

Melbourne Academic Centre for Health

NHMRC AHRTC and CIRH Reporting

June 2019



Australian Government
National Health and
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NHMRC accredited Advanced Health Research and Translation Centre

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Question 1: Better Care

What health services (e.g., procedures, preventative measures, treatments or devices) has the centre developed, tested, implemented and scaled-up, or eliminated, to deliver better care for patients?

Part A: STRATEGY

MACH clinical experts have identified priority areas for health service development, including improving uptake of guidelines, enhancing communication across the care continuum, streamlining patient journeys through the health care system, and reducing unplanned readmissions. MACH is funding novel, collaborative, and scalable translational research projects to address identified health services gaps to deliver better care for patients at our partner sites.

See *Appendix 1* (p. 15) for a full list of MACH investigator-led projects funded through the Medical Research Future Fund (MRFF) Rapid Applied Research Translation (RART) program.

One example is a recently completed <u>project aiming to counteract sarcopenia</u> (low muscle mass) in geriatric patients. MACH clinician-researchers successfully implemented evidence-based diagnostics into routine clinical practice in the care of geriatric patients undergoing inpatient rehabilitation. The combination of effective diagnosis, exercise and nutrition interventions for sarcopenia and patient-centred education is likely to enhance independent living and reduce falls in this patient community. Hospitals across several Australian states have adopted this diagnostic and intervention bundle with further scale-up likely.

Additional ongoing projects aiming to deliver better patient care include:

- Integrating Osteoporosis in Primary Care: The Osteoporosis Risk and Management Project
- Improving the care of children with frequent asthma admissions through partnerships with hospitals, GPs, and families
- Future Health Today Project Co-design of Prototype (managing diabetes, cardiovascular, and kidney disease)

See <u>MACH RART projects</u> for further details of these activities.



Part B: Case study - Integration of retinal photography and artificial intelligence (AI) to build opportunistic screening services in primary care settings – Prof Ming He, University of Melbourne; Centre for Eye Research Australia.

This research project was supported by the MRFF (RART Round 1) program in conjunction with the MACH. <u>Click here</u> for further details of this study.

Challenge/problem

Vision impairment and blindness are major public health problems in Australia. Over 50% of blindness in those aged over 40 years is caused by just three diseases (glaucoma, diabetic retinopathy, and agerelated macular degeneration). These diseases are difficult to identify early as patients often have no symptoms. Delayed diagnosis undermines early treatment, which is often very effective. The gold standard for diagnosing these diseases is retinal photography, however currently, widespread screening programs with retinal photography is limited by the need to have a large, trained workforce of image analysts.

Approach/response

An approach to this challenge is to use artificial intelligence (AI) to analyse screening retinal photographs in general practices. This randomised controlled trial (RCT) embeds opportunistic retinal screening into GP surgeries and uses an AI system for the examination of the photographs, removing the need to train and pay additional professional staff. The comparator in this trial is usual general practice care. As a first step, this project used 100,000 pre-labelled retinal images to train the AI system. Deep learning allowed photographs to be rapidly and accurately examined, identifying disease markers and flagging the patient for early intervention. This real-world study is currently assessing the impact, feasibility, and cost-effectiveness of this model and screening of participants is ongoing.

Significance

This study informs the real-world application of the opportunistic, automated screening model and increases the effectiveness with which eye diseases can be identified before becoming symptomatic. The AI screening system has the potential to reduce the proportion of undiagnosed retinal diseases, allow more targeted referrals to ophthalmologists and optometrists, reduce the cost of eye screening in Australia and reduce burden on the healthcare system. The screening process has been successfully implemented and preliminary results indicate that the system has been well accepted, with over 80% of participants agreeing or strongly agreeing that the automated screening report was easy to understand, and referral recommendations were clear. More than 85% of participants were satisfied or very satisfied with the automated screening model and were extremely likely to use the service again. Demonstrating implementation of this screening improves patient outcomes and adds new knowledge and understanding to the management of eye-related diseases that lead to blindness.

