ID: 59837773
Infectious Diseases - HAI, Infectious Diseases - Host Site Description
Massachusetts Department of Public Health

Assignment Location: Jamaica Plain, US-MA
                           Massachusetts Department of Public Health
                           Epidemiology/Healthcare-Associated Infections and Antimicrobial Resistance Program

Primary Mentor: Catherine Brown, DVM, MSc, MPH
                           State Epidemiologist/State Public Health Veterinarian
                           Massachusetts Department of Public Health

Secondary Mentor: Melissa Cumming, MS
                           Senior Epidemiologist and HAI/AR Program Manager
                           Massachusetts Department of Public Health

Work Environment
Hybrid

Assignment Description

The fellow's assignment will be as a healthcare-associated infections and antimicrobial resistance (HAI/AR) epidemiologist in the HAI/AR Program in the Division of Epidemiology. As such, the fellow will participate in all programmatic activities related to surveillance, prevention and control of healthcare-associated infections and antimicrobial resistance. A key feature of this assignment will be conducting advanced analyses of relevant data (NHSN, surveillance, antimicrobial use and resistance, etc.) in order to direct the program's efforts. Additionally, the fellow will necessarily be engaged in activities related to promoting infection prevention and control best practices through educational initiatives as well as becoming fully trained to conduct infection control assessment response (ICAR) visits in healthcare facilities with a public health nurse partner. We would also expect the fellow to be involved in statewide efforts to promote antimicrobial stewardship across the healthcare continuum. Day to day activities will be like those of other HAI/AR epidemiologists. These activities include but are not limited to: participating in a wide variety of monthly national, stakeholder and regional HAI/AR related calls and webinars (CDC, CSTE, etc.), quarterly statewide HAI/AR Technical Advisory Group meetings, bi-weekly check-ins with HAI/AR Program leads and HAI/AR Program team meetings, bi-weekly division huddles with clinical leadership, monthly division meetings, quarterly Bureau meetings, weekly responsibility for coverage of HAI and AR-related morbidity and investigations, work on specific analytic projects related to HAI/AR Program responsibilities and goals, and participation in both preventive and responsive ICAR visits in healthcare facilities across Massachusetts.

Describe Statistical and Data Analysis Support, Such as Databases, Software, and Surveillance Systems Available to the Fellow

The fellow will have access to all of the same surveillance systems, data sources, and statistical software that all members of the HAI/AR Program have access to. These data include but are not limited to NHSN data, antibiotic use data, Massachusetts Virtual Epidemiologic Network (MAVEN) data (our web-based surveillance and investigation platform, including all electronically reported laboratory data relevant to HAI/AR), all-payer claims data, etc. As far as software is concerned, all staff have access to the Office 365 suite of products, as well as SAS. In terms of analytic support, the Division of Epidemiology has an active SAS user group, to support one another with analytic project work, and access to periodic SAS courses through the state's online training platform. Additionally, the HAI/AR Program has an Analytic Coordinator with subject matter expertise in analyses involving the data sources listed, to provide support and mentorship to those performing analytic work for the program.

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Projects

Surveillance Activity Title: Develop the Framework and Specifications for an Internal Multi-drug Resistant Organism Dashboard

Surveillance Activity Description:
In a typical year, the HAI/AR Program responds to several hundred situations involving an identified multi-drug resistant organism (MDRO) of concern, such as Candida auris or a carbapenemase-producing organisms. Each situation is unique, and the appropriate response varies by setting type, organism and circumstances but is always guided by the CDC's MDRO Containment guidance, which has been adapted by the MDPH HAI/AR Program, to address the local epidemiology of these pathogens and our capacity as a program. In many situations, colonization screening of potentially exposed patients and residents is indicated as well as an onsite infection control assessment response (ICAR) visit. In others, individuals who were potentially exposed but recently discharged to another healthcare facility, must be followed by the HAI/AR Program to ensure that screening takes place. While we are fortunate to have a robust and adaptable surveillance and investigation platform (MAVEN), to assist with our management of these responses and associated lab results and facilities, the data visualization capabilities of MAVEN are limited. Following the successful deployment of an internal Group A Streptococcus (GAS) dashboard utilizing Tableau, to better track and manage countless healthcare-associated invasive GAS clusters in long-term care facilities (LTCFs), the HAI/AR Program would like to embark on developing and deploying an internal MDRO dashboard to help us better manage MDRO-related responses. Adding to the burden of managing these responses and the documentation, communications and laboratory data associated with them, is the need to also manage proactive colonization screening in high-risk facilities, as well as admission screening for high-risk patients. Being able to visualize responsive and proactive colonization screening efforts and results in a meaningful way, as well as the ability to see geographically, where MDROs are being identified and potentially incorporating relationships between isolates/cases revealed through whole genome sequencing, will significantly improve our ability to effectively respond to and manage these situations.

