

ID: 83999323

Infectious Diseases - HAI - Host Site Description

Nebraska Department of Health and Human Services

Assignment Location: Lincoln, US-NE
Nebraska Department of Health and Human Services
Division of Public Health

Primary Mentor: Muhammad Salman Ashraf, MBBS
Medical Director, HAI/AR Program
Nebraska Department of Health and Human Services

Secondary Mentor: Brianna Loeck, MPH
Infectious Disease Epidemiologist III
Nebraska Department of Health and Human Services

Work Environment

100% In-person

Assignment Description

The fellow will be working in the Division of Public Health within its Epidemiology Unit's Healthcare-Associated Infections and Antimicrobial Resistance (HAI/AR) Program. Dr. Muhammad Salman Ashraf is the medical director and the lead for the HAI/AR program and will serve as the primary mentor for the fellow. The program is responsible for surveillance and prevention of HAIs in Nebraska along with surveillance of multidrug-resistance organisms and limiting its spread within the state. The team also have processes in place to identify and respond to outbreaks in various healthcare settings. Furthermore, it collaborates with its academic partners at University of Nebraska Medical Center and Nebraska Medicine through Nebraska ICAP and ASAP initiatives to assess infection prevention and control and antimicrobial stewardship programs of healthcare facilities and provides them feedback for improvement. Nebraska ICAP and ASAP are also responsible for developing educational programs and guidance for healthcare workers/facilities in Nebraska.

The fellow will have the opportunity to collaborate with Nebraska ICAP and ASAP team too during their training. The fellow will be an integral part of the HAI/AR program and contribute in the same manner as the rest of the team members. The working day usually starts at 8 AM and the day is usually done around 5 pm with a break for the lunch during the day. The hours are flexible to some extent based on the needs of the individual team members. HAI/AR program has team huddles on Mondays, Wednesday, and Fridays, ICAP has their morning huddle every day and ASAP huddle is once a week. The entire team joins an epidemiology huddle once a week, where colleagues from various sections of the division of public health provide updates in their areas. Fellow will be recommended to join all of the above-mentioned huddles, if possible as it is usually great learning experience and prepares the team for the work that needed to be done in the coming days and weeks.

The fellow will also meet with the primary mentor at least 3 times a week and with all mentors together (primary, secondary and tertiary) at least once a week. Additional meetings with the primary and secondary mentor will also be needed depending on the projects that fellow is working on. For the rest of the time. the fellow is encouraged to organize their own schedule to work on different projects. The fellow is allowed to choose their projects after discussion the mentors as long as they are in agreement that the project is feasible and will contribute to their educational need. The fellow will have an orientation upon first joining the program, and will be provided with necessary resources to work on the approved projects including additional training, orientations, or software.

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

The first phase of orientation would include an introduction to the workplace (physical building to access some of the surveillance datamarts through secured log-in). Remote VPN access will also be provided for them to be able to access surveillance databases from outside the building for situations when fellows may not be able work in person for some reason. In general, depending on their needs, fellow will have access to the same databases, software and surveillance systems that are available to any of the epidemiologists working at the state health department. These resources include access to NEDSS, NHSN, State Health Information Exchange, REDCap, SAS, R studio, Microsoft Office including Power BI and others, as needed.

Projects

Surveillance Activity Title: Candida auris surveillance validation and enhancement

Surveillance Activity Description:

Candida auris is considered an urgent health threat in the US and the number of cases are increasing rapidly across the nation including in Nebraska. However, incidence and prevalence of C. auris are still lower in Nebraska compared to some other states in the country. We recorded our first C. auris outbreak in 2024 and had a few more in 2025. After the first outbreak, C. auris was added to reportable disease list in Nebraska and now laboratories are starting to electronically report positive C. auris test results. These results are available in NEDSS. A surveillance database has been developed to capture C. auris cases. The fellow will work on validating the database and setting up a real time C. auris alert process that will facilitate timely identification of clinical cases, collection of isolates from clinical laboratories for whole genome sequencing and analyzing the results (that will include comparing new isolates to previous ones) for detection of clusters/outbreak. They will be able to use the infrastructure that is already in place for surveillance of some of the other multidrug resistant organisms to work on this project.

