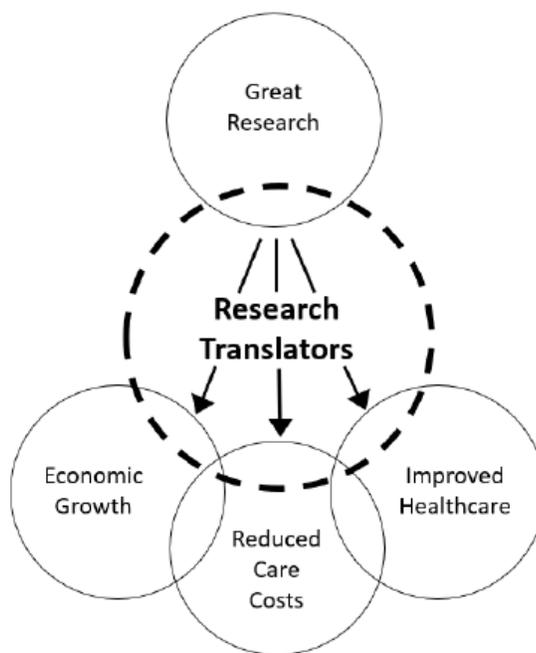


RESEARCH TRANSLATORS: AN ASPIRATION FOR MACH, VICTORIA AND AUSTRALIA

The primary purpose of the MACH alliance is the translation of interdisciplinary research that will benefit patients and strengthen the economy. In the case of health and medical research, “translation” is the complex process by which research is moved (translated) from the library and the laboratory to the clinic, the community and the company. This short article rehearses the case that Victoria and Australia should find ways to invest in funded time for **“Research Translators”**. These are skilled front-line clinical care staff who conduct and champion the translation of health and medical research to achieve better healthcare, reduced care costs and economic growth through successful commercialisation (see Figure). By contrast with competing health economies overseas, such as the UK, USA and Singapore, Australia has yet to invest at scale in such staff. Indeed, because of internationally-leading strengths in other parts of the research and translation pathway, Research Translators seem to be a “missing link” in Australia.

Figure:

Research Translators: The missing link in the health economy



Research Translators:

- Serve as front-line members of all caring professions
- Prove the practical relevance of research to service
- Champion adoption of public and private innovation

What are Research Translators?

The most culturally challenging gap in translation is the difficulty in moving research evidence into practice. In the UK, for example, this has been achieved at scale by investing through the English National Institute for Health Research (NIHR). This funding body commits ~\$10 *pa* per citizen in a cadre of Research Translators embedded in major hospitals, with an additional ~\$3.3 *pa* per citizen being invested in smaller regional hospitals and community-based services (1). Across the English system, which serves a population of 55 million, about 15,000 staff are supported at an average of about 0.5 FTE per staff member – the usual model is to combine work in a front-line clinical discipline with research translation.

Time funded for Research Translators is deployed as needed across all professional groups and focused exclusively on research and translation in health services. Such leadership is not restricted to doctors; it is crucial that there are also Research Translators amongst nurses, allied health professionals, pharmacists, clinical laboratory staff and medical informaticians, to name but a few of the healthcare professional groups needed. By undertaking research and translation in the clinical “front-line”, such staff prove the practical relevance of research to the health service setting and provide the evidence and leadership to champion the beneficial adoption of research findings into practice.

An example of the beneficial impact of Research Translators, which the author sponsored, was successful translation of research into a new cross-system care pathway for sudden heart attack (acute myocardial infarction or MI) now the standard of care in Edinburgh (UK): Patients with acute chest pain are attended by an ambulance, their ECG is telemetrically transmitted to the coronary care unit, an ECG diagnosis of acute MI is made and the ambulance team is instructed by its controllers to bypass the emergency department, taking the patient directly to the cardiac catheterisation suite for an immediate primary coronary intervention. This pathway ensures that pain and loss of heart muscle are definitively terminated in a median time from onset of pain of just under 90 minutes with the patient returning home soon after. This represented a very dramatic improvement over the pre-existing pathway and is comparable to the best services worldwide. To secure adoption of this pathway, time and evidence were required from Research Translators embedded in the health service and funded part-time by government. These staff included ambulance paramedics, hospital IT staff, cardiac electrophysiologists, coronary care nurses, consultant cardiologists, pharmacists, operating department staff, biostatisticians and health economists. Not only did these health service professionals provide “proof of relevance”, gathering key data to demonstrate that the proposed evidence-based changes would indeed work in the Edinburgh health system, but these staff were also champions for the new care pathway, educating their fellow health service professionals in how to make the changes become a new, sustainable standard of care.

Furthermore, competing economies have also used expert Research Translators to address the other key gap in the pathway to successful translation – moving discoveries from both “wet” and “dry” laboratories into clinical development. Internationally, research funders have concentrated on providing the monies needed to make new discoveries. However, governments are now realising that specific investments in addition to research funding are needed to achieve translation of health science discoveries into improved health and wealth. For example England has, through the NIHR, dedicated a further \$6 *pa* per citizen to a second cadre of Research Translators housed in **Biomedical Research Centres** embedded in leading university hospitals. These have very successfully engaged affiliated universities to attract public and private investment, engage industry and accelerate clinical development of basic research discoveries (1). In England BRCs employ ~2,200 Research Translators,



many full time, who are expert in activities such as therapeutic target validation, high throughput screening, development of new diagnostic technologies, experimental medicine and first-in-patient trials, clinical trial design, biostatistics, data analytics and the many other expert disciplines needed to transform a discovery into a new therapeutic, diagnostic or preventative prospect. In particular, a successful translational system requires focussed capacity and expertise in intensive early clinical trials involving highly characterised hospital patient volunteers. Such translational effort is essential for proof of concept and proof of relevance work on therapeutic and diagnostic prospects emerging from laboratory research.

