Office of the Prime Minister's Chief Science Advisor
Kaitohutohu Mātanga Pūtaiao Matua ki te Pirimia

Title:

INFORMATION SHEET: Capturing the benefits of AI in healthcare for Aotearoa New Zealand - Summary A3

Author:

OPMCSA

Output type: PDF				
Pages: 2 pp				
Date: Dec-2023				
Language: English				
Review: Peer reviewed				
Versions				
Record number:	*Version:*	*Date V1 created:*	*Date:*	*Printed version*
PMCSA-23-12-05-V2	V2	20-Oct-2023	15-Dec-2023	Y
DOI:	-			
ISBN:	-			
Archive page link: https://dpmc.govt.nz/our-programmes/special-programmes/prime-ministers-chief-science-advisor-archives/archive/gerrard-2021-2024				
Notes: Delivered to the Government pre-election (October 2023) – publicly released 15 December 2023				

Capturing the benefits of AI in healthcare for Aotearoa New Zealand

Implemented well, AI offers many potential benefits to our healthcare service delivery.

Digitisation of our health systems is in progress and is key to ensuring we realise the benefits of AI in our healthcare services. Effective implementation will require strong leadership, AI supportive system settings, adaptation to our specific context, and effective cross-sector relationships.

LEADERSHIP

- Well established governance structures will ensure safe and effective decision making
- Mechanisms for ethical, safe, and patient-centric decision making can support beneficial health outcomes for our communities

SYSTEM SETTINGS

- AI technology will provide the best outcomes for our healthcare system if deployed within a well-supported, well-resourced environment for research, teaching, innovation and entrepreneurship
- Appropriate regulatory settings, a strong talent pipeline, and high-quality data are some of the key components that will support an AI-ready ecosystem

CONTEXT

- The implementation of AI systems globally allows us to see how technologies introduced in other jurisdictions might benefit our national context
- Appreciating our national context will allow us to select technologies that best meet our specific needs, or to tailor available technologies accordingly

RELATIONSHIPS

- Designing, developing and deploying AI technology requires skillsets that sit across various sectors and disciplines
- Strong relationships across public and private sectors, relevant agencies, research institutions, healthcare professionals and consumer groups will provide useful support to the evolving healthcare landscape

"Combining the power of humans and machines - intelligence both human and artificial - would take medicine to an unprecedented level. There are plenty of obstacles...the path won't be easy, and the end is a long way off. But with the right guardrails, medicine can get there."

Eric Topol, Deep Medicine (2019)

Recommendations

Our report makes 22 recommendations, captured under eight broad themes.

Mapping the landscape

Maintaining the human element of care

Enabling adoption

Establishing confidence and trust

Tackling inequity

Te ao Māori

Data and systems

Exploring opportunities

Ethical principles for the use of AI in healthcare in Aotearoa

With the rapidly evolving technology landscape it is important that principles for the ethical development and deployment of AI tools are adopted. Our report outlines 17 example principles, grouped into six themes, to guide the development, implementation, and use of predictive and generative AI in our healthcare system.

Implementing Te Tiriti o Waitangi and recognising tikanga Māori

Globally, collective rights for Indigenous populations are recognised and affirmed by the United Nationals Declaration of the Rights of Indigenous Peoples (UNDRIP). New Zealand gave its support to the declaration in 2010, acknowledging Māori as tangata whenua and affirming a commitment to the common objectives of the declaration and Te Tiriti o Waitangi. Te Tiriti and its principles require consideration on an ongoing basis as the breadth of applications for AI in healthcare delivery continutes to evolve.

Safe and effective AI

AI must be safe, not exposing patients to increased levels of risk. It must be effective in achieving the goals set out in the Pae Ora|Healthy Futures Strategies (2023) to achieve health equity and improve health outcomes for all. This will require: the development of frameworks for evaluating AI in various healthcare contexts; better understanding of the limitations and risks of AI systems; and the development of rules and governance frameworks across the health system.

AI for equity

If we are to make good on the Pae Ora strategies, our deployment of AI must focus on capturing equity in access and in outcomes. There must be ongoing audit and evaluation of potential biases and prioritisation of use cases that enhance equity. While inappropriate use can lead to inequity, early evidence suggests that AI is capable of enhancing equity by lowering barriers to knowledge, enhancing access to healthcare, and increasing the productivity of healthcare professionals. If such productivity gains prove viable, it is essential that they be harnessed to increase the equity of healthcare provision.