Surveillance Activity Objectives:

1. Validate C. auris database and set up process for real time updates for initiating timely response
2. Generate reports on C. auris trends in various health jurisdictions within Nebraska
3. Identify clusters for C. auris and summarize transmission pathways

Surveillance Activity Impact:

Real time identification of C. auris cases or clusters will assist in timely response for containment. Furthermore, educating healthcare workers and communities in C. auris trends will facilitate them in implementing prevention strategies in their settings.

Surveillance System Evaluation Title: Evaluation of Carbapenem resistant Enterobacterales (CRE) datamart

Surveillance System Evaluation Description:

Carbapenem resistant Enterobacterales is reportable in Nebraska. Clinical laboratories report positive culture results for various Enterobacterales along with their susceptibility results. The results are available into NEDSS and get transferred to various databases on daily basis. This allow us to update our CRE datamart every day. Upon identification of new cases of CRE, a notification is sent to the public health lab for them to make sure that they secure the isolates from the clinical lab and perform additional testing for carbapenemase enzyme production. CRE isolates that are identified to be producing various carbapenemase enzymes undergo Whole Genome Sequencing to assist with cluster/outbreak identification. The fellow will be tasked to review this datamart for accuracy, map the data flow, identify vulnerabilities and errors and recommend corrective actions.

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Surveillance System Objectives:

1. Assess the performance of existing CRE datamart and identify areas for improvements
2. Create a flow chart visualizing the data flow through the surveillance system
3. Recommend corrective actions to improve CRE surveillance

Surveillance System Impact:

Carbapenem-resistant Enterobacterales (CRE), especially carbapenemase producing Carbapenem-resistant Enterobacterales (CP-CRE) are serious public health threat due to its high resistance to antibiotics (which makes infection difficult to treat) and ability to spread rapidly in healthcare settings. Therefore, presence of a well-functioning CRE surveillance system is essential in timely identification and containment of CP-CRE cases and clusters. The project will help identify vulnerabilities and improvement opportunities in the surveillance system.

Major Project Title: Evaluating Antibiotic Prescribing and Resistance Trends in Nebraska Hospitals and Providing Real-Time Feedback for Program Improvement

Major Project Description:

The emergence of resistant organisms has become a significant concern at the global, national, and state levels. Inappropriate use of antibiotics is one of the main risk factors for emergence of antibiotic resistance. In Nebraska, we have spent significant resources in strengthening surveillance of antibiotic use in the hospital settings. Currently 80% of Nebraska hospitals are reporting their antibiotic use in CDC's National Healthcare Safety Network (NHSN) database. Nearly 60% of these hospitals are also reporting Antimicrobial Resistance data through NHSN. Nebraska DHHS has access to the antibiotic use and antibiotic resistance data from NHSN. Furthermore, since 2017, several organisms were added to the required reportable condition list in Nebraska including; Acinetobacter species, Citrobacter species, Enterobacter species, Enterococcus species, Escherichia coli, Klebsiella species, Pseudomonas aeruginosa, Staphylococcus aureus, and Streptococcus pneumoniae. The Nebraska HAI/AR program has access to the susceptibility reports which has been used to develop regional antibiograms.

The Fellow will be able to use the above-mentioned databases to assess prescribing patterns in Nebraska hospitals over multiple years and correlate it with the antibiotic resistance prevalence in these settings. The project will include development of a real time dashboard that will focus on providing feedback to the hospitals on their antibiotic prescribing and resistance pattern as compared to the others (in an anonymous and aggregated manner). The fellow will be working on this project under close supervision and guidance by both primary and secondary mentor and will also be collaborating with HAI/AR epidemiologist, HAI/AR program infection preventionist (who is also state NHSN lead), HAI/AR pharmacist and Nebraska ASAP team. The fellow will also conduct a survey of Nebraska hospitals to analyze the usefulness and impact of the feedback on antibiotic stewardship program at these hospitals.

