Te Niwha

Research Project Impact Case Study

Rapid point-of-use testing for infectious diseases in the community

Short Research Title

Rapid testing for infectious diseases in the community

Key researchers

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Introduction

Rapid point-of-use (POU) diagnostics are changing the landscape of laboratory testing for infectious diseases. There are clear opportunities for rapid POU testing to reduce inequity and empower communities to take control of their own health by having results delivered in less than one hour, on-site, and with minimal equipment requirements. Our team has expertise in developing POU tests for infectious diseases. In this project, we are taking a fresh approach by integrating community engagement and involvement from the ground up in developing new POU tests. With the assistance of Te Niwha, we partnered with two iwi-owned community health providers, Turanga Health in Tairāwhiti Gisborne and Ngā Miro Health in Ngāruawāhia, and their communities to undertake this project. We worked with these communities to understand their priorities for assay development (i.e. the target diseases) and methods for deployment (e.g. in clinics, marae, trucks), with their regular input into assay design, prototyping and eventual testing in community settings.

This project responds to the Te Niwha mission by building research capability for Aotearoa New Zealand in the area of POU diagnostics for serious infectious disease threats. COVID-19 has taught us that there are significant inequities in access to healthcare which may as a result of cultural, economic or geographic factors (or all three). By shifting the diagnosis of diseases from the laboratory or hospital to on-site testing in communities, this allows individuals to take control of their own health and environmental resources and better prepares the whole of Aotearoa to monitor and respond to future serious infectious disease threats. We helped to deliver this improved response capability by training emerging scientists, incorporating multiple science disciplines, clinicians and Māori, leveraging local and international expertise and, importantly, involving communities in the creation of rapid diagnostic solutions which are optimal for our local conditions and needs.

Results

We worked with our community partners and selected two of their priority POU tests for development. These tests were for Group A Streptococcus (GAS; rheumatic fever is an autoimmune disease associated with this bacteria) and Respiratory Syncytial Virus (RSV; which can lead to bronchitis or pneumonia). Both rheumatic fever and RSV are more prevalent in Māori, Pacific, and low socioeconomic groups. New rapid molecular assays for both GAS and RSV were created in a format that is amenable to development as POU diagnostics. These assays were tested in the laboratory and it was demonstrated that they were able to detect the targeted microorganisms: GAS and RSV. In parallel to the laboratory activities, we worked with our community partners to develop workflows for the deployment of POU testing in their community settings. This included co-development of a phone app for recording assay results, co-design of a new lightbox for visualising results, ethics, data security and data sovereignty plans. The new prototype POU assays were tested using the workflows on throat (GAS) and nasal (RSV) swab samples. Parallel testing of the samples with established laboratory methods (PCR) revealed consistent results, indicating that the new assays have potential to be developed further as POU tests for community use.

Impact

This project helped to deliver improved community health and health status for remote regions and disadvantaged populations in Aotearoa New Zealand. These groups are currently hard to reach with traditional laboratory testing services due to accessibility and time to results. Developing rapid POU testing where the result can be known within an hour enables much earlier healthcare interventions which will both reduce disease burden and reduce health costs. Developing this new capability will also enable Aotearoa New Zealand to respond more quickly to future serious health outbreaks, including pandemics, by enabling rapid on-site monitoring of disease transmission. Through the project we also made valuable new connections between researchers, clinicians, community health providers and research institutes which will be the basis for continuing collaborations on other future projects.

Beyond this project, we will work with our partners to validate and eventually deploy the new POU tests we are developing into community settings. We are already discussing further tests of interest to our partners and how capabilities can be extended across Aotearoa New Zealand and the Pacific.

In summary, we helped to develop capability in Aotearoa New Zealand for rapid POU tests to ensure that Aotearoa New Zealand's response to current, ongoing, and emerging infectious disease threats is strong, prepared and unified.