Effective control of AI

Where AI is supervised it is essential that its supervision be effective. Increasingly, we will not always want to supervise all AI as confidence and trust builds. There will be low risk domains in which supervision is not cost effective and, as AI becomes increasingly powerful, we will be less competent at supervising it.

Evaluated and trusted AI

The use of AI in health contexts must be both trusted and trustworthy. People should understand the role that AI plays in their care. Significant effort is being put into explaining the nature and reliability of technology. But, by its nature, generative AI is less explainable. In some cases, its trustworthiness is best secured by effective and well communicated audit and evaluation, rather than by communicating the mechanics of its operation and the nature of the vast and commercially sensitive amount of data on which it is constructed.

Responsible AI

Effective use of AI requires clear rules about liability and responsibility.

For this report, we have chosen to be very broad in our conception of AI. This includes relatively simple algorithms alongside the newer generative AI tools or computer vision technologies. Please refer to the report for more detail and for references.

Case studies

Soul Machines

Founded in 2016, Soul Machines develops ‘Digital People’, whose faces and bodies are simulated by cutting-edge computer graphics and animation methods, and whose behaviours emerge from a biologically-inspired model of cognition.

A particular focus is on building appropriate facial expressions and humanlike behaviours during conversations in order to engage users. Agents of this kind have potential applications in telemedicine, for instance to address loneliness and stress and more generally to provide emotional support. Soul Machines demonstrate how AI systems may be able to supplement human care, by performing screening, monitoring, and the delivery of remote interventions.

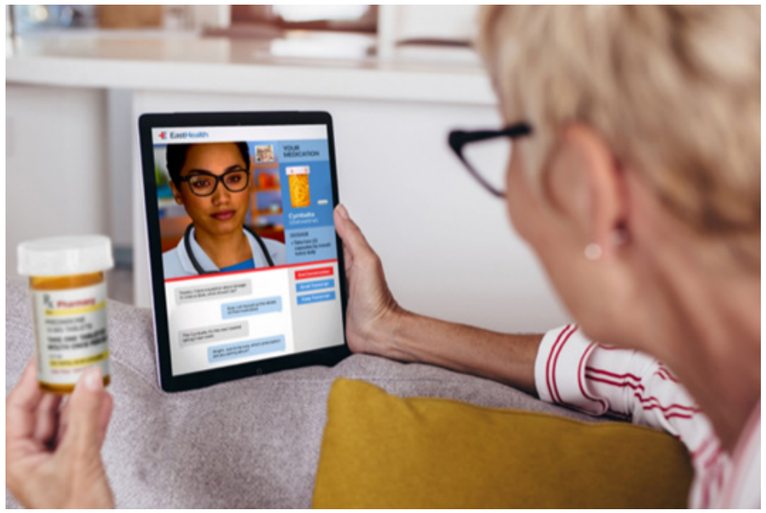

Image courtesy of Soul Machines

AI for ambulance dispatch

Aoteaora New Zealand’s emergency medical service is under pressure to handle increasingly high demand. Machine Learning can improve the responsiveness of emergency medical dispatch, a critical but challenging problem for emergency medical services.

Associate Professor Yi Mei, from the Centre for Data Science and Artificial Intelligence, Te Herenga Waka - Victoria University of Wellington, recently won an MBIE Smart Idea (Endeavour Fund) Grant to lead a project on machine learning for emergency medical dispatch. Their prior work has demonstrated machine learning’s superiority over a suite of expert-designed dispatch rules that approximate human dispatch behaviour, reducing simulated response times by up to 75%. This research is in partnership with Wellington Free Ambulance, with the goal of developing a technology directly applicable to the real world.

Volpara Health

Wellington-based software company Volpara Health has been listed on the ASX since 2016, and its success comes from its AI image analysis capabilities applied in a pragmatic and robust manner on mammograms (breast X-rays). Today, Volpara’s software is employed in over 40% of US breast cancer screenings (over 15M women a year) along with BreastScreen South Australia, Queensland and Victoria, and a handful of private clinics in Aotearoa New Zealand.

One metric that Volpara’s software returns is breast density, the proportion of fibrous and glandular tissue in the breast as compared to fatty tissue. Breast density is an independent breast cancer risk factor and can significantly reduce the ability of a radiologist to see a breast cancer in a mammogram. In Aotearoa New Zealand, early work on Volpara’s products indicate that differences in breast density might explain some of the health disparities that are seen in our national breast cancer rates.