Major Project Objectives:

1. Report summarizing key antibiotic prescribing patterns in Nebraska hospitals and changes in prescribing pattern over the years for each of the hospitals
2. Report comparing inpatient (hospital) antibiotic prescribing trends to antimicrobial resistance for each local health jurisdiction
3. Present the report to hospitals and the local health departments during our regularly scheduled educational webinars
4. Develop a dashboard to provide real time feedback on antibiotic use and resistance patterns to Nebraska hospitals
5. A summary report for the project that provides the background, interventions, analyses and the impact of this project

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Major Project Impact:

The project will raise awareness of antibiotic prescribing and resistance trends in Nebraska hospitals and will allow them to compare their progress with other similar hospitals in the state. The real time feedback will help them monitor their own progress for any new interventions they will be implementing to improve their antimicrobial stewardship programs and antibiotic prescribing. Improved antibiotic prescribing in hospitals across the state will be helpful in the public health efforts for limiting the emergence and spread of multidrug resistant organisms and ultimately will save lives.

Additional Project #1 Title: Monitoring Antibiotic Resistance Genes Associated with Multidrug-Resistant Organisms in Nebraska

Project #1 Type: Surveillance Activity

Project #1 Description:

Nebraska DHHS HAI/AR program collaborates with the Nebraska Public Health Laboratory (NPHL), healthcare facilities and clinical labs to obtain all Carbapenem Resistant Enterobacterales (CRE), Carbapenem Resistant Pseudomonas Aeruginosa (CRPA) and Carbapenem Resistant Acinetobacter baumannii (CRAB) isolates. They are then tested for carbapenemase enzyme production and if they are found to be carbapenemase enzyme producing organisms then undergo Whole Genome Sequencing. The Whole Genome Sequencing provides information on various genes that provides the bacteria the ability to fight against specific antibiotics and the results are available in NEDSS. The fellow will work with primary and secondary mentors, HAI/AR epidemiologist, HAI/AR pharmacist and Nebraska ASAP medical directors to build a central datamart that will pull in all antibiotic resistance genes of epidemiological significance on a regular basis. The fellow will also be responsible for reviewing the trends of various antibiotic resistance gene prevalence in Nebraska over last few years and sharing the findings with various public health partners, healthcare facilities and other relevant stakeholders.

Project #1 Objectives and Expected Deliverables:

1. Develop a datamart for antibiotic resistance genes of epidemiological significance.
2. Report summarizing the epidemiology of antibiotic resistance genes associated with multidrug-resistant organisms in the state including all 19 local health jurisdictions.
3. Present the findings to healthcare facilities and local health department

Project #1 Impact:

Understanding the prevalence of various antibiotic resistance genes in multidrug resistant organisms within various parts of our state, will help us make informed decisions on prevention and containment efforts. More resources need to be diverted to limit the spread of multidrug resistant organisms with novel or rarely identified resistance genes in the state. The healthcare facilities will also use this information for implementing infection prevention and control efforts for patient safety within their buildings.

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

Nebraska HAI/AR program actively engage various healthcare organizations and healthcare facilities in preparedness and response efforts. The fellow will help gather relevant data, develop summary reports and presentations for healthcare and community partners and participate in education and training program developments (including tabletop exercises). Fellow will also assist primary mentor in ensuring timely communication with healthcare facilities, general public and other partner organizations, as needed. The fellow will have necessary supervision and guidance to be able to successfully perform these roles.

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

The fellow will work alongside the HAI/AR medical director (primary mentor), HAI/AR epidemiologists (including secondary and tertiary mentors) and infection preventionists on outbreak investigations. The role will depend on the experience they have gained in the program. Initially, in their training their roles will include data gathering, case investigations, and epidemiological investigations. However, once they have gained enough experience, they may also get the opportunity to lead an outbreak investigation under supervision of their mentors. As a part of the learning experience, the fellow will also be encouraged to write outbreak reports for internal and external partners under the supervision of mentors. Time allocation will depend on the nature of outbreaks. They will be expected to participate in at least 2 to 3 outbreak investigations (and may be lead one) during their training. Site visits with the team may be required with all safety precautions in place.