With support and guidance from HAI/AR Program leads, as well as colleagues in our Division of Surveillance, Analytics and Informatics (DSAI), the fellow will develop the parameters and list of data elements of interest that will be necessary to create an internal MDRO dashboard. While the creation of internal dashboards is dependent on internal priorities and funding, it is anticipated that before the end of the two-year fellowship, that creation of an MDRO dashboard may be possible. In anticipation of this, this project will allow for laying the groundwork for this important resource.

Surveillance Activity Objectives:
The primary objective is to lay the groundwork for an internal MDRO dashboard to enable more efficient MDRO prevention and response efforts.

- Complete MAVEN training and achieve required competencies to be granted access to the system.
- Develop a project plan and obtain approval from HAI/AR Program Analytic Leads.
- Develop a list of desired capabilities for an internal MDRO dashboard, based on feedback from interviews with HAI/AR Program leads and experience from involvement in MDRO case investigations.
- Create a list of required data elements from individual and cluster events in MAVEN that will be necessary to populate the dashboard.
- Collaborate with DSAI partners to evaluate existing ad-hoc MAVEN reports to determine if any can be modified to provide the necessary data elements needed to populate the MDRO dashboard.
- Test a prototype MDRO dashboard in collaboration with DSAI partners, as funding and dashboard priorities allows.

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Surveillance Activity Impact:
By enabling more efficient and prompt response to MDRO cases and clusters, the anticipated public health impact is reduced MDRO transmission in healthcare settings due to more efficient response and prevention activities as well as enhanced identification of epidemiologic links.

Surveillance System Evaluation Title: Identify Disparities among Individuals with Healthcare-Associated Infections

Surveillance System Evaluation Description:
Surveillance data for healthcare-associated infections (HAIs) in Massachusetts, including those caused by multi-drug resistant organisms (MDROs), comes from two sources: the National Healthcare Safety Network (NHSN) and the Massachusetts Virtual Epidemiologic Network (MAVEN), our web-based surveillance and investigation platform. While certain healthcare facilities such as acute care hospitals and dialysis centers are required by CMS to report patient-level data for certain HAIs to NHSN, there is currently no requirement for healthcare facilities to report variables such as race and ethnicity, that could be used to identify health disparities among those with a reported HAI in NHSN. In Massachusetts, we also capture robust data on reportable HAIs such as invasive Group A Streptococcus and certain multi-drug resistant organisms in MAVEN. These data include demographic, risk and laboratory data. For this project, we would like to identify the variables in MAVEN that might be used to assess health disparities among those impacted by reportable HAIs, and then evaluate the completeness of each of these data fields in our surveillance data. With this information, next steps in the project would include collaboration with HAI/AR Program and DSAI Leads to develop a list of possible options to improve data completeness. It is anticipated that during the first year of this fellowship, preliminary analyses would be completed and proposed solutions to improve data completion would be implemented. In the second year, the goal would be to have at least 12 consecutive months of data, achieving at least 90% completeness, which could be analyzed to identify disparities among the population impacted by HAIs.

Surveillance System Objectives:
The overall objective is to evaluate the ability to use MAVEN surveillance data, to identify disparities among individuals with reportable healthcare-associated infections, and if the data currently being reported is too incomplete, then a secondary objective will be to propose opportunities to improve this data.

- Complete MAVEN training and achieve required competencies to be granted access to the system.
- Develop a project plan and obtain approval from HAI/AR Program Analytic Leads.
- Identify a candidate list of data variables currently captured in MAVEN events, that could help to identify existing disparities among those impacted by reportable healthcare-associated infections.
- Analyze MAVEN surveillance data to determine the completeness of the selected variables.
- Propose a list of suggestions to improve data completeness.
- Analyze identified health equity variables for potential disparities.
- Present findings to Division Leadership and consider abstract submission and presentation.