The European Society of Breast Imaging and the FDA in the US both recommend women are told their breast density when they are screened. Since receiving FDA clearance in 2010, Volpara has extended its range of automated, quantitative measurements to include radiation dose, breast compression and image quality and more recently they have included breast cancer risk assessment, where breast density has become a critical input. Aotearoa New Zealand, with its population size, focus on health disparities and frequency of breast cancer diagnosis, has the potential to be a global leader as a fast adopter for AI in healthcare that is clear, explainable, measurable and impactful.

An example of the Volpara scorecard for a patient is shown in the inset image. The scorecard indicates that for this patient cancers will be very hard to see with X-rays, if they should develop. In the US, such women might be offered additional screening using ultrasound.

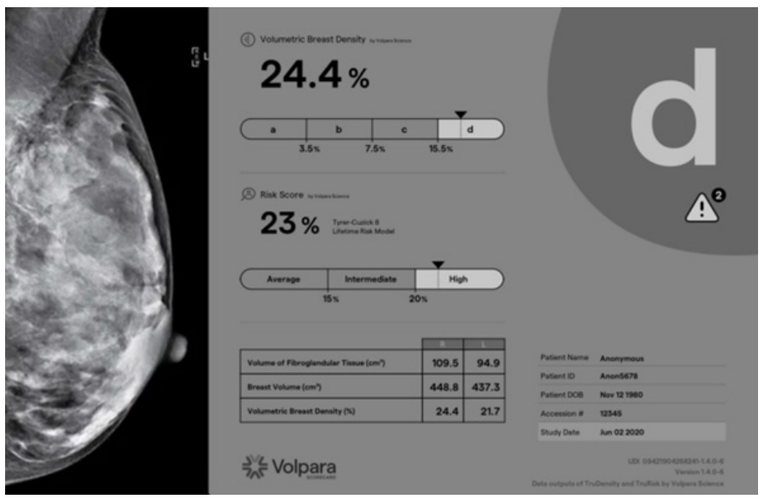

Image courtesy of Volpara

Formus

Founded and housed within the Auckland Bioengineering Institute, Formus aims to enhance surgical decision-making processes. Developing biomechanical models of the hip joint generally relies on limited geometric information available through traditional medical imaging techniques. Minor changes to model geometry have implications on subsequent joint force calculations, a crucial factor to understand for hip arthroplasty implant mechanics.

Employing cutting-edge biomechanics and AI-enabled machine learnings, Formus Labs’ Automatic Custom Implant Design (ACID) can establish an exact 3D model of the hip joint that enables surgeons to map out surgical interventions virtually and can produce a plan from a scan in under an hour. Feedback from orthopedic surgeons describe how “the Formus platform helps showcase all available options, assisting with decision making on the best possible reconstruction for the patient.”

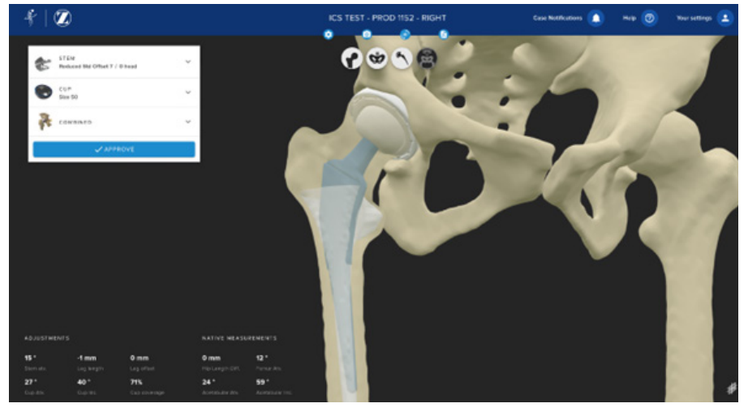

Image courtesy of Formus

Mercy Radiology

Mercy Radiology is an Auckland based private medical imaging practice which has introduced several AI tools to support service delivery. Mercy Radiology use multiple tools to support, not replace, clinical decision-making. Dr Remy Lim, Medical Director at Mercy Radiology indicated there is a general sense among staff that the support of AI tools has improved efficiencies in the practice, although no formal assessment has been carried out.

While Mercy are only using three AI tools at present, there is a willingness to try out other tools in future if there is a product that seems suitable to enhance their service provision. The AI tools in use at present support clinicians with fracture identification in X-ray images, removing noise to produce better quality PET images and identification of lung nodules on CT scans. Implementing new AI tools is relatively straightforward and largely depends on the needs of the clinic and the appetite to innovate to support their practice.