Reach

Over 5% of Australians over 55 suffer from at least one of glaucoma, diabetic retinopathy and agerelated macular degeneration, all of which are often undiagnosed. With high rates of avoidable blindness and undiagnosed eye disease and approximately 85% of the Australian population visiting a GP at least once every 12 months, unrelated GP visits provide an ideal opportunity for screening to reach a broad section of the population and reduce disease burden. At the conclusion of the study around 8000 participants will have taken part in the screening process, dramatically increasing early identification of eye diseases, leading to treatment and direct patient benefit. Assuming the project confirms the anticipated benefit of the screening program, national and international level scaling and commercialisation of approach is likely.

Question 2: Platforms and Systems

What platforms or systems has the centre developed to support improved health services?

Part A: STRATEGY

The central mission of MACH is to support research, cross-disciplinary, and cross-institutional collaborations to improve health services. The MACH has established seven subcommittees as platforms to improve health services by identifying both local and national areas of priority. These subcommittees include 1) Care of the Ageing; 2) Clinical Trials and Research Facilitation; 3) Education and Workforce Planning; 4) Health Services and Data; 5) Indigenous Health; 6) Women's and Newborn Health; and, most recently, 7) Infectious Diseases.

These intersecting subcommittees draw on the extensive expertise of multi-disciplinary clinician researchers and academics to define research questions across multiple MACH partners to deliver improved health services. MACH aims to enable cross-subcommittee collaborations, such as: Care of the Ageing with Women's and Newborn Health; and Clinical Trials and Research Facilitation with Education and Workforce Planning. These subcommittee platforms provide a vehicle to bring together world-class experts within MACH partners to produce strong collaborations and novel approaches to identified gaps in health services to better patient care. Importantly, these platforms are often aligned to the national research subcommittee platforms of the Australian Health Research Alliance (AHRA).

In addition, multi-institutional networks focusing on Consumer and Community Involvement and Research Library Services are currently evolving across the MACH network. The MACH Research Platforms Committee, chaired by Prof Kathryn North AC, identifies and facilitates major multi-centre translational research across a range of platforms: Genomics; Bioinformatics; Cell and Biological Therapies; Stem Cells and Regenerative Medicine; Drug Discovery; Digital Health and Clinical Informatics; Medical Devices and Implantables; Population Health Systems and Services; Vaccines; and Immunology and Imaging. The MACH Research Platforms Committee has close links to the Melbourne Biomedical Precinct and the Victorian Government Department of Jobs, Precincts and Regions.

The University of Melbourne's Faculty of Medicine, Dentistry and Health Sciences has also approved a plan to develop a clinical trials unit from existing research support structures to support researchers across MACH partners.



Part B: Case study - Designing a system and network for data driven healthcare improvement nationally.

Challenge/problem

Unwanted practice variation in clinical care leading to worse outcomes is an international problem and is exacerbated by inconsistencies in data linkage and integration, and fragmented data holdings. Jurisdictional differences and lack of interstate collaboration further contributes to this challenge.

Approach/response including significance and reach

A national system and network for data driven health care improvement has been established under MACH leadership working with all NHMRC-accredited translation centres. A national data workshop facilitated by MACH in November 2018 identified priority areas to shape a strategy to effectively tackle these challenges. The top 3 priorities are:

- Creating data incubator hubs within the AHRTCs and CIRHs to stimulate collaboration and partnership
- Integrating large-scale datasets to undertake research and quality improvement across the primary care, acute and sub-acute continuum
- Developing workforce capacity in data use for health care improvement through training at graduate and undergraduate levels across university partners within AHRA

Arising from these priorities, MACH led three key national activities:

- 1. Understanding current data linkage and quality framework activities utilising primary care data, through a primary care data survey. The MACH surveyed over 300 data custodians and data users across a wide range of organisations in the primary and community health sector to develop an understanding of the availability and use of primary care datasets and quality frameworks. Barriers to the better use of primary care data identified included major inconsistencies between data quality frameworks, 89 different primary care data sources with widely varied characteristics, a lack of standard coding systems, limited resources, limitations of clinical software systems and lack of public trust. As a result of the survey, the MACH coordinated a national approach to mapping data linkage work utilising primary care data across the AHRTCs and CIRHs.
- 2. Building understanding and trust in routinely-collected GP data. The primary care data survey highlighted a lack of consistency in approaches to managing data quality in primary care data. This finding was anticipated, and MACH had already been researching data quality frameworks in advance of the survey. MACH has used leading international approaches to advance and adapt frameworks for practical and systematic data warehouse implementation. The framework has been tested in a practical setting against systematically-collected, routine GP data for research. This new knowledge will be published to facilitate translation.
- 3. Data linkage workshop. MACH convened a workshop to lead a national approach to data linkage, data quality assurance and standardisation of primary care datasets, and determine a pragmatic approach. Participants were data custodians such as AHRA partner organisations, AIHW, and Primary Health Networks. Key concerns raised included funding, poor documentation, inadequate processes, uncertain value for GPs, and research waste and inaccurate results from poor quality data. This workshop led to a national strategy.