Surveillance System Impact:
This project aims to identify potential disparities that may exist among those affected by healthcare-associated infections, so that steps can be taken to address these disparities through better targeted HAI prevention strategies.

Major Project Title: Multi-drug Resistant Organism Prevention Initiative in High-Risk Healthcare Settings

Major Project Description:
Multi-drug resistant organisms (MDROs) are a growing public health threat because infections caused by these organisms can be difficult to treat and are often transmitted silently within healthcare facilities. The MDPH HAI/AR Program has prioritized identification of Candida auris, and carbapenemase-producing organisms (CPOs), for prevention

and containment efforts in our highest risk healthcare settings. C. auris is often drug resistant, difficult to kill, and can persist in the healthcare environment, despite standard cleaning and disinfection practices. CPOs are bacteria that have gained resistance to a class of antibiotics called carbapenems by acquiring a mobile genetic element that encodes for production of an enzyme called a carbapanemase, which breaks down carbapenems. C. auris and CPOs can cause clinical infection, or colonization, without causing illness. Individuals admitted to healthcare facilities are at increased risk of acquiring C. auris and CPOs because MDROs can be spread via staff hands, if hand hygiene practices are insufficient, and through shared medical equipment that is not properly cleaned and disinfected after each use. Those admitted to healthcare facilities are also more likely to have risk factors that make them more vulnerable to acquiring an MDRO. Because of the high level of medical care required, and the presence of a tracheostomy and dependence on a ventilator, residents of ventilator-capable skilled nursing facilities (vSNFs) are at a significantly increased risk of transmitting and/or acquiring MDROs, and because colonization is not visibly apparent, these facilities are typically unaware that their residents may be colonized.

With much support from HAI/AR Program Leads and epidemiologists, the fellow will co-lead an initiative to achieve the program's goal of implementing quarterly point prevalence screenings (PPS) for C. auris and CPOs at influential healthcare facilities in Massachusetts. This project will form a collaborative among stakeholders at Massachusetts ventilator-capable skilled nursing facilities (vSNFs) with the goal of using feedback and input obtained to support them with implementation of the CDC's MDRO prevention strategy which calls for ongoing, periodic point prevalence screening (PPS) for C. auris and CPOs in these high-risk settings. As a part of this initiative, routine infection control assessment response (ICAR) visits will be conducted in these facilities to support and evaluate their efforts to prevent MDRO transmission. This project will involve planning and managing the logistics of ongoing PPS (and potentially admission screening) in these facilities, including collaborating with our partner AR laboratory, Wadsworth in New York and interpreting and responding to the results of such screenings. The fellow will be actively involved in the engagement of facilities and providing education around the importance of this initiative and maintaining ongoing support and collaboration among them. To date, the HAI/AR Program has only had the capacity to conduct occasional proactive PPS in these facilities, but unfortunately, has begun observing an increase in the detection of C. auris in ventilated residents across the Commonwealth and so there is an increased urgency to expand and operationalize these efforts in a coordinated and long-lasting way.

Major Project Objectives:
The overall objective will be to engage Massachusetts vSNFs to conduct ongoing, quarterly PPS on their ventilator-capable units.

Specific deliverables include:
- Develop a standard operating procedure for quarterly proactive point prevalence screening at vSNFs to detect residents unknowingly colonized with C. auris or a CPO.
- Obtain buy in from key stakeholders at the seven vSNFs in Massachusetts.
- Engage with members of the HAI/AR education working group to help develop educational materials regarding MDROs and screening, where gaps in this information exist.
- Create a pre-meeting survey to learn what vSNFs have already implemented to prevent MDRO transmission in their facilities and gauge knowledge on C. auris and CPO prevention strategies.
- Identify a co-chair with a clinical background, to participate in the collaborative.
- Reach out to the Administrators, Directors of Nursing, and Infection Preventionists at each vSNF and engage them in participating in the collaborative.
- Engage Bureau-level clinical leadership.
- Engage the leadership of a vSNF that has experienced an outbreak of C. auris to discuss how screening helped to control ongoing transmission.
- Obtain important vSNF perspectives on barriers to effectively implement a quarterly PPS.

