

**Program Element #23: Support of Acute and Communicable Disease Prevention (ACDP)  
Section Collaboration with Epidemiology and Laboratory Capacity (ELC) Programs (OHSU,  
VA, and OSU)**

1. **Purpose of Acute and Communicable Disease Prevention (ACDP) Section.** ACDP is a section of the Oregon Health Authority tasked with preventing the spread of infectious diseases in Oregon.
2. **Purpose of Epidemiology and Laboratory Capacity Cooperative Agreement.** The purpose of the Epidemiology and Laboratory Capacity Cooperative Agreement (ELC) is to provide State Public Health agencies with funding to improve surveillance for, and response to, infectious diseases and other Public Health threats.
3. **Staffing Requirements.** Grantee assures OHA that the following staff: Dr. John Townes, Associate Professor of Medicine, Judith Guzman-Cottrill, Associate Professor of Pediatrics, and Lynne Strasfeld Associate Professor of Medicine, Oregon Health and Sciences University (OHSU); Dr. Chris Pfeiffer, Division of Infectious Disease, Portland Veterans Affairs Medical Center (VAMC) and Assistant Professor of Medicine, OHSU; and Dr. Jon Furuno, PhD, Department of Pharmacy Practice, Oregon State University (OSU):
  - a. Are assigned to assist OHA ACDP planners in conducting the projects;
  - b. Are available for and will devote amounts of time that are sufficient to ensure continuation of assigned ACDP surveillance projects;
  - c. Will monitor the administration of ACDP surveillance projects;
  - d. Will supervise Grantee staff persons, interns and physicians performing work associated with ACDP surveillance projects;
  - e. Will design protocols for ACDP surveillance projects;
  - f. Will coordinate activities associated with ACDP surveillance projects, as set forth herein;
  - g. Will develop and deliver related education and training, as set forth herein, and
  - h. Will ensure that adequate progress is made as outlined in their respective roles in the Multidrug Resistant Organism (MDRO) Surveillance and Response Network as set forth in Attachment 1 “ACDP Funded Grant Activities” to this Program Element Description and in accordance with the timelines and measures of effectiveness therein.
4. **ACDP Surveillance Projects.** Use and retention by Grantee of disbursements of financial assistance provided by OHA under this Agreement for ACDP surveillance projects is conditioned upon Grantee conducting the ACDP surveillance projects in accordance with the operational requirements and procedures and reporting requirements set forth herein, all satisfactory to OHA in its reasonable discretion.
  - a. **Continuing ELC Surveillance Project.**

**Multidrug Resistant Organism (MDRO) Surveillance.** Grantee must establish and maintain the operation of the MDRO Surveillance for enhancing the capacity for early detection, reporting, and prevention of MDRO among physicians, medical care providers, and Local Public Health Authorities (LPHA) in Oregon.

    - (1) **MDRO Surveillance Requirements.** Grantee affirms to OHA that Grantee possesses the operational capacity to maintain the administrative and operational

capacity to conduct MDRO Surveillance activities in accordance with the provisions of this Agreement.

- (2) **MDRO Surveillance Procedures.** Grantee must observe the following procedures in conducting the MDRO Surveillance:
- (a.) Grantee must conduct MDRO Surveillance activities in accordance with the practices and protocols established by OHA for Continuing ELC Surveillance projects.
  - (b.) Grantee must conduct surveillance of incidents of infection with MDRO among residents of the State of Oregon in accordance with investigative protocols established by Grantee for this purpose.
  - (c.) Grantee must ensure that a qualified epidemiologist collects, compiles and submits data to Grantee concerning the incidence of infection with MDRO from hospital laboratories located within the State of Oregon.
  - (d.) Grantee must consult with Oregon State Public Health Laboratory (OSPHL) to ensure that OSPHL maintains the technical and laboratory capacity to collect MDRO bacterial isolates from the State of Oregon hospitals for potential additional analysis and testing.
  - (e.) Grantee will supervise OHA's MDRO Surveillance Epidemiologist in conducting analysis of parts, or all, of the MDRO data contained in OHA surveillance database. OHA will determine the purpose, procedures and content of analysis in consultation with Grantee. The quality of the analysis conducted by Grantee and MDRO Surveillance Epidemiologist must satisfy CDC and OHA standards for quality, accuracy and statistical significance.
  - (f.) Grantee must maintain confidentiality of patient records in accordance with OHA standards.

**b. Contingency ACDP Study Projects.** Grantee acknowledges and agrees that:

- (1) OHA may require the conduct of Contingency ACDP Study Projects of emerging infectious diseases from time to time over the term of this Agreement, subject to the mutual consent of OHA and Grantee and in accordance with a duly executed amendment to this Agreement.
- (2) OHA designations of a Contingency ACDP Study Project may be made in instances in which the numbers of, or the geographic concentration of, individuals who have been diagnosed with, or who present symptoms of, an emerging infectious disease, or in instances in which there is a reasonable risk of individuals developing an emerging infectious disease, cause the OHA ACDP Manager to designate a Contingency ACDP Study Project on a rapid-response, contingency basis.