This workshop overcame a very fragmented field to produce an agreed vision and clearly identified national challenges. Further, the workshop identified the central importance of AHRA to success in this area.

Question 3: Meeting Catchment Needs

How is the centre meeting the needs of its population, including vulnerable groups?

Part A: STRATEGY

With 19 partners, including 10 hospitals, the MACH network provides care for a wide range of culturally and linguistically diverse populations, as well as urban Indigenous communities. The MACH directly addresses the needs of these populations by enabling clinician-driven, translational research within partner hospitals in collaboration with world-class medical research institutes and the University of Melbourne. Healthcare providers identify patient and community needs in consultation with research leaders, primary care, clinicians and consumers (patients and advocates) across a breadth of disciplines.

The needs of vulnerable groups in our catchment are addressed through priority areas set by the MACH in line with MRFF priorities. In response, the MACH has established several subcommittees including those addressing the needs of vulnerable groups such as Care of the Ageing, Women's & Newborn Health, and Indigenous Health with mandates to guide research programs and encourage collaboration across the partnership, including cross-pollination across subcommittees where focus areas overlap. (see Q2 for list).

One example is the MACH's approach to health issues faced by Indigenous Australians through the MACH <u>Indigenous Health Subcommittee</u>. This subcommittee is driven by leading Aboriginal researchers. Projects in this area currently in progress include an exploration of dynamic consent in Aboriginal communities partnering in research.

Other ongoing MACH projects aimed at improving the health of its vulnerable populations, include (see *Appendix 1* for a full list of projects):

- A flash glucose monitoring program for Indigenous Australians with Type 2 Diabetes
- A state-wide approach to preventing hip dislocation for young people with cerebral palsy
- An RCT aimed at reducing persisting symptoms following child concussion
- An investigation of clinical and community service provision for people with disabilities



Part B: Case study - *Melbourne Thunderstorm Epidemic of Asthma: Solving the puzzle – Prof Jo Douglass, Melbourne Health; University of Melbourne*

This research was supported by the MRFF RART program in conjunction with the MACH. <u>Click here</u> for further details.

Challenge/Problem

In 2016, Melbourne suffered a thunderstorm asthma epidemic that led to the activation of disaster codes. Emergency services were overwhelmed and 10 people died, mostly in Melbourne's (relatively disadvantaged) Western suburbs. Currently there is no reason to believe this will not occur again. To be prepared we need to understand what puts certain people at risk of life-threatening asthma, develop treatments and build an early warning system.

Approach/Response

This project had several aims: (a) to determine who is most at risk, (b) to monitor those at risk and track how air quality impacts them, and (c) to extend our ability to provide pollen warnings across additional states in Australia.

To accomplish this, a Victoria-wide telephone survey was conducted, confirming that people with preexisting asthma have increased risk, as do those born overseas. This work was used to advise guidelines issued by the Victorian DHHS to provide treatment recommendations for clinicians and patients at risk.

The work, which is ongoing, also began recruiting patients from six hospitals across Victoria to collect medical data on affected patients and establish a biobank for future research. The study utilises a smartphone app to collect environmental data to connect asthma attacks reported in the patient group. It is an interdisciplinary collaboration that includes clinical partners from multiple sites in Victoria.

