiotic Resistant Organisms

Emergence and spread of highly antibiotic resistant organisms jeopardize the practice of modern medicine. The combination of increasing antibiotic resistance and fewer new antibiotics is likely to result in more and more untreatable infections. Treatments such as joint replacement, caesarian section, cancer chemotherapy, and organ transplant could become too risky if effective antibiotics are unavailable. The Centers for Disease Control and Prevention’s (CDC) Containment Strategy for Unusual Resistance depends on collaboration between state and local public health agencies, laboratories, and healthcare facilities and providers to contain highly antibiotic resistant organisms towards a common goal of protecting patients and improving public health.

Reducing Antibiotic Resistance

The following actions can help combat antibiotic resistance:

- Minimize the emergence of antibiotic resistance by improving antibiotic use
- Detect targeted antibiotic resistant organisms through laboratory testing
- Contain the spread of antibiotic resistant organisms

Increased federal funding for combating antibiotic resistance through the Antibiotic Resistance Laboratory Network (ARLN) and State Healthcare Associated Infections Programs has greatly increased capacity to detect and respond to high priority organisms. The ARLN network of laboratories includes academic and clinical
laboratories, state public health laboratories, and regional antibiotic resistance laboratories, including the Western Region Antibiotic Resistance Laboratory located in Shoreline at the Washington Public Health Laboratories.

When a targeted organism is suspected based on clinical laboratory results, prompt communication and implementation of infection control measures to prevent spread will protect additional patients until confirmatory testing is performed. By rapidly communicating results to local health jurisdictions, healthcare facilities can enlist expertise and support for the investigation. The ARLN can perform colonization screening of patients who are linked to a case. Public health agencies are encouraged to perform onsite infection control assessments, arrange screening, and provide infection control guidance until transmission is controlled.

CDC recently published Interim Guidance for a Public Health Response to Contain Novel or Targeted Multidrug-resistant Organisms (MDROs) that describes a tiered response depending on the significance of resistance identified. Overall the goals of rapid detection, response, and containment are to:

- Identify if transmission is occurring
- Identify affected patients
- Ensure appropriate control measures are promptly implemented to contain spread
- Characterize the organism to guide further actions

In Washington, targeted multidrug resistant organisms are categorized by tiers in the table below (Table 1). Note that not all targeted MDROs are mandated by law to be reported to public health, but all are of public health significance.

Table 1. Targeted Multi-drug Resistant Organisms in Washington

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| 1    | • Pan-resistant organism with plasmid-mediated resistance
      | • Vancomycin-resistant Staphylococcus aureus
      | • Novel resistant organism for which knowledge is limited |
| 2    | • Carbapenemase-producing organisms (including Enterobacteriaceae, Pseudomonas and Acinetobacter) containing KPC, NDM, OXA-48, IMP or VIM carbapenemase
      | • Candida auris
      | • Organisms with mobile colistin resistance (mcr) |
| 3    | • Other carbapenemases in Acinetobacter (e.g. OXA-23, OXA-24/40) |

Public health agencies can communicate with healthcare facilities and providers regarding which resistant organisms should be reported and/or submitted to public health, and educate regarding advanced testing capabilities available at state and regional laboratories. CDC’s Containment Strategy guidance proposes a standardized healthcare response, but identifying and tracking transmission is more aggressively pursued for higher tier organisms. The following actions should be taken for all targeted antibiotic resistant organisms:
• Involve local and state public health agencies
• Notify the patient’s healthcare providers, including those receiving the patient in transfer
• Ensure appropriate infection control measures are in place
• Inform patient and family and educate regarding infection prevention
• Investigate to attempt to identify the source
• Conduct a contact investigation to identify others at risk for acquisition
• Consider surveillance screening of contacts or a point prevalence survey in the facility
• Perform retrospective and prospective laboratory surveillance to identify similar organisms

Facility staff should initiate case and contact investigations as soon as possible to compile key information. By gathering information about type and location of the case’s other recent healthcare and travel history (including healthcare utilization), the case investigation can suggest the source of acquisition. The contact investigation should compile types of healthcare utilization (intensive care, long term care, ventilation, indwelling devices, wounds, bed bound) and whether the case had any roommates. The investigation should also determine whether the case was on infection prevention precautions effective at limiting spread of the particular targeted organism, and timing of such precautions. All these factors will impact the level of concern for spread to other patients, and suggest whom to screen for potential acquisition. The contact investigation flowchart (Figure) can aid in identifying a group of at-risk patients for screening.

Figure 1. Contact Investigation for Screening Epi-Linked Patients

*Higher risk for acquisition: e.g., bed bound, requiring higher level of care, indwelling devices, wounds.

**Higher risk for transmission: e.g., bed bound, requiring higher level of care, uncontained drainage, needs assistance with toileting.
Screening epi-linked patients for MDRO acquisition can be conducted in a ring fashion, first screening the group of patients at highest risk for acquisition. If no transmission is identified, screening can cease. However, if transmission is identified, a wider ring of screening should be performed. If screening is recommended and very few contacts are still in the facility, point prevalence screening could be performed in the highest risk location, for example, on the ward or wing where the case was inpatient. An important consideration is that the screening sample size should be large enough to identify potential transmission, for example, if 20 epi-linked patients are identified but only 2 can be screened, the numbers are potentially inadequate to detect transmission. In those situations, public health and facilities should work together to define some combination of epi-linked and point prevalence screening to increase the ability to detect transmission.

Facilities’ first experience with screening can be challenging. Facility leadership should be aware and involved in decision-making about screening. Leadership is often worried about negative media attention as a result of screening. In Washington from January 2016 through July 2018, for 19 MDRO investigations with screening, there has been no resulting media attention. Public health agencies are available to provide guidance, support, and onsite assistance for screening. The DOH Healthcare Associated Infections Program (HAI) can provide onsite assistance if local public health is unavailable to go onsite. Screening goes most smoothly if a public health representative can be onsite to assist with paperwork, and labeling and delivery of samples. A template for FAQs and verbal assent document for use when approaching patients for screening is available (https://www.cdc.gov/hai/downloads/Screening-FAQs-verbal-consent-example.docx).

The Healthcare Associated Infections Program will offer several table top exercises around the state, in conjunction with local health and hospitals, to practice response for targeted MDROs. For any questions about MDROs or services available from the ARLN or HAI Program, please contact Kelly Kauber at 206-418-5500. Antibiotic resistance threatens all of us – people and animals, old and young, parents, children, and patients. Combating antibiotic resistance is a global priority.

**Resources**

For additional information, see:

  [https://www.cdc.gov/mmwr/volumes/67/wr/mm6713e1.htm?s_cid=mm6713e1_w](https://www.cdc.gov/mmwr/volumes/67/wr/mm6713e1.htm?s_cid=mm6713e1_w)
- [https://www.cdc.gov/vitalsigns/containing-unusual-resistance/index.html](https://www.cdc.gov/vitalsigns/containing-unusual-resistance/index.html)