*Note: The following subsections c. (1) thru c. (3) of Section 4. "ACDP Surveillance Projects" sets forth the process by which OHA identifies a potential emerging infectious disease and by which OHA designates Contingency ACDP Study Projects.*

**c. OHA Designation of Contingency ACDP Study Project.**

- (1) Reporting a Potential Emerging Infection Situation to OHA.** OHA receives reporting of potential epidemic occurrences from physicians and medical service provider organizations such as the following:
  - (a.)** Oregon Health and Sciences University (OHSU)
  - (b.)** Local Public Health Authorities, in accordance with OHA Communicable Disease Investigative Guidelines, available at <http://www.dhs.state.or.us/publichealth/lhd/index.cfm>.
  - (c.)** Hospital staff, physicians or other certified health professionals.
  - (d.)** Disease control reporting systems in Oregon, such as the Health Alert Network (HAN).
  - (e.)** Other formal and informal means by which OHA is informed of an emerging infection situation.
- (2) Designation of Contingency ACDP Study Project by OHA.** OHA retains the authority to designate a Contingency EIP Study Project that is required to protect the public health interests of Oregon's population. This designation authority resides with OHA to allow OHA to respond quickly to emerging infectious diseases that have the potential to become epidemics.
- (3) Initiation and Implementation of Contingency ACDP Study Project.**
  - (a.)** Following designation of Contingency ACDP Study Project by OHA Acute and Communicable Disease Prevention Manager, Grantee must provide Contingency ACDP Study Project services to OHA designed to prevent or control the potential communicable disease situation.
  - (b.)** Grantee must review existing and available data on the potential communicable disease situation.
  - (c.)** Grantee must confer with the public health officials and other experts whom Grantee, using professional judgment, determines are necessary to consult.
  - (d.)** Grantee must participate, upon request by OHA, in CDC consultations directed toward designing Contingency ACDP Study Project protocols.
  - (e.)** Grantee must design an epidemiological study to investigate the potential communicable disease situation, if, in the professional judgment of Grantee, an epidemiological study is required.
  - (f.)** Grantee must conduct or monitor, as necessary, data collection pertaining to the potential communicable disease situation.

- (g.) Grantee must conduct or monitor, as necessary, data compilation, analysis and interpretation pertaining to the potential communicable disease situation.
- (h.) Grantee must develop a written report pertaining to the potential communicable disease situation and submit the report in a timely manner to OHA.
- (i.) OHA and Grantee may agree, pursuant to future Grant agreements, if such agreements are executed by OHA and Grantee, to establish Contingency ACDP Study Project as Continuing ACDP Study Projects, in instances in which OHA and Grantee agree that continuation of the Contingency ACDP Study Project serves the public health interests of Oregon's population.
- (j.) If the Contingency ACDP Study is deemed "research" by the OHA, Grantee must ensure that requirements of relevant Institutional Review Boards for the protection of human subjects involved in the Contingency ACDP Study are met.
- (k.) Grantee must maintain confidentiality of patient records in accordance with OHA standards.

5. **Reporting Obligations and Periodic Reporting Requirements.** In addition to the reporting obligations set forth in Exhibit D, section 8, of this Agreement, Grantee shall provide written progress updates in accordance with a schedule that OHA determines in consultation with Grantee. Grantee shall submit the written progress updates as follows:

- a. Quarterly progress reporting, using a form approved for this use by OHA, on Continuing ACDP Study Projects.
- b. Periodically, as determined by OHA in consultation with Grantee, progress reports for Contingency ACDP Special Projects.

**Attachment 1 to Program Element #23**  
**ACDP Funded Grant Activities**

**Activity D.1.C.Regional Multidrug-Resistant Organism Prevention and Detection**

**Background, Need, Capacity, and Understanding**

***Background of Carbapenem-Resistant Enterobacteriaceae (CRE) in Oregon***

In November, 2010 an Oregon physician requested assistance for a patient who was culture positive for *Klebsiella pneumoniae* and resistant to carbapenem antibiotics. We contacted the Centers for Disease Control and Prevention (CDC), who provided infection control recommendations and a carbapenem-resistant Enterobacteriaceae (CRE) response algorithm. As part of the Emerging Infections Program's (EIP) Multi-State Gram-negative Surveillance Initiative (MuGSI), our initial data indicated that no laboratory in the Portland Tri-County had seen these multidrug-resistant organisms (MDROs). Unlike other geographic areas in the US and abroad, CRE appear to not be endemic in Oregon.

Our first known CRE clinical isolate, which ultimately tested positive for *Klebsiella pneumoniae* carbapenemase (KPC), provided a wake-up call to initiate surveillance and response. By the end of 2011 we were fully participating in CRE surveillance, both through the MuGSI project in the Portland Tri-County area, and via statewide reportability. All isolates identified as CRE are sent to CDC for further testing, which includes the Modified Hodge Test (MHT), to determine whether cultures are carbapenemase producers, and polymerase chain reaction (PCR), to identify specific resistance mechanisms of concern. We are working to provide follow up for cases that meet criteria and to develop a method to limit the spread of these MDROs, particularly those that are producers of carbapenemase such as *Klebsiella pneumoniae* carbapenemase (KPC) or New-Delhi metallo-beta-lactamase (NDM), due to their known potential for rapid spread through highly mobile genetic elements. Oregon would greatly benefit from expanded resources in this important effort.

***Need***

We are in a situation with a critical opportunity to potentially limit the spread of a very dangerous class of MDRO. As stated above, prior to 2011, we were aware of only one CRE isolate identified in Oregon. We initiated statewide reportability in 2011 and in December had 3 CRE cases, none of which were carbapenemase producers. At the present moment, in May, 2012 we have a total of 18 confirmed and 8 suspected CRE cases and just recently had our second confirmed carbapenemase producer (another KPC). As both patients with cultures that tested positive for KPC had a history of recent travel to geographic regions in which CRE are considered endemic, the KPC for both cases may have been acquired outside of Oregon.