Significance

This study enables the Government and health professionals to provide evidence-based, targeted advice to people with grass pollen allergy, including those identified with predictive biomarkers for thunderstorm asthma, on the risks of thunderstorm asthma and to invest in evidence-based treatment and warning systems to avert a repeat of the 2016 disaster. The study also informs guidelines through consumer links to change the way patients with hay fever are managed in primary care and in hospital. TAISAR's data contributes to modelling for future weather events and advocates for the use of a nationwide pollen app for monitoring asthma symptoms and distributing warnings and emergency advice.

Reach

The study has national implications, with aims to expand pollen counting capabilities across several states. In particular, South Australia and Western Australia will have pollen monitoring stations and publicly available pollen data for the first time this season thanks to the TAISAR study, joining systems already in place in Victoria, NSW, QLD and Tasmania. Predictive biomarkers identified can be shared nationally and internationally.

Question 4: End User Involvement

How are end-users, particularly consumers and clinicians, setting research directions or otherwise actively involved in closing the loop between clinical practice and research?

Part A: STRATEGY

The MACH is committed to increasing end-user engagement across all its activities to close the loop between clinical practice and research. The MACH achieves this in a number of ways including by supporting a broad range of clinician researcher- and subcommittee-led projects that address areas of local and national priority informed by consumers.

In addition to supporting projects, the MACH is further strengthening links with all end-users, particularly consumers, by:

- holding consultations with consumer engagement representatives across the MACH network;
- endorsing and encouraging uptake of principles for consumer and community involvement in health research across all MACH partners;
- revising these principles with other AHRA centres;
- linking training and resources across partners for health care providers and researchers on how to engage consumers and community members in research;
- evaluating existing consumer engagement programs found across the MACH network, e.g. the Walter and Eliza Hall Institute's Research Buddy Program, for potential modelling and scaling up;
- including consumer representatives on MACH subcommittees;
- engaging with consumer and community as a RART funding criterion;
- developing closer affiliations with Monash Partners and all six Victorian PHNs;
- having recently established a Primary Care subcommittee of the MACH Board to increase primary care research engagement across the care continuum.



Part B: Case study - MACH-WEHI Research Buddy Program Evaluation Project

Challenge/Problem

Australian health and medical research lags behind its international counterparts in engaging endusers (especially consumers) in the research process. Researchers are often unsure how to best incorporate a consumer voice in conducting their research. There are pockets of established end-user engagement, but they remain unknown to the broader research community and most have not undergone formal evaluation.

Approach/Response

In response to this problem, in mid-2019 the MACH will begin a feasibility project studying the success of, and barriers and enablers to the Walter and Eliza Hall Institute (WEHI) Research Buddy Program. This program matches a WEHI scientist with a consumer who has experience relevant to the scientist's focus. These scientist-consumer buddies have regular meetings and ad hoc reviews at various stages throughout research projects. Anecdotally, this program has been well-received by both consumers and researchers. Researchers have noted consumer input has enriched their research.

This MACH research will employ a mixed-methods analysis including participant (researcher and consumer) interviews, surveys across stakeholders (researchers, consumer buddies, external consumers), across research streams. Using formal implementation metrics, data gathered will be assessed and synthesized into key recommendations.

Anticipating that our study will demonstrate that the WEHI Research Buddy program is successful, MACH intends to work with WEHI and then AHRA groups to develop a model for scaling up across other MACH partners and nationally through AHRA's Consumer and Community Involvement Steering Committee. Crucially, a consumer advisory panel organised by WEHI will oversee this project.

Significance

Formal evidence garnered from one of the country's premier research institutes would hold great weight with other MACH and national partners. We foresee the potential for wide adoption of the WEHI model. The MACH anticipates leading workshops to help implement the WEHI model across our partners. An easy-to-follow model would also make strides towards Australia achieving international parity in consumer engagement. MACH views integrating consumers into research design and management as a priority and anticipates that consumer engagement will also be routinely incorporated into Australia-wide research governance. This study's outputs will represent new knowledge in this field.

Reach

The WEHI model would be highly adaptable to the individual needs of institutes and therefore has important national significance. Through AHRA, the MACH has a natural avenue for national dissemination. The findings of this MACH research are readily publishable.

Question 5: Workforce

How is the centre building workforce capacity and capabilities in research and translation to ensure health professionals have access to evidence-based education and training and are contributing to health research?