- Hold ongoing meetings with the vSNF collaborative to address challenges as they come up, to foster support between facilities, and engage in ongoing prevention efforts targeting MDROs.
- Create a schedule for conducting a quarterly PPS in all vSNFs. Consider using calendar alerts on a shared team calendar to track facility communication and screening activities.
- Develop a process to remind facilities of an upcoming PPS.
- Communicate with and develop a plan to facilitate ongoing PPS in Massachusetts vSNF locations with our regional AR Laboratory Network partner, the Wadsworth Laboratory in New York.
- Develop a process for promptly documenting and sharing the results of each PPS.
- Develop a strategy for delegating responsibility and management of quarterly PPS for each vSNF among HAI/AR Program epidemiologists.
- Outline expectations regarding documentation of laboratory results from each PPS and communicating with our AR Lab Network partner, HAI/AR Program leadership, and vSNF leadership.
  - Create and maintain a list of current contact information for vSNF leadership.
  - Develop a resource that outlines next steps for a vSNF if a new positive is identified through a PPS.

Major Project Impact:
This project is intended to protect residents of vSNFs from acquiring MDROs and the morbidity and mortality associated with acquisition. This project will also support vSNFs by avoiding the significant costs associated with MDRO transmission and outbreaks.

Additional Project #1 Title: Evaluation of Expanding National Healthcare Safety Network Reporting Requirements to Include Outpatient Surgical Procedures
Project #1 Type: Surveillance Activity

Project #1 Description:
Currently, acute care hospitals (ACH) in Massachusetts are required to report data to the National Healthcare Safety Network (NHSN) for surgical site infections (SSIs) associated with six types of inpatient surgical procedures. In recent years, there has been a notable decrease in ACH inpatient surgical procedures, most evident in abdominal hysterectomies (HYST) and vaginal hysterectomies (VHYS), but potentially impacting other procedures such as colon procedures (COLO), knee arthroplasty (KPRO), hip arthroplasty (HPRO), and coronary artery bypass grafts (CABG). Without systematic collection of SSI data for outpatient procedures, there is concern for increasing risk to patients, as the frequency of outpatient surgical procedures continues to grow. This project would aim to evaluate the possibility of expanding current NHSN reporting requirements to include outpatient surgical procedures performed by acute care hospitals by quantifying ACH outpatient surgical procedure data to better define the noted increase and exploring the analytic options available for tracking outpatient SSIs.

Project #1 Objectives and Expected Deliverables:
The objectives of this project are primarily to describe SSI procedure location changes over time and determine potential benchmarking metrics for facility feedback reports and subsequent public-facing reports. To initiate this project, a survey will be created to collect data on the number of inpatient and outpatient procedures performed each year for at least the past five years for the following surgical procedures: HYST, VHYS, COLO, KPRO, and HPRO. In addition, a review and evaluation of the NHSN outpatient SSI protocol in collaboration with the HAI Coordinator, HAI/AR Program Analytic Coordinator, the NHSN Lead as well as CDC NHSN team if needed, to determine potential metrics that could be utilized in statewide analytic reports and facility-specific feedback reports.

- Describe SSI procedure location changes over time and determine potential benchmarking metrics for facility feedback reports and subsequent public-facing reports.

- Create a survey to collect data on the number of inpatient and outpatient procedures performed each year for at least the past five years for the following surgical procedures: HYST, VHYS, COLO, KPRO, and HPRO.
- Review and evaluate the NHSN outpatient SSI protocol in collaboration with the HAI Coordinator, HAI/AR Program Analytic Coordinator, the NHSN Lead as well as CDC NHSN team if needed, to determine potential metrics that could be utilized in statewide analytic reports and facility-specific feedback reports.

Project #1 Impact:
The potential for SSIs to occur following outpatient surgical procedures has been a growing concern of the HAI/AR Program and Departmental Leadership. Understanding the frequency and types of outpatient procedures being performed and standardizing SSI surveillance and reporting, including public-facing reports of SSI data, could significantly benefit patient safety and care. Patients seek and receive elective surgeries for a variety of reasons, and it is important for the Department to monitor and evaluate risk in these settings, and in turn, share these data with facilities and patients for transparency and improved patient safety and quality. This project, if achievable, could be replicated for the ambulatory surgical center space for similar surgical procedures, ensuring complete and appropriate SSI surveillance and reporting across the continuum of care.