Currently we receive reports of CRE, forward isolates to CDC, and attempt to follow up on cases. Unfortunately laboratories differ in their capacity to identify and submit CRE and so we are not sure that we are receiving all reports of true incident cases. We are also receiving a relatively high number of false positives, which result in non-CRE isolates sent to CDC and wasted work in isolate processing. In addition, due to limited resources, there is a significant delay between the time we receive reports and the time in which we provide a response for confirmed cases. Furthermore, our surveys, which targeted laboratories and members of the infectious disease community in the Tri-County Portland metro area, indicate that 82% of respondents would like to implement strong active measures to prevent transmission of CRE.

Though CRE may be emerging in Oregon, we do not have the resources to implement aggressive response mechanisms or to evaluate the effectiveness of such efforts. We would like to initiate a multi-faceted MDRO response network, including the following components: collaboration between local and national experts across the healthcare continuum; enhanced surveillance with rapid local determination of CRE, which will help us understand how these and other MDROs are locally transmitted; development of a database to allow for rapid determination of links between identified MDRO cases; rapid response to any identified CRE or outbreaks of other targeted MDROs; and prevention efforts, including consultation and invited MDRO experts to assist in a multi-hospital prevention collaborative.

## **General Capacity**

Our work at the Oregon Public Health Division's (OPHD) Acute and Communicable Disease and Prevention Section (ACDP), in collaboration with local and national partners at CDC, the Association for Professionals in Infection Control (APIC), the Office of Health Policy and Research (OOHPR), the Oregon Patient Safety Commission (OPSC), and Oregon Health & Science University (OHSU) demonstrate capacity for surveillance, response to outbreaks, and prevention of HAIs. The ACDP Healthcare Associated Infection (HAI) program engages in a wide variety of activities, which require collaboration of hospitals, laboratories, local organizations, and national agencies. These activities include surveillance of CRE, candidemia, and *Clostridium difficile*, HAI and antimicrobial use point prevalence surveys, projects to make National Healthcare Safety Network (NHSN) definitions more accurate and useable, validation of reported NHSN data, and prevention activities focused on antimicrobial stewardship.

On the local level, ACDP works with OOHPR, which oversees mandatory NHSN HAI reporting in Oregon, by providing validation of reported NHSN data. ACDP also works closely with OPSC on the recently established antimicrobial stewardship program, focused on HAI prevention through multi-hospital collaboratives. OHSU, a major teaching hospital, recently honored with a U.S. Department of Health & Human Services award for HAI reduction, serves as a partner on a number of projects, including our Methicillin-resistant *Staphylococcus aureus* (MRSA) surveillance project, for which John Townes, MD acts as Principal Investigator (PI). Dr. Townes and several other experts at OHSU, the Portland VA Hospital, and Oregon State University (OSU), will participate as advisors for the proposed regional MDRO surveillance program. ACDP has also established strong connections with hospitals throughout the state, by way of regular participation in our regional APIC chapter, allowing us to rapidly recruit hospitals and complete projects with statewide participation. ACDP also has extensive experience with contracts; we financially administer federal grant funds for HAI activities for OOHPR as well as OPSC, with Zintars Beldavs, MS, manager of ACDP's HAI activities overseeing budgets for these funds.

Much of our work is funded and guided by CDC, with whom we have daily contact, and includes large scale projects, such as our Antimicrobial Prevalence surveys, NHSN validation projects, and statewide CRE surveillance. The recently completed full roll out of the HAI and Antimicrobial Prevalence survey included detailed on-site record reviews at a representative sample of 15 Oregon hospitals, to determine current antimicrobial use patterns and prevalence. This effort, with overall coordination from CDC and participation by 10 states throughout the country, will provide the most current estimate of antimicrobial use patterns and HAIs in the US.

Our capacities for effective completion of large scale HAI work is also highlighted by the recent publication of our statewide Central Line Associated Blood Stream Infections (CLABSI) validation for all 44 hospitals required to report CLABSIs in Oregon<sup>1</sup>. In the CLABSI validation study, our work resulted in a directly measurable impact in which reported rates of CLABSI increased from 1.21/1,000 central-line days to an estimated 1.54/1,000 central-line days, following validation. This change in reported findings is reflected in Oregon's current public report of HAI data. We are currently completing a statewide validation of reported coronary artery bypass graft (CABG) data. Furthermore, as with most of our work, the results from this validation can be readily compared with other states since Oregon uses CDC's NHSN data system and surveillance definitions for mandatory HAI reporting.

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<sup>1</sup> Oh, J., Y. Cunningham, M. C., Beldavs, Z. G., Tujo, J., Moore, S. W., Thomas, A. R., Cieslak, P., R. (2012) Statewide Validation of Hospital-Reported Central-Line Associated Bloodstream Infections. *Infection Control Hosp Epidemiol* 33(5), 439-445.