STRATEGY

MACH is committed to building workforce capacity and capabilities demonstrated by its wellestablished <u>Education and Workforce Planning Subcommittee</u> with member representation. The scope of the subcommittee is to address unmet workforce needs and capacity building requirements. An example of activity conducted by the subcommittee is a recent workplace learning symposium entitled 'Cultivating a Safe Working Environment'. This symposium showcased programs conducted by each of the MACH members reporting on successful implementation and shared learnings.

In addition, a pilot study being conducted under the auspices of this subcommittee called 'Safety and Rescue' will enable mutual recognition of mandatory training in Acute and Basic life support, aseptic technique and hand hygiene. It was identified that significant medical resources were wasted repeating training and administrative resources wasted obtaining training confirmation from different health services. The aim is for centrally stored and easily accessible training records across multiple health services. This module will be offered online as an e-health training option, reducing overhead costs and making it easily accessible to clinicians at the time of their choosing.

Further to this, MACH has specialist subcommittees (detailed in Question 2) which have the remit to identify needs and conduct activities and workshops for capacity building. Workshops take place regularly and have included an annual <u>Study Coordinator Symposium</u>, Trial Design Workshops and a Clinical Informatics Workshop. This programme will continue and expand as additional gaps are identified. Surveys are conducted following each workshop to measure impact and success. The University also offers research support in statistics and health informatics to enhance research capability, while the MACH is exploring methods to gain expertise in improvement and implementation science.

MACH is currently funding protected research time through MRFF-RART for early career/emerging leaders to gain research expertise. Further, MACH is currently developing a capacity building programme in conjunction with the University of Melbourne's Driving Research Momentum initiative which formalises training for our up-and-coming research fellows.



Question 6: Partner Contribution

How are the partners of the centre contributing to its operation?

The MACH is an unincorporated joint venture between ten major Victorian healthcare services, eight leading biomedical research institutes and the University of Melbourne. The MACH is formally administered by the University of Melbourne on behalf of all members and has two key levels of governance – a Council and an Executive Board. The Council is the top-level authority for the MACH and is made up of representatives from all MACH members, and is led by an independent Chair. MACH Council has strategic, governance and financial oversight of the MACH and is responsible for the establishment of the Executive Board and the appointment of the Executive Director.

As recognised in the MACH's joint venture agreement, partner contribution is central to the operation of the MACH. In addition to providing and conducting world-class healthcare and collaborative translational research, MACH partners provide expert representation across committees, subcommittees, working groups and networks at the local (MACH) and national (AHRA) levels.

MACH members contribute in-kind operational and infrastructure support to ensure the success of local and national projects and activities. The University of Melbourne provides all housing and indirect costs in kind for the MACH Executive and operational team. MACH members provide a further \$890,000 per year in membership fees for operational costs.

Question 7: Clinical Trials

Have you improved processes (e.g. ethics and/or governance arrangements) so that your patients can access clinical trials more easily and/or sooner?

The MACH has established a <u>Clinical Trials Subcommittee</u> and the Research Excellence Committee (REx) to improve governance and ethics arrangements across the partnership with the aim of improving patient access to clinical trials. MACH is also working closely with the Victorian Comprehensive Cancer Centre (VCCC) on these programs, including teletrials. MACH is partnering with Monash Partners to enhance clinical trial accessibility within Victoria.

Activities to include:

- Staggered Human Research Ethics Committee (HREC) meetings to ensure there is an adult National Mutual Acceptance HREC each week
- Producing an investigator-initiated trials toolkit to assist researcher setting up trials
- Dynamic consent development for Indigenous participants
- Developing guidelines on sponsorship of clinical trials
- Establishing standardised and streamlined HREC processes
- Pilot programme through VCCC implementing Site Docs trial master file electronic system

Annual Study Coordinator Seminars

Commencing in 2016, MACH has conducted annual study coordinator seminars to educate research coordinators on new initiatives in clinical research and to provide uniform education on new guidelines, such as the NHMRC Safety monitoring guideline from November 2016. These seminars are well attended with over 130 study coordinators attending each year.

