# Digitising New Zealand Hospitals for Data Driven Care and Improvement

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## Institution Introduction

Waitemata District Health Board (DHB) is one of three DHBs[[1]](#footnote-1) providing health services for the Auckland metro region – the largest city in New Zealand. Waitemata is the largest DHB, being responsible for improving, promoting and protecting the health of a geographic population of ~630,000. It provides two hospitals and community services from 30 sites across the district. It also funds primary health care services via Primary Health Organisations (PHOs). Waitemata DHB’s annual budget is NZ$1.4 billion. The DHB has ~6800 staff, and sees 119,885 emergency department and 175,885 outpatient clinic attendances each year.

## Project Profile

Waitemata DHB has been working towards the digitization of systems and the collection of electronic data through its Leapfrog Programme. This has included the implementation of electronic systems for: nursing observations and assessments; prescribing and administration of medications; ordering of laboratory and radiology tests; ward whiteboards; referrals from primary care and across hospital services; mobile apps for junior doctors to manage their patient tasklists and for ward calls (paging); mobile app for orderlies task management; patient experience reporting and patient reported outcomes collection; development of a one page patient summary (InPatientSnapshot). It also includes a business intelligence tool to put the data in the hands of the clinicians directly via dashboards.

## Problems and Demands

While New Zealand’s primary care has been electronic for some time, our hospitals have been slow to follow. Many processes have remained paper-based and there has been a lack of electronic data to support audit and process improvement. Waitemata DHB has been at the forefront of ‘digitising’ its hospitals through the Leapfrog Programme and other projects. This has predominantly been through a ‘best of breed’ approach to implementing new electronic systems that solve particular problems within the hospitals. It has also included internal development of useful clinical ‘apps’ in between the existing systems to support our clinicians’ workflow. This programme has required a significant amount of change in clinical practice that has been introduced in a staged manner towards the overall goal of digitisation. Our ward nurses are now using iPad minis in their normal clinical practice. These tablet computers fit into the pocket of their uniforms and allow them to complete many of their duties at the bedside, instead of having to go and find patient notes or sit at a fixed computer. In general these changes have been particularly well accepted by staff as they have been designed to support clinical workflows rather than to add extra burden of data collection and authentication to the process.

As we add more and more systems to the mix in our hospitals, the burden of integration, maintenance, connectivity, support from legacy infrastructure, and extra steps continues to rise. Our team is currently considering the potential benefits of an integrated EMR system over our existing solutions for the future.

## Implementation Process

These projects were instituted under a CEO-sponsored Leapfrog Programme with high visibility and priority, and regular reporting to the CEO, executive leadership and the Board of Waitemata DHB. The Programme was given seed funding to allow the thorough exploration of options prior to preparing business cases for new project. Real world experience of the new systems or models of care was sought from international institutions prior to implementation, although many have been NZ-first implementations. Each project is supported by the health services to be impacted and has a clinical lead who understands the impact on staff as well as the importance of the project. The Leapfrog Programme team consists of highly talented and experienced clinical and IT staff, supported by the DHB’s Chief Information Officer (CIO) and Director of Innovation & Improvement. Each individual project is seen as one step on the overall pathway to digitization, establishing necessary foundations first, and then building off each other to support each new development.

As an example, one of the foundational projects was a Mobility Strategy that initially laid down the policies and governance around mobility for staff, followed by free access to WiFi throughout our facilities (for patients, visitors and staff), mobile device management systems for staff devices, and a mobile enterprise application platform that allows us to develop mobile apps within our health information systems. Once all of this was in place, we were able to support the implementation of new clinical systems, such as eVitals. This system is used by nurses on iPad mini tablets that fit in the uniform pocket and so can be carried with the nurse to the bedside. While with the patient the nurse can enter their observations (heart rate, temperature, blood pressure, respiratory rate) and their assessments (eg. falls risk, nutritional status, risk of pressure injuries, cognitive state etc). The system adds up the Early Warning Score and provides a visual representation of increasing or decreasing risks for each patient, across the whole ward or the entire hospital. The system can also provide alerts and escalation pathways for patient deterioration. This project was led by a clinical outreach nurse and a pharmacist/IT expert who worked directly with the services prior to implementation. The system was piloted on two wards while initial issues were sorted, and then was rolled out ward by ward across two hospitals. New developments (for example, in maternity and pediatric wards) were co-designed and implemented at the end of the project.

This has added an extra layer of electronic observation data that was not previously available within the DHB. This has been used in several new development and research projects. Our internal team has developed an Inpatient Snapshot which brings together summary information about a single patient into one page on the Clinical Portal – this includes the EWS and current observation chart. This is more easily accessible for clinicians than having to go in and out of different ‘tabs’ or pages, and allows them to see all pertinent clinical information at once. The data is also being used in research projects as part of the Precision Driven Health Research Partnership with our Institute for Innovation and Improvement (i3; http://i3.waitematadhb.govt.nz/). We are investigating adding observation/EWS data into a readmission risk predictive algorithm that is run on Day 2 of inpatient admissions.