## ***MDRO Specific Capacity and Experience***

### **CRE**

Beginning in 2011, we have implemented surveillance of carbapenem resistant *Enterbacteriaceae* and *Acinetobacter* spp. within the Tri-County Portland metro area, through the EIP MuGSI project. In this targeted surveillance, laboratories use automated susceptibility testing software to identify all organisms isolated from normally sterile sites and urine specimens, which exhibit the following characteristics:

Species	Category	Definition of carbapenem-nonsusceptibility
<i>E. coli</i> & <i>Klebsiella</i> species*, and <i>Enterobacter</i> species**	Carbapenem- nonsusceptible  <i>Enterobacteriaceae</i>	Intermediate or resistant to:  imipenem, meropenem, or doripenem  AND resistant to: ceftazidime,  ceftriaxone, and cefotaxime based on  current CLSI breakpoints
<i>Acinetobacter</i>  <i>baumannii</i> §	Carbapenem- nonsusceptible  <i>Acinetobacter baumannii</i>	Intermediate or resistant to:  doripenem, imipenem, or meropenem

\**Klebsiella pneumoniae* and *Klebsiella oxytoca*

\*\**Enterobacter aerogenes* and *Enterobacter cloacae*

§ includes *A. baumannii*, *A. baumannii* complex, *A. calcoaceticus-baumannii* complex

For the MuGSI project, as in many of our projects, we have voluntary participation by all catchment area laboratories, which allows for population based surveillance.

We have also made CRE reportable statewide. To identify CRE, laboratories must report any *Enterbacteriaceae*, except *Morganella spp.*, *Proteus spp.*, and *Providencia spp.* isolated from a sterile site or urine that meet any of the following criteria: 1) a gene sequence specific for carbapenemase, 2) positive phenotypic test (e.g. Modified Hodge test), indicating production of carbapenemase, or 3) elevated minimum inhibitory concentrations for ertapenem, imipenem, or meropenem and resistance to a third-generation cephalosporin. All CRE isolates are forwarded to CDC, where they provide confirmation of antimicrobial sensitivity, determine whether cultures are carbapenemase producers and test for specific resistance mechanisms with PCR.

### **Other MDRO Work**

Along with CRE surveillance, since 2005 Oregon has participated in surveillance of invasive MRSA through the Active Bacterial Core (ABCs) surveillance program, focused on the Tri-County area surrounding Portland Oregon, and including approximately 1.6 million people. The ABCs program includes partnership with OHSU and all laboratories located within the Portland metro catchment area. As is further discussed below, we have also recently expanded our antimicrobial stewardship efforts, which were previously focused on the outpatient centered Alliance Working for Antibiotic Resistance Education (AWARE) program, to include the inpatient setting through a multi-hospital antimicrobial stewardship collaborative headed by OPSC and assisted by the ACDP HAI program.

### ***Operational Plan***

We plan to establish a regional MDRO program to better understand which MDROs are of greatest concern in Oregon, determine how to best respond to these threats, and provide response and prevention support for healthcare facilities. The program has 9 overall objectives:

1. Create a regional MDRO response network comprised of local and national experts;

2. Establish short- and long-term MDRO goals based on national and regional trends;
3. Identify MDROs to target and create facility-specific prevalence reports;
4. Determine the characteristics and relationship between targeted MDRO facility incidence with infection control and antimicrobial stewardship practices;
5. Describe MDRO transfer between hospitals and long-term care facilities;
6. Provide MDRO education and assistance to hospitals and long term-care providers;
7. Develop a protocol for use by public health and clinical laboratories to allow for rapid identification and response to targeted MDROs;
8. Provide rapid facility-level assistance with response to targeted MDROs;
9. Rapidly identify targeted MDROs and submit relevant isolates to CDC reference laboratories for further analysis.

The primary position responsible for this work will be the MDRO surveillance and response coordinator, who will be a physician with expertise in infectious diseases. This person will initiate the project by conducting a statewide needs assessment of MDRO surveillance and response capacity and implementation. The coordinator will then work with other staff to recruit a multi-disciplinary group of experts to assist with a regional MDRO response network, which will use local and national resources to establish overall short- and long-term targets for MDROs, with an initial focus on CRE. As our ultimate goal for the program is to decrease MDROs in general, along with the CRE focus, we will work to define short and long term objectives and assist with outbreaks of other more prevalent MDROs. The program elements are further defined below, under the core components of surveillance, response, and prevention.

### ***Needs Assessment***

In order to determine MDRO targets and the most appropriate response, we will initiate the project by conducting statewide needs assessments of infection preventionists and laboratories. The needs assessments will be used to determine laboratory capacity, infection control practices, and methods of identification, response, and prevention of MDROs used by hospitals, long term care facilities, and laboratories throughout Oregon. The questions will focus on level of surveillance for MDROs, rate of hand hygiene compliance, awareness of appropriate infection control practices for specific MDROs, screening procedures, and antimicrobial stewardship practices. The response network will use this needs assessment, expert guidance from CDC, and a literature search to identify target MDROs and set short and long term objectives for prevention and response.

### ***Surveillance***

As previously described, we have already initiated statewide reportability of CRE and require shipment of isolated cultures from sterile sites and urine specimens to CDC. We aim to improve the accuracy, timeliness, and thoroughness of our surveillance, as described below.

### **Enhanced Laboratory Capacity**

Since many laboratories do not use the same methods for identifying isolates that meet case definitions, we are receiving many isolates that do not meet criteria for CRE. Secondly, we may not be receiving all incident cases, particularly from facilities that may use out-of-state laboratories. Requested resources will support a microbiologist at the Oregon State Public Health Laboratory (OSPHL) and a laboratory physician expert consultant who will help laboratories define appropriate automated queries in order to accurately identify true CRE cases and limit the number of false positive isolates sent to CDC, which will ensure accurate surveillance and limit burden. We will also help facilities to implement Electronic Laboratory Reporting (ELR) of CRE.