Table 1 – Measures/metrics of success

		1 – Better care	2 – Platforms and Systems	3 – Meeting catchment needs	4 – End User Involvement	5 – Workforce	
Measures/Metrics of success		1, 2, 3, 5	1, 2, 4, 8	1, 5, 7, 8, 11	1, 3, 5, 6, 8	9,10, 12	
LIST OF MEASURES/METRICS							
1.	1. Number of health service partners that have adopted and implemented (specific) evidence- based care						
2.	2. Number of processes, procedures, treatments or devices streamlined or eliminated						
3.	Number of partners that have implemented the (specific) process, procedure, treatment						
4.	Number of agreements in place with other AHRTC and CIRHs for data linkage, data security, access and management systems						
5.	 Number of research priorities identified by end-users (differentiate between consumers and health professionals) Proportion resulting in research projects 						
6.	6. Number of end-users involved in design of implementation strategies						
7.	7. Number of initiatives that engage Aboriginal and Torres Strait Islander community and consumers or other vulnerable groups to inform research priorities and translation activities						
8.	8. Number and reach of collaborative networks across the partnership and beyond the partnership that bring together academic, health service and education providers						
9.	9. Number of health professionals (including managers) with research competencies and capabilities in centre partners						
10. Number of health professionals with translation and implementation competencies							
11.	11. Number of clinicians involved in research (co-design, undertaking, leading)						
12. Number of mentorship initiatives/activities							

Appendix 1 – List of MACH MRFF RART-funded projects

MRFF RART Round	Lead Investigator	Project Title
1	Jo Douglass	Melbourne Thunderstorm Epidemic of Asthma: Solving the puzzle
1	Ming He	Integration of retinal photography and artificial intelligence to build opportunistic screening services in primary care settings
1	Andrea Maier	Enhancing Muscle POWER in Geriatric Rehabilitation: EMPOWER-GR
1	Ingrid Scheffer	Developing precision medicine for the epileptic encephalopathies
2 (Stage 1)	Andrew Bivard	Tenecteplase versus Alteplase for Stroke Thrombolysis Evaluation Trial in the Ambulance (TASTEa)
2 (Stage 1)	Luke Burchill	Closing the gap on Indigenous cardiovascular (CV) health: Improving community outcomes through high impact policy relevant research.
2 (Stage 1)	Adam Deane	Liberal glUcose Control in critically III patient with pre-existing type 2 Diabetes (LUCID): a phase IIB multi-centre parallel group randomised clinical trial
2 (Stage 1)	Gustavo Duque	Integrating Osteoporosis in Primary Care: The Osteoporosis Risk and Management (ORMA) Project
2 (Stage 1)	Harriet Hiscock	Improving the care of children with frequent asthma admissions through partnerships with hospitals, GPs, and families.
2 (Stage 1)	Craig Nelson	Future Health Today Project-Co-design of Prototype
2 (Stage 2)	Vicki Anderson	Reducing persisting symptoms following child concussion - a randomised controlled clinical trial.
2 (Stage 2)	Amy Brodtmann	Preventing post-stroke dementia and brain atrophy with exercise: The Post Ischaemic Stroke Cardiovascular Exercise Study (PISCES)
2 (Stage 2)	David Castle	Evaluating the impact of a psychological intervention to reduce the severe stress and psychological morbidity of people with chronic kidney disease: The Kidney Optimal Health Program (KOHP): Stage 2
2 (Stage 2)	Elif Ekinci	Can flash glucose monitoring improve blood glucose control in Indigenous Australians with type 2 diabetes?
2 (Stage 2)	Nicola Lautenschlager	Physical Activity in Aged Mental Health Services: Physical activity guidelines implementation for aged mental health community team consumers at Melbourne Health and St Vincent's Health
2 (Stage 2)	Jeannette Milgrom	Clinical Decision Support Integrated with e-Screening for Postnatal Depression
2 (Stage 2)	Allison Milner	Clinical and community service provision for people with disabilities: Investigating the perspectives of the health care workforce and their clients
2 (Stage 2)	Dinah Reddihough	Hips on Track: A state-wide approach to preventing hip dislocation for young people with cerebral palsy
2 (Stage 2)	Dennis Velakoulis	Clinical utility of plasma neurofilament light chain in the diagnostic screening of psychiatric and neurological disorders: An "ESR" for the brain?





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