digital health CRC

CHANGING HEALTH TRAJECTORIES IN CHRONIC DISEASE

Vision

With half of all Australians suffering from one or more chronic disease[1], this research will reduce the burden of chronic disease by assembling identified and de-identified data from multiple care settings (primary care, hospitals) and using AI-based solutions to identify populations at risk of chronic disease.

These solutions will enable the design and implementation of personalised models of care throughout the healthcare continuum from prevention to treatment to post-discharge care, leading to consumer engagement products.

Digitally supported early interventions will empower consumers to embrace actions that will result in better health outcomes and avoid unnecessary hospitalisations.

Burden of Chronic Disease in Australia

Chronic diseases are the leading cause of ill health and death in Australia[2]. In 2014–15, more than 11 million Australians had at least one of eight common chronic diseases, and one-quarter of the population had two or more of them. In terms of the non-fatal burden of disease, which is a measure of the number of years of 'healthy' life lost due to living with a disability, mental and behavioural disorders were the largest contributor (23.6%), followed by musculoskeletal disorders (22.7%) and respiratory disorders (11.9%).

DHCRC flagship programs are large multi-participant collaborative research programs designed to deliver systemic impact across the health sector by focussing on areas of focusing demonstrated indus

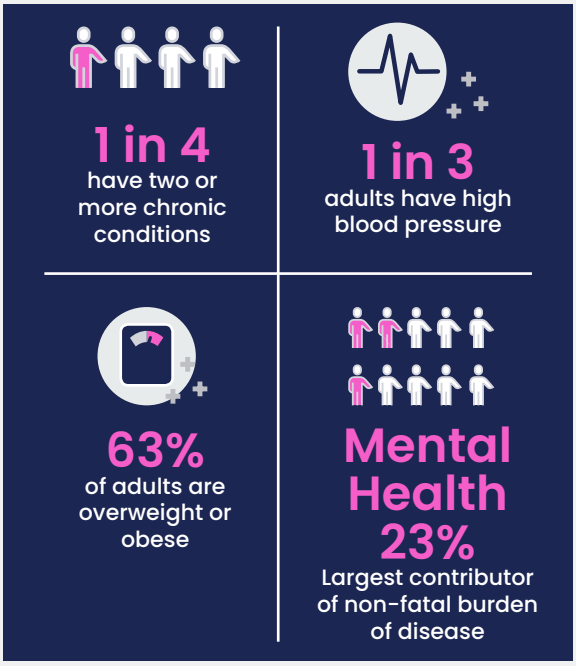

Fig. 1 Burden of Chronic Disease

Drivers for Change

Chronic disease contributes to more than one in three potentially preventable hospitalisations in Australia. Many chronic health conditions share common preventable risk factors, such as smoking, excessive alcohol consumption and not getting enough exercise—in fact, around one-third of our nation's 'disease burden' is due to preventable risk factors[3].

1 *https://www.aihw.gov.au/reports-data/health-conditions-disability-deaths/chronic-disease/overview.*
2 *https://www.aihw.gov.au/reports/australias-health/australias-health-2016/contents/chapter-3-leading-causes-of-ill-health.*
3 *https://www.aihw.gov.au/reports-data/health-conditions-disability-deaths/burden-of-disease/overview.*

As healthcare in general, and chronic disease in particular, is managed at both the primary care and hospital level, the full spectrum of longitudinal health data of consumers is distributed across both public and private health systems. Compared with the volume of hospital information that is compiled at the federal and state government levels, much less detailed clinical information about primary care data is shared. This further inhibits a holistic view of a consumer's health status.

As funders and providers grapple with rising costs of chronic disease management, consumers are turning to new digital health technologies such as mobile phone apps and activity monitors for managing their own health and wellness. These technology trends are driving new trends of consumer-centred models of care (eg. personal health coaching) that focus on prevention and wellness. This is an international trend increasingly being driven by countries that are responding proactively to these technology drivers and Australia cannot afford to fall back in responding to the threat of rising risk of chronic disease.

Research and Innovation

A key component of this research will be to assemble and link primary and acute hospital care data sets and taking a longitudinal view of a consumer's health data at the individual and population level. This research will apply Artificial Intelligence (AI) and Machine Learning (ML) techniques to identify populations that are at risk of developing specific types of chronic diseases. Understanding the risk profile will help in delivering appropriate health services, as well as in designing personalised models of care that help trigger behaviour changes in consumers, with the aim of avoiding unnecessary hospital admissions and empowering consumers to manage their own health and well being.

Key Innovations

Design and development of automated novel enrolment program for individuals at risk

The focus here will be on intelligent analysis and synthesis of data from multiple care delivery systems to focus on delivering personalised preventive services. The analysis and outcomes of this research will be grounded in behavioural science principles and motivate actions with positive outcomes.

Develop sophisticated AI-based risk stratification methods that segment populations at risk or with rising risk of unmanaged chronic disease

This research will enable the design and implementation of new models of care, based on risk stratification algorithms that categorise populations at different levels of risk including rising risk, to deliver appropriate chronic disease management services specifically tailored to address the risk level. In addition to personalised services, this research will reduce the impact on acute care services and preventable presentations.

Design platforms to support new models of care for people at risk of chronic disease

This research will focus on taking advantage of new technologies that reach out and scale up behaviour change for large targeted cohorts eligible for new models of care. A variety of emerging technologies such as interactive voice recording systems, and emergency departments (ED) would be used to reach out on scale to deliver appropriate wellness and preventive healthcare services.

Design dashboards and systems to support remote delivery of personalised healthcare using new models of care

The focus here will be to design shared dashboards and systems to support new consumer engagement models to deliver targeted programs specifically designed for people at high risk. A key component of the design will be consumer facing dashboards that will enable providers and consumers to proactively collaborate in managing their health risks.