Genomic sequencing - equipment, personnel, and systems enhancements for variant tracking in Rhode Island and nationally

CSTE Stories FROM THE Field

CONTRIBUTOR: *Glen Gallagher, PhD, Associate Director of Health, Division of Health Laboratories, Rhode Island Department of Health*

CATEGORY: **Epidemiology and Laboratory Capacity (ELC)**

The Rhode Island State Health Laboratory expanded SARS-CoV-2 genomic sequencing capacity through increased staffing, bioinformatics infrastructure, instrumentation, and data analysis support. This empowered public health officials to better track the spread of COVID-19 variants and has contributed to more participation in surveillance and research projects.

The "What"

The Rhode Island State Health Laboratory (RISHL) is a division of the Rhode Island Department of Health (RIDOH) and Rhode Island's only public health laboratory. At the onset of the COVID-19 pandemic, RISHL was the only laboratory in Rhode Island performing testing for the SARS-CoV-2. In mid-2020, RISHL collaborated with an academic partner at Brown University to generate the first SARS-CoV-2 genomic sequences in Rhode Island by next-generation sequencing. RISHL leveraged existing sequencing capacity by January of 2021 to sequence SARS-CoV-2 in-house and worked with additional partners at the Massachusetts State Public Health Laboratory and eventually the Broad Institute in Cambridge, MA, to rapidly scale up sequencing efforts.

Funding from the Epidemiology and Laboratory Capacity for the Prevention and Control of Emerging Infectious Diseases (ELC) cooperative agreement has supported the expansion of RISHL's sequencing laboratory capacity. We have added dedicated sequencing staff, in-house bioinformatics computing infrastructure and staff, sequencing instrumentation, and data analysis support. We expanded the number of bacterial and viral pathogens we are able to sequence and analyze, and participated in both CDC-directed and multi-state sequencing-based surveillance and research projects. RISHL has ongoing grant funded research with Brown University to support increased SARS-CoV-2 sequencing surveillance within vulnerable populations and are delving into sequencing for SARS-CoV-2 in wastewater. Computational

infrastructure is now online and routinely undertaking local analysis and curation of large data volumes with subsequent upload to public national databases. RISHL was awarded an ELC Sequencing and Analytics Supplemental Award to construct a new state health laboratory predicated on the commitment that it will include a world-class public heath sequencing laboratory.

These data were an important component of the state COVID-19 response and were used **inform the public, support policy and intervention actions, determine best-practice empiric medical treatments, and track outbreaks**, among other uses.

The "So What"

The SARS-CoV-2 variant data generated by RISHL's direct and coordinated efforts were critical to providing clarity on the spread of variants within Rhode Island, regionally, and nationally. RIDOH COVID-19 data teams used the sequencing data to develop and curate a public facing webpage on the status of variants in Rhode Island. These data were an important component of the state COVID-19 response and were used inform the public, support policy and intervention actions, determine best-practice empiric medical treatments, and track outbreaks, among other uses.

To date RISHL has successfully submitted over 5,400 SARS-CoV-2 sequences to GISAID (an initiative promotes the rapid sharing of data from all influenza viruses and the coronavirus causing COVID-19) and has, in some capacity, been involved in the submission of the majority of the additional 21,700 sequences in GISAID for Rhode Island.

The "Now What"

With an eye to the new lab building and its dedicated sequencing core laboratory RISHL is planning for the opportunities that will come with increased space and ability to expand sequencing capacity to track other potential infectious agents of public health concern. We will soon make additional grant funded equipment purchases that will further diversify sequencing platforms and greatly increase backup emergency capacity, as well as make investments in cloud computing and data storage. In addition, we are hoping to hire additional sequencing dedicated scientists, who are essential to ensure the data can be used to inform public health action.

Key contributors to this project include Richard Huard Ph.D., Kristin Carpenter-Azevedo , and Sean Sierra-Patev, Ph.D. Rhode Island Department of Health.

Funding source: This work was supported in part by the Centers for Disease Control and Prevention (CDC) cooperative agreement #NU38OT000297. Its contents are solely the responsibility of the authors and do not necessarily reflect the views of the CDC.