We will develop a protocol for use by public health and clinical laboratories to allow for rapid identification and response to targeted MDROs, which will include CRE identification, use of ELR reporting, and investigation of other methods to rapidly identify outbreaks. First, we will work to ensure that all out of state labs that test for

facilities provide us with information on any cases positive for CRE. We will also meet with microbiology directors and assist them with setting up efficient and standardized queries for CRE and establishing methods for communicating alerts when cases are identified.

In addition, we will develop capacity at the OSPHL to rapidly identify which isolates submitted as CRE meet necessary resistance criteria, use the MHT to identify carbapenemase producers, and we will use the protocol developed by CDC for PCR<sup>2</sup> to identify production of KPC and NDM. This will allow us to respond quickly, without waiting for shipment and identification at CDC, with expected time for results within 3 days, in comparison to the current 3 weeks. True CRE Isolates will still be shipped to CDC for further testing.

Currently all laboratories reporting more than 30 cases a month in Oregon use ELR for reportable diseases, with small laboratories also rapidly transitioning to ELR. Unfortunately, the complexity of the CRE case definition, which includes multiple organisms and specifics of antimicrobial susceptibility and minimum inhibitory concentrations, has kept us from full implementation of ELR CRE reporting. We currently receive reports from two labs that are filtered to a CRE MS Access database but the reports often do not contain the correct organisms or meet the correct susceptibility criteria. Our MDRO coordinator will work with assistance from the microbiologist at OSPHL, our laboratory physician expert, and our ELR staff in ACDP to help these laboratories to send appropriate HL7 messages and for our system to appropriately filter and receive them so that CRE can be correctly and accurately identified. As most laboratories in Oregon use ELR for other reportable conditions, once this process is correctly in place for these laboratories, we will work to transfer implementation to other laboratories throughout Oregon.

Along with CRE specific work, we will also investigate, and, if feasible, initiate novel methods of surveillance for identification of outbreaks of MDROs, beginning with *Clostridium difficile* as a pilot. OHSU investigators Drs. John Townes, MD and Christopher Pfeiffer, MD, medical directors of infection control for OHSU and the Portland VA Medical Center, respectively, who will serve as consultants for the project, are currently investigating the possibility of using rapid gene sequencing technology to identify clonal *Clostridium difficile*. The MDRO coordinator will work with Drs. Townes and Pfeiffer to assess the capacity for this technology to allow for rapid definitive determination of *Clostridium difficile* outbreaks, both for Oregon and for neighboring states. The project will begin with the use of PCR ribotyping and ultimately include whole genome sequencing. If this project is successful, future phases might be used for rapid gene sequencing of other MDROS for use in definitively identifying outbreaks.

### Tracking CRE and Facility Transfer

Any time CRE is identified at a laboratory, the MDRO Response Coordinator will determine the initial location and then provide the infection preventionist with an inter-facility transfer form<sup>3</sup> and outline the appropriate response, as detailed below, as well as a request to notify us of any time the patient has been transferred to any medical facility, including acute care hospitals and long term care facilities, until the patient has been determined to no longer be colonized. In order to assure that we are receiving all transfer information accurately, we will also contact any laboratory confirmed CRE cases and request an initial patient interview and attempt quarterly follow up calls with the patient to inquire as to facility transfer, along with other pertinent information, as discussed in the Response section below. Transfer information will be recorded in the MDRO database.

### MDRO Database

We will establish a useable MDRO database, if feasible using NHSN, focused on detailed information for CRE or other targeted MDROs of low prevalence, which will include detailed information on organisms, antibiograms, antimicrobials used for treatment, implemented infection control measures, underlying conditions, medical procedures, patient outcome, and inter-facility transfer. NHSN would be ideal, if workable, simply because laboratories or facilities could potentially add to the database independently. If NHSN does not provide the flexibility needed, Diane Roy, our HAI administrative assistant has developed our overall HAI

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<sup>2</sup> <http://www.cdc.gov/HAI/settings/lab/kpc-ndm1-lab-protocol.html>

<sup>3</sup> <http://www.cdc.gov/hai/pdfs/toolkits/InfectionControlTransferFormExample1.pdf>

relational database, which includes our validation studies, HAI contacts, and other HAI projects in MS Access. Diane's work with these complex studies has demonstrated that, if needed, she has the capacity to expand this database to include an MDRO component. The antimicrobial stewardship collaborative is working to create a database of antimicrobial use and we will attempt to coordinate these efforts and also investigate the potential to integrate information from other existing data sources, such as the EIP MuGSI project, the 2011 HAI and Antimicrobial Use Point Prevalence Survey, the ABCs MRSA surveillance project, NHSN, and our hospital discharge database.

This database will be used to determine the characteristics and relationship between targeted MDRO facility incidence with infection control and antimicrobial stewardship practices. The database will also house information collected from the inter-facility transfer form, which will allow us to collect and analyze detailed facility information, both for hospital and long term care facilities, including specific inpatient location as well as infection control procedures, devices, symptoms, and use of antibiotics for all CRE patients. The detailed information from the interfacility form will help us to identify links between patients and understand the epidemiology of CRE. We will generate regular general and facility specific reports to assess and, if necessary, modify surveillance, response, and prevention efforts.

### ***Response***

The MDRO coordinator will work with the response network, including local experts as well as CDC and other national experts, to devise and implement the most appropriate response to targeted MDROs. The response network will consist of infectious disease physicians, infection preventionists, and researchers with MDRO expertise throughout Oregon as well as at CDC. We will recruit members through our connections with the local APIC chapter, the Infectious Disease Society of Oregon (IDSO), county health departments, state partners at other health departments within the region, and at the Healthcare Associated Infections Advisory Committee meeting, where key stakeholders meet quarterly to discuss HAI surveillance and prevention for Oregon. The response network will have monthly conference calls to discuss current progress and a list-serve will be designed where members can request help for identified cases of CRE or other targeted MDRO outbreaks.