Please Describe the Fellow's Anticipated Role in Preparedness and Response Efforts – Include Activities and Time Allocation (Required Competency of Fellowship)

The Division of Epidemiology and the HAI/AR Program enjoy a collaborative working relationship with our partners in the MDPH Office of Preparedness and Emergency Management (OPEM). When MDPH was selected as one of three pilot sites for the NHSN Connectivity Initiative to assess hospital bed capacity, our HAI/AR Program NHSN subject matter experts provided much needed assistance to our OPEM colleagues. We would welcome the opportunity for a CSTE Fellow to engage in this important initiative. Additionally, there are multiple preparedness activities ongoing at the Department including: development of an inter-state transfer protocol for patients diagnosed with a high-consequence infectious disease (e.g. Ebola virus disease) requiring care at the Region 1 Regional Emergency Special Pathogens Treatment Center which exists in Massachusetts; refinement of existing plans for response to outbreaks of Eastern equine encephalitis (EEE), a mosquito-borne disease which impacts Massachusetts disproportionately; and updates to the statewide Infectious Disease Emergency Response plan which includes appendices for specific pathogens. Depending on the progress of each of these efforts and the specific interests of the fellow, these are several of the opportunities for involvement in preparedness efforts that they could engage in. In terms of response efforts, large outbreaks often require an all-hands on deck approach for at least some period of time. Previous Applied Epidemiology Fellows have been included in large, multi-state food-borne disease outbreaks and EEE response activities. Emerging issues that could also provide experience include response to migrant populations and significant increases in active tuberculosis and congenital syphilis cases. We anticipate that emergency preparedness work will be 5% or less but that involvement in response activities may add to the proportion of time the fellow spends in cluster and outbreak investigation by 5-10%.

Please Describe the Fellow's Anticipated Role in Cluster and Outbreak Investigations – Include Activities and Time Allocation (Required Competency of Fellowship)

We anticipate that from day one, the fellow would begin shadowing other epidemiologists during HAI/AR cluster and outbreak investigations, such as invasive Group A Streptococcus outbreaks in long. Extensive shadowing, participation and training would occur over the course of the fellowship, and we would expect that by the end of the two-year period, the fellow would have a full comprehension of internal standard operating procedures for responding to such situations and would be able to lead such investigations with support from HAI/AR Program leads. Activities will include, communicating with clinicians and infection preventionists in a variety of healthcare settings, communicating with laboratory partners, interpreting laboratory results, documenting all activities related to the investigation in our

surveillance and investigation platform (MAVEN), managing calls and meetings with facilities and HAI/AR Program staff, conducting on-site visits when indicated, making appropriate recommendations related to colonization screening and infection prevention and control where appropriate and facilitating colonization screening with laboratory partners and impacted healthcare facilities. Time allocation for these activities is estimated to be 25-30% but will naturally vary over time.

Please Describe the Fellow's Anticipated Role in the COVID-19 Response – Include Activities and Time Allocation

At the present time, HAI/AR Program activities related to COVID-19 primarily involve providing guidance and recommendations relative to clusters and outbreaks in healthcare settings (most frequently, long-term care settings) and promoting vaccination among patients, residents and staff. We would expect the fellow to become familiar with existing COVID-19 guidance for long-term care facilities and after sufficient shadowing and training with other epidemiologists responding to these situations, would be able to independently provide recommendations and guidance to a long-term care facility reaching out to the Division for support. Time allocation for these activities is anticipated to be less than 5%.

Please Describe Opportunities for Fellows to Work in Health Equity as well as Incorporating Diversity, Equity, and Inclusion into their Work

The MDPH Health Equity Approach is shared here: https://www.mass.gov/doc/to-promote-wellness-and-health-equity-for-all-our-health-equity-approach/download

The HAI/AR Program is actively working to ensure that a health equity lens is applied to all of our work. There are a number of proposed and ongoing activities and projects (including the proposed surveillance evaluation project listed above) that seek to explore and improve our access to data that will enable us to identify and address disparities where they exist, among the populations impacted by healthcare-associated infections. as well as to incorporate diversity, equity and inclusion in our work. Additional opportunities for the fellow to work in health equity and incorporate diversity, equity and inclusion in their work include activities such as identifying the need for and developing accessible educational content and tools related to infection prevention and control that are culturally and linguistically meaningful for the healthcare staff who need them, working to incorporate race and ethnicity data in our long-term care facility (LTCF) antibiotic start reporting, assessing for disparities among individuals labeled as penicillin-allergic in our LTCFs, and working with our hospital partners and CDC to find a solution to the inability to reliably collect race and ethnicity data in NHSN, to name just a few.