Editorial: Laboratory Spotlight

Medi3 Healthcare - Managing SARS-CoV-2 in Norway

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When the world went into global lockdown due to Covid-19, and the regional industry in a corner of Norway could not get workers to cover shifts, Medi3 expanded their laboratory facilities to include SARS-CoV-2 analysis. This gave the industry a way to clear the staff for duty and help limit the spread of the coronavirus. In charge of the project, and quality of the analysis, was the dynamic duo that devoted their time in this laboratory spotlight, Ole Andreas Erstad and Karoline Valkvae.

About Medi3, and their role in SARS-CoV2 testing during the pandemic

Medi3 is a private healthcare service, and Medi3 Aalesund provides medical services for the marine and maritime industry in the region, in addition to traditional medical services. The region is a global supplier of maritime technology and ships as well as seafood. A new situation occurred during the covid pandemic, when otherwise healthy industrial workers needed to confirm that they were SARS-CoV-2 negative. The Norwegian healthcare system was pushed to the limits analyzing samples from patients with symptoms or close contacts of confirmed infected patients. The public healthcare system could not prioritize analysis of healthy individuals. This was a huge challenge for the regional industry that had to prevent the SARS-CoV-2 virus from spreading on site, to keep the wheels turning. Medi3 became a key factor in solving the problem and they were able to decrease the burden on the public healthcare system by taking over routine screening for SARS-CoV-2 virus as preventive measures among industrial workers and occupational travelers.

After some time, they were also able to provide testing for shipping crew, in nasopharynx sampling and point of care covid testing, so that crew could verify SARS-CoV-2 status at sea. When ships are far away from the harbor they needed to be able to determine whether they would have to abort the current mission and return to harbor or if they could continue towards their destination.

A new branch of the lab in the middle of a pandemic

In the start of the pandemic, limited clinical information was available concerning SARS-CoV-2 symptoms, analytical methodology and how to collect samples from a patient. Joint forces from multiple medical professions collaborated to overcome certain obstacles such as the identification of areas for patient sampling and developing a pipeline for distributing samples. The interprofessional approach to building a completely new molecular biology laboratory has been crucial to establish quality control (QC) and quality assurance (QA) systems and procedures for SARS-CoV-2 analysis during the pandemic. The analytical

pipeline, from the sampling of individuals, the laboratory pipeline and distribution of results, had to be determined based on basic knowledge and the broad experience from multiple contributors. The broad interprofessional approach enabled an analytical pipeline of the highest standards and has resulted in a laboratory capacity that includes analysis, quality assurance and the release of results within 24 hours. The dedication from the team at the laboratory has made this possible, and the routine screening has ensured a safer working environment on industrial sites.

Managing SARS-Cov2 variants

Initially, the requirements for laboratory results only included positive and negative results. When the laboratory chose analytical technology and considered different approaches, the traditional Real-time quantitative reverse transcriptase polymerase chain reaction (RT-qPCR) with three marker genes and an internal standard was utilized. The analysis was robust enough to detect the mutated variants, and with some experience, the lab was able to identify differences such as the Delta variant. The Delta variant demonstrated strong amplification of all three marker genes, while omicron had laps (gene dropout or gene target failure) in the S gene. The laboratory spent a lot of time working on QC/QA protocols for interpretation of results, and as any other RT-qPCR analysis, amplification curves are as individual as the patients the samples come from. The laboratory built a library of amplification curves for interpretation, and continuously improved the analytical pipeline to optimize the results. There were strict protocols for validation of results, and at some point, the quality of the positive control became an issue when the control sample temperature was too high.

Biomedical laboratory scientist Karoline Valkvae, who oversees the training and routines at the laboratory, carefully monitors all the details. Full scale RT-qPCR analysis can have a lot of critical analytical errors and preventing those requires the attention to details that biomedical laboratory scientists get from their education and professional training. Undoubtedly, continued monitoring of quality and the development of standards will continue as SARS-CoV2 remains a challenge to the laboratories across the globe.

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