The coordinator will be available to provide rapid assistance for hospitals in responding to identified targeted MDROs as follows: For MDROs, such as CRE, of low prevalence, the coordinator will follow up and offer facilities response assistance for each case; the coordinator will also provide outbreak response for higher prevalence targeted MDROs.

### **Individual Patient Follow up for CRE**

As previously discussed, unless increased case count burden causes such individual attention to become unrealistic, we will follow up with each patient identified with CRE until they are no longer colonized. This will include requests for medical records and laboratory reports and epidemiologic investigation, including an initial phone interview and quarterly phone calls with the patient. This information will be used to assess medical transfer, recent travel, use of antimicrobials, symptoms, source, transmission, and medical consequences related to CRE, in order to help guide appropriate response on an individual case level.

### **Facility Consultation, Education, and Assistance for Identified CRE**

At any facility where a patient positive for CRE is identified or transferred, we will provide consultation, education, and assistance on the appropriate response for these cases. The recommendations and assistance will be based, in part, on those in the CRE toolkit provided by CDC. Recommendations will include proper hand hygiene, use of contact precautions as long as patients are colonized, healthcare provider education, recommendations on minimizing device usage, patient and staff cohorting, rapid laboratory notification of further positive CRE, appropriate antimicrobial stewardship, CRE screening among high risk contacts, and use of point prevalence surveys. In situations where there is concern for potential transmission of CRE, the MDRO coordinator will travel onsite to assist with these response efforts.

## Other MDRO Consultation Support for Facilities

We will also provide assistance with response to outbreaks of other targeted MDROs via education, recommendations, and on-site assistance. Although other MDROs are not a high priority for this funding opportunity, they are common in Oregon, and the ability to provide consultation for other MDROs helps us establish relationships with hospitals and laboratories that will increase the likelihood that we will be contacted when CRE isolates are identified. Prevention and control efforts are also more likely to flow smoothly if we already have developed contacts with the necessary partners (laboratories, infectious disease physicians, and infection preventionists). We anticipate that the assistance with other MDROs will be limited to recommendations and outbreak assistance rather than individual case follow up; CRE is our initial primary focus and the anticipated resources will not allow for this level of focus on other targeted MDROs.

### ***Prevention***

While we are planning on primarily targeting laboratory detection and reporting, our regional surveillance and response plan also includes prevention, via individual facility consultation, and education from national experts.

### Prevention Collaborative

As we are already working with OPSC on an antimicrobial stewardship collaborative, we plan to leverage this existing infrastructure by bolstering the program with expertise focused on MDRO prevention. The antimicrobial stewardship collaborative has two primary components, focusing on stewardship needs in larger hospitals as well as smaller hospitals by assisting pharmacists and others with determining appropriate type, duration, dose, and routes of antimicrobial therapy and establishing sustainable systems for continued best practice. We will assist the collaborative and provide expert MDRO education to interested hospitals by inviting national MDRO prevention and response experts to the 5 already planned educational sessions hosted by the collaborative. These events will be centered in Portland Oregon, where facilities throughout Oregon can attend either in person or by calling into a conference line and viewing a webinar. For hospitals that do not participate in the antimicrobial stewardship collaborative, we will record the presentation as a webinar and make it readily accessible as part of an on-line training and information page on our web-site. We will also actively promote the availability of this training via the MDRO network and other appropriate mechanisms, such as the local APIC chapter.

### Educational Outreach

The MDRO coordinator will also work to provide ongoing consultation to facilities which may lack expertise in controlling and responding to MDROs, such as smaller hospitals or long term care facilities. Along with this we will host monthly conference calls in which medical facilities can discuss appropriate response and prevention efforts focused on MDROs in Oregon. In addition to inviting the hospitals participating in the OPSC Prevention Collaborative, we will post the agenda of the monthly phone call on listservs for the local APIC chapter and the Infectious Diseases Society of Oregon, as well as to hospital laboratorians. We will use the results of the needs assessment to determine which facilities have the greatest requirement for assistance in establishing MDRO prevention and response capabilities. The MDRO coordinator will then reach out to facilities, beginning with those in most need, to assist in establishing such capabilities. The outreach effort will include providing and assisting with interpretation of educational materials, including the CRE toolkit. We will also provide MDRO prevention information on our website and a means to contact for ongoing consultation.

### ***Personnel***

#### *MDRO Surveillance and Response Coordinator*

The MDRO response coordinator, a physician with MDRO expertise, will be responsible for the creation and implementation of Oregon's regional MDRO strategy. The MDRO response coordinator will work closely with Zintars Beldavs, ACDP's HAI Program manager (see below).

This work will include recruitment and consultation with the regional network to devise the overall strategy and to determine MDROs to target, oversee protocol development for prevention and control of MDROs, conduct a statewide needs assessment, monitor facility level prevalence of targeted MDROs, provide rapid follow up for

CRE cases, assist with MDRO outbreaks, and evaluate the relationship between targeted MDROs and infection control characteristics of facilities. This position will provide direct consultation to facilities and detailed assistance and response to targeted MDROs (1.0 FTE).