## Comparative Advantages

The benefits of digitizing our hospitals at Waitemata DHB are multiple. One of the main aims has been to make the information more available and accessible where/when it is required at the point of care. Other benefits have included enabling clinicians to spend more of their time with patients, reducing time spent searching for written patient notes, reducing administration and travel time for community-based clinicians, enhancing the clinician-patient interaction through the use of consumer apps, reducing the amount of paper used by our system, reducing administration time in the radiology and laboratory departments through eOrdering systems, reducing turnaround times for orders. In particular, the eVitals project has been well accepted by nurses: 94% said it made their working life easier; 90% said accessing the systems on the iPad made them more efficient and 88% said it improved the quality of the care they provided. Compliance with required observations increased from 71% to 100%, and the number of nurses who spent more than 30 minutes looking for notes each shift reduced from 33% to 5%. Escalations of those with an EWS >2 increased from 59% to 75%.

We are at the point now of being able to introduce more clinical decision support aids through the use and integration of these data. We have also implemented a business intelligence tool to allow clinicians to access all this data in order to directly monitor and improve the quality of care by their services.

This has also led to research projects through academic partnerships, predominantly the Precision Driven Health (PDH; www.precisiondrivenhealth.com) research partnership with the University of Auckland and Orion Health Ltd (NZs largest health IT company). One of these projects is HOPE for stroke which uses past hospital data on admissions for stroke to predict likely outcomes on discharge (eg. discharge home with home care, discharge home with no care required, discharge to an aged care residential facility, discharge to a private hospital etc) for new stroke patients. This is leading to many more research projects using machine learning, predictive analytics, artificial intelligence and chatbots. We are also building on NZ’s leading research in mHealth behavior change programmes to develop and implement services such as TextMATCH (text message health information for pregnant women and young families with children up to 2 years of age in 16 different cultural/language versions)[[2]](#footnote-2), SMS4BG (2-way text message support for diabetes self-management in those with poorly controlled diabetes)[[3]](#footnote-3) and more.

There are several advantages of the New Zealand context that have helped in these developments. Centrally, the NZ Ministry of Health (MoH) has been working on a national Digital Health Strategy – one of the themes of which is digital hospitals. All of the DHBs have been measured on the HIMSS electronic medical record maturity scale and the MoH has been supporting DHBs to increase their use of electronic systems. The use of data has become much more prominent in NZ recently – we have had a Health Information Privacy Code (HIPC) for many years, but in the past year or so there has been more public discussion on the uses of data (Data Futures Partnership; www.datafutures.co.nz). NZ also has a unique health identifier – the National Health Index, NHI – which allows health data to be linked to the individual across various organisations and datasets. More recently, the government has established the Integrated Data Infrastructure (IDI; http://archive.stats.govt.nz/browse\_for\_stats/snapshots-of-nz/integrated-data-infrastructure.aspx) which allows sharing of data across government sectors.

## Experience and Lessons

It is all about the use of the data. Putting the data into the hands of clinicians in ways that they can actually use it to examine and improve their clinical practice, helps to improve the quality of the data but also is much appreciated by clinicians and leads to data driven improvement projects.

Projects that impact on clinical workflows, including IT projects, are more successful when led by clinicians. Clinicians with extensive knowledge and understanding of health IT systems and processes are valuable and we need to consider how we train a workforce to design, build and implement new systems with that clinical perspective. Certainly the investment in a great team has been a substantial factor in getting Waitemata DHB to where it is today.

It is important to learn from others and to share what we have learnt with others. Waitemata DHB is working with the other DHBs in the northern region of New Zealand to rationalize the number of systems we have across the region, and to improve data sharing between the various organisations in the region.

## Wisdom and Inspiration

While we have learnt a lot about how to implement these substantial clinical and IT change projects within our own organization, we are constantly looking to high performing international organisations for the next stages of our journey. The best examples of practice internationally and the latest research provide us with inspiration to keep improving. The next phases for us may include investigating a hospital EMR, the development of a national EHR system for data sharing and providing an innovation ecosystem for others to support the health sector to grow, and the translation of AI research into clinical practice.

1. https://www.health.govt.nz/new-zealand-health-system/key-health-sector-organisations-and-people/district-health-boards [↑](#footnote-ref-1)
2. Dobson R, Whittaker R, Bartley H, Connor A, Chen R, Ross M, McCool J. Development of a culturally tailored text message maternal health program (TextMATCH). JMIR mHealth & uHealth 2017;5(4):e49. DOI: 10.2196/mhealth.7205 [↑](#footnote-ref-2)
3. Dobson R, Whittaker, R. Jiang, Y. Maddison, R. Shepherd, M. McNamara, C. Cutfield, R. Khanolkar, M. Murphy, R. Effectiveness of text message based, diabetes self management support programme (SMS4BG): two arm, parallel randomised controlled trial. BMJ 2018;361:k1959 [↑](#footnote-ref-3)