Opportunities for strengthening translation to improve healthcare in Victoria

Victoria hosts Australia's largest concentration of publicly-funded health and medical research, with about 45% of Australia's investment in this domain coming to the State's research intensive universities, medical research institutes and health services. For example in the 2020 round of NHMRC Investigator Grants, nearly 30% of total value was awarded to applicants employed by MACH member organisations. Indeed, Victoria has the critical mass of highly skilled staff needed to develop a world leading health and medical research ecosystem – 20,000 staff in universities, MRIs and health services, and 30,000 staff in sector businesses (2).

MACH-affiliated health services have successfully supported translation of innovative Victorian research to improve healthcare. The impacts of this work include new models of care (eg rapid thrombolysis for acute stroke, RMH-UoM); new medicines (eg venetoclax for blood malignancies; RMH-WEHI-AbbVie/Genentech); new cell therapies (eg CAR T-cells for leukaemia; PeterMac-Cell Therapies); new diagnostics (eg saliva test for SARS-CoV-2; RMH-UoM via Doherty); and new devices (eg ICU COVID patient isolation hood, Western-UoM). This work has depended critically on translation undertaken by front-line doctors, nurses, allied health professionals (eg radiographers), clinical laboratory staff and pharmacists. However, such translational support was only possible because of time-limited research grants from sources including governments, industry and philanthropy; the health service staff involved have not been able to work long-term in research translation.

Indeed, because of the lack of dedicated recurrent investment, clinical staff with time funded to focus on research translation are conspicuous by their absence in Victorian Health Services. About 1,300 staff working at 0.5 FTE would be needed to match the English investment in proportion to the population, with ~1,000 in metropolitan Victoria (about 500 across MACH) and ~300 in regional Victoria. Staff with the necessary skills can be identified as exemplified above; but what is missing is the funded time to allow these front-line staff to lead and champion Research Translation. In particular, to secure improved healthcare with greater speed and reliability there is need for time from Research Translators with skills in clinical care (i.e. **clinician researchers**); **clinical trials** design and delivery; **medical data** integration; **clinical laboratory analysis** and **pharmaceutical practice**.

Economic growth from investment in translation of health and medical research

Health and medical research in Australia is excellent value for money with an overall benefit-cost ratio (BCR) of ~ 3.9 (3). However, compared with competing economies, this encouraging multiplier masks under-performance in the delivery of economic growth derived from commercialisation of such research (4). Australian biomedical research delivers financial benefit at a ratio of 2:1 in favour of reduced health costs vs increases in GDP from commercialisation of research. However in the UK, for example, a broadly similar biomedical research and innovation ecosystem delivers GDP gain



approximately 4 times more efficiently with a 1:2 ratio for healthcare savings vs wider GDP spillovers (5,6).

This superior economic performance reflects investments made by the UK, as for a number of competing nations, to address the key translational gaps highlighted above (7). For example, the NIHR Biomedical Research Centre (BRC) initiative has delivered impressive benefits. In UK financial year 2017/18, BRCs levered £1.148bn in external research funding compared with government investment of £165.5m (a 6.9-fold return); supported 1,149 industry contract studies and 621 industry collaborative studies; filed 199 patent applications and had 237 applications granted; and generated £28.2m in revenues from exploitation of intellectual property to reach a total of £255.5m of such revenue with 67 spin-off companies winning additional revenue over the 8 year period from 2009/10 to 2017/18 (1). The broader economic benefits of such investments in translation are already evident from UK economic experts reporting a four- to seven-fold return on such investments in less than a decade (refs 5,6,8) changes in economic indicators can be detected more rapidly than those in health indicators, which have a longer timescale, although improvements in healthcare are now becoming sustained (9). Economic benefits include positive spillovers, “crowding in” of private sector funding and reduced service costs.

A 2018 report from ACIL ALLEN consulting to Victorian government (10) confirms that these general principles apply to the Victorian economic ecosystem. Thus in 18 years from 1999/00, Victorian Government invested over \$2bn into the Medical Technologies and Pharmaceutical Sector (much into academic environments). For every \$1 of Victorian Government investment, Victorian income over the 18 year period was \$4.54 greater than it would have been if the funding had been allocated to general government expenditure; the real income of Victoria benefitted by a cumulative total of \$10.89bn (with a net present value of \$16.08bn, using a 7 per cent real discount rate).

Conclusion: Research Translators as an aspiration

Should the necessary funding be identified, MACH would be well placed to lead the introduction of Research Translators to health services in Australia and demonstrate the benefits of such an investment. MACH brings together two communities key to successful translation of health and medical research - (a) health services and (b) researchers in leading universities and medical research institutes. Furthermore, the MACH alliance potentially offers a “one stop shop” for collaboration with innovative healthcare companies. Competing economies have deliberately formed constructs very similar to MACH to translate health and medical research en route to adoption in the clinic and scale-up in the company. MACH has the aspiration to participate in piloting Research Translators in our state and nation.

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