OHSU Infection Control Physician Expert Advisor

John Townes, MD, Division of Infectious Disease, OHSU, will provide clinical expertise and support for the MDRO Response Coordinator and serve as an adviser for the response network. Dr. Townes will also provide on call assistance for the MDRO coordinator in designing specific infection control measures to implement in response to detected CRE or MDRO outbreaks as well as suggested measures to be used for prevention of MDROs in facilities without identified CRE. Dr. Townes will offer his extensive experience with MDRO surveillance and prevention, with a focus on infection control, which will be drawn from his role as Medical Director of Infection Control at OHSU (.1 FTE).

VA/OHSU Innovation and Laboratory Physician Expert Advisor

Christopher Pfeiffer, MD, MHS, Department of Hospital and Specialty Medicine, VA Portland Health Care System (VAPORHCS) and Assistant Professor of Medicine, OHSU, , will provide clinical expertise and support the MDRO Response Coordinator and serve in the response network. Dr. Pfeiffer will provide on-call support to the MDRO Response Coordinator and microbiologist in implementing appropriate laboratory methods for identification of CRE such as PCR, CarbaNP Test, and other novel methods and appropriate interpretation of antibiograms and ancillary tests submitted isolates. Dr. Pfeiffer will provide expertise on the relationship between laboratory data and infectious disease response and development of new methods, such as rapid gene sequencing for use in *C. difficile* and other MDRO outbreak investigations and response. Dr. Pfeiffer will also assist the OSPHL with establishing laboratory capacity for identifying MDROs. Dr. Pfeiffer has training in both Infectious Diseases and Medical Microbiology and is the Hospital Epidemiologist at the VAPORHCS. He currently collaborates on two multi-center VA HSR&D-funded infection control-related projects and recently served as an expert advisory group member for the 2015 VHA Guideline for Control of CRE. He will serve as the clinical microbiology-epidemiology liaison for the project. He will be responsible for ensuring that optimal methodology is used for specimen collection and processing, including both traditional culture and molecular evaluation. He will participate in CRE outbreak response. He will also help develop and support the CRE educational material provided to facilities related to clinical microbiology.

OHSU Physician Faculty Advisor

Judith Guzman-Cottrill, DO, from OHSU's Division of Pediatric Infectious Diseases, will provide clinical expertise and serve as Medical Director of the Oregon Antibiotic Use (AU) and Antimicrobial Resistance (AR) Implementation Project. Dr. Guzman will be responsible for recruiting Oregon hospitals to begin reporting AU and/or AR using the NHSN modules. She will focus on facilities that are currently involved in the Vermont Oxford Network (VON) NICU Quality Improvement Collaborative *iNICQ 2016: Choosing Antibiotics Wisely*. The VON project's structure & timeline will allow Dr. Guzman to work with VON, CDC (an established partner for this project), and key Oregon hospital-level contacts: Infection prevention, pharmacy, and IT departments. Dr. Guzman is board certified in Pediatric Infectious Diseases and served as the Pediatric Hospital Epidemiologist & Medical Director at OHSU for 11 years. She serves on the SHEA Board of Trustees, which allows her to collaborate with international experts in antibiotic stewardship, infection prevention, and healthcare epidemiology. Dr. Guzman previously served as the Collaborative Chair of a statewide Oregon neonatal CLABSI prevention collaborative, which allowed her to create working relationships with all Oregon NICU physician and nursing leadership. (0.25 FTE).

OHSU Physician Faculty Advisor

Lynne Strasfeld, MD, from OHSU will serve as the principal investigator for our *C. difficile* carriage and transmission project and serve as a consult for work related to *C. difficile* and antimicrobial stewardship. Dr. Strasfeld will oversee OHSU medical students and ensure all aspects of the *C. difficile* project are carried out in accord with the protocol approved by OHA's HAI program.

OSU/OHSU Pharmacy, Long Term Care, and Facility Transfer Expert Advisor

Jon P. Furuno, PhD, Department of Pharmacy Practice, Oregon State University (OSU)/OHSU College of Pharmacy, will provide clinical expertise and support for the MDRO Response Coordinator and serve in the response network. Dr. Furuno will draw from his wealth of experience and expertise, specifically focused on risk factors, acquisition, transfer, and prevention of MDROs and appropriate antimicrobial stewardship within the long term care setting. Dr. Furuno's experience in this setting includes serving as Principal Investigator on two federally-funded (National Institutes of Health and Agency for Health Research and Quality) projects to optimize infection prevention efforts and antibiotic use. These projects have involved forming strong relationships with multiple LTCFs essential for primary data collection of chart review data, specimen collection, and interviews of residents, staff and administrators.

VA/OHSU Antimicrobial Stewardship Physician Advisor (in-kind)

Graeme Forrest, MBBS, Division of Infectious Disease, Portland VA Medical Center and OHSU, will provide in-kind clinical expertise and consultation to provide on call support for the MDRO Response Coordinator and serve on the expert panel for response to detected CRE cases or MDRO outbreaks. Dr. Forrest is the director of OHSU's antimicrobial stewardship program and will provide invaluable assistance for designing prevention efforts, which incorporate appropriate antimicrobial stewardship.

OSPHL Microbiologist 2

A microbiologist will be assigned to provide expert consultation for laboratories to set up and standardize queries for identifying CRE or other targeted MDROs in order to ensure that the State receives as accurate and complete account as possible of CRE. This position will also be in charge of rapidly determining which submitted isolates meet CRE antimicrobial susceptibility criteria, use the MHT and PCR to identify and subtype carbapenemase producers, ensure that isolates are correctly forwarded to CDC, and assist in interpreting laboratory results. (.25 FTE).

ACDP HAI Program Manager

Zintars Beldavs, MS, who manages OPHD HAI efforts, will be primarily responsible for ensuring that the MDRO response network maximally benefits from all available State resources and will oversee management of the budget and contract administration. Mr. Beldavs will work with the MDRO response coordinator and expert panel to design the MDRO strategy, including identification and development of specific outcome and process measures, which, if possible, will be implemented in NHSN. Mr. Beldavs will also work with the MDRO coordinator to identify and gain assistance from experts, both locally through OHSU, OPSC, and APIC, and nationally, with CDC. (.25 FTE).

ACDP HAI Research Analyst 3(in-kind)

This position, already funded for work with the antimicrobial stewardship collaborative, will provide in-kind assistance with MDRO database design, measurement, and analysis. This position will also work with the microbiologist and our ELR staff to improve current CRE reporting to determine whether there are methods to allow for reports to be submitted via ELR; currently laboratories are capable of submitting ELR but the complexity of the CRE case definition has made it difficult to submit workable HL7 CRE messages.

ACDP HAI Administrative Assistant

Diane Roy will provide administrative and database support, including scheduling visits to medical facilities and laboratories, assisting with creation and implementation of the MDRO database, and entering data and producing descriptive reports. (.25 FTE).

ACDP HAI Epidemiologist (in-kind)

Maureen Cassidy, MPH, will provide in-kind support by continuing her work for the MuGSI project and ensuring that this work is adequately integrated with the newly enhanced surveillance, response and prevention efforts.

***Timeline for Judith Guzman-Cottrill, DO***

<b>Timing</b>	<b>Activity</b>
January 2016 (Completed)	Establish partnerships with Vermont Oxford Network (VON) and state-level collaborative leadership. Gain understanding CDC goals for AU/AR module implementation.
February 2016 (Completed)	Continue to establish key partnerships at VON, CDC, and state leads. Learn from other state HAI programs key strategies for recruitment. Explore hospital's perceived benefits to AU/AR reporting and barriers to implementation.
March-April 2016	Create 12-month project timeline with Oregon NICU leadership that aligns VON and HAI program goals. Continue learning from hospitals, state HAI programs, CDC, and VON the benefits & barriers of AU/AR reporting. Explore vendor capability for AU/AR reporting (e.g. EPIC, Theradoc, Medmined/CareFusion). Determine if grant incentives go to vendor or hospital. Begin writing a written document for hospitals, which summarizes the benefits of reporting AU/AR to NHSN. Draft agenda & budget for Oregon NICU meeting (Fall 2016).
April-May 2016	Review and finalize AU/AR Benefits document by 4/30. Identify first 2 hospitals to recruit for implementing AU module.
May-June 2016	Distribute document widely. Begin working with hospital #1.
June-July 2016	Continuation of on-boarding hospital #1.
July-August 2016	Analyses of program effectiveness to date. Modify overall plan based on analysis. Identify hospital #3.
August-Sept. 2016	Continuation of on-boarding hospital #1. Begin on-boarding hospital #2 and #3
September 2016	Continuation of on-boarding hospitals #1-3
October 2016	Continuation of on-boarding hospitals #1-3. Identify hospital #4 (or hospital #1 for AR Module). Assist in state NICU collaborative meeting.
November 2016	Begin working with hospital #4 AU or #1 AR
December 2016	Continuation of on-boarding hospitals #1-4
January 2017	Analyses of program effectiveness to date.
<i>Note: Activities for March 2016 – January 2017 are in process.</i>	

***Timeline for Dr. Chris Pfeiffer***

<b>Timing</b>	<b>Activity</b>
Sept 2015-Aug 2016	Provide on-call support for MDRO Coordinator and microbiology laboratory including support for all CP-CRE case investigations
Sept-December 2015	Update the Oregon CRE Toolkit
Sept 2015-Jan 2016	Finalize CarbaNP validation, data analysis, and publication
Jan 2016-Sept 2016	Finalize CRE screening protocol, IRB procedures, and collect specimens
Oct 2016-March 2017	CRE Screening protocol: data analysis, presentation, publication
Sept 2015-Jan 2016	Assist in survey tool development for Acute Care, Long-term Care, and microbiology laboratories statewide
March 2016-Aug 2016	Assist in survey tool data analysis
Sept 2016-Aug 2017	Survey Tool data analysis, presentation, and publication
April 2016-Dec 2017	Draft Regional MDRO Toolkit

*Timeline for Dr. Lynne Strasfeld*

<b>Timing</b>	<b>Activity</b>
January – March 2016 (Completed)	Finalize protocol and IRB procedures.
April – July 2016	Active study and specimen collection
August – December 2016	Follow-up Surveillance
January – July 2017	Data analysis, presentation, publication
<i>Note: Activities for April 2016 – July 2017 are in process.</i>	

*Performance Measures*

<b>MEASURE</b>
<ul style="list-style-type: none"> <li>• <b>Completion of feasibility survey of hospitals and long term care facilities</b></li> </ul>
# of members recruited for MDRO response network
# of MDROs with short and long term targets defined
# of facilities providing monthly reports of MDRO prevalence
# of CRE cases with inter-facility form completed
# of facilities used to describe potential inter-facility transfer of MDRO
# of facilities participating in MDRO education efforts or receiving consultation
<ul style="list-style-type: none"> <li>• <b>Completion of protocol for public health and laboratory identification and response to MDROs</b></li> </ul>
# of facilities receiving rapid response assistance with individual CRE or targeted MDRO outbreaks
# of targeted MDRO isolates shipped to CDC reference labs