

Public consultation for the New Zealand Health Research Strategy discussion document – collated views from Fellows and Constituent Organisations of the Royal Society of New Zealand

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This is a collation of views from Fellows and Constituent Organisations of the Royal Society of New Zealand on the discussion document guiding the further development of New Zealand's first health research strategy. The strategy will set out a vision, mission, guiding principles and strategic priorities for health research for the next 10 years. It will also contain specific actions to ensure a collective move towards achieving the vision. The questions in the discussion document reflect points of interest to help develop the strategy.

The purpose of the health research strategy is to generate more value from investment in health research. The recent review of the Health Research Council noted the lack of strategic direction for the health research and innovation system in New Zealand, and the potential to generate more benefits for the country. It also found that connections and coordination between government agencies, health researchers, end users and the commercial sector could be strengthened.

1. Does the proposed vision capture what you see as the desirable future state for health research in New Zealand by 2026?

The public discussion document provides an excellent starting point to inform the development of a New Zealand Health Research Strategy, and the inclusive nature of the vision and its broad goals should be supported. However, this is a comprehensive vision statement and the current vision needs to be simplified and generalised (see Question 2 below). The first bullet point of the proposed vision for 2016 could also be changed from "meaningful contribution" to "meaningful, evidence-based contribution".

Further, a great opportunity to enhance health research, population health outcomes and achieve cost-effective system-wide delivery is to focus on achieving equity - health equity should be defined and explicit in the vision and mission, as well as in the guiding principles and the strategic priorities.

2. Are there additional aspects that you think should be included in the vision?

The proposed vision in the discussion document reads: "New Zealand will have a more dynamic, well connected and world-leading health research and innovation system that markedly improves the health, social and economic wellbeing, of all New Zealanders" with seven different bullet points.

It would be better, however, if the vision was simplified and generalised, for example:

1) *To create a health research system that supports research that is likely to improve health outcomes, such as:*

- (i) saving the lives of New Zealanders, and/or
- (ii) improving New Zealanders' quality of life, and/or
- (iii) ability to contribute to society, and/or
- (iv) reducing New Zealand's healthcare costs.

2) *To support the development of New Zealand-based and internationally competitive healthcare-related industries.*

These two areas are currently included in the vision, but the genuine potential conflict between them is not acknowledged. The commercial aspects of health research innovations are advocated with a suggestion that there should be 'widespread use and adoption' without due consideration of efficacy, safety, or cost-effectiveness. These elements should be explicit provisos.

The core problem is that healthcare-related technologies are often expensive, and adopting such technologies without careful evaluation of whether these technologies improve outcomes risks driving up healthcare expenditure. In order to manage healthcare costs, New Zealand could benefit from creating a system that supports researchers to conduct investigator-initiated research using New Zealand technologies. High-quality, independent research demonstrating that such technologies improve patient outcomes, is probably the most effective pathway to ensuring the adoption of technologies in New Zealand and around the world.

Further, a greater emphasis might be given to economic / commercial benefits beyond technological innovations to include New Zealand-based pharmaceutical, nutraceutical, complementary and alternative medicines, based on and derived from New Zealand's primary industries, with particular emphasis on properly controlled evidence-based assessments of nutraceutical, complementary and alternative medicines to establish benefits (if any) and risks. In any event, where the main purpose of research is the commercial benefit, this should be assessed in competition with other MBIE or MPI proposals -- both so that the economic and commercial potential gets proper expert consideration, and so as to avoid diverting health research funding away from establishing true medical, nutritive and clinical benefits.

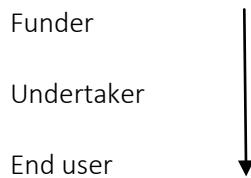
The vision could also be improved by making it more inclusive. For example, the statement that 'clinicians' should be involved in health research is unnecessarily narrow. It would be preferable for the vision to state that 'healthcare professionals' and 'healthcare organisations' should be involved, and not just 'clinicians'. Similarly, highlighting "engineering" in the proposed vision as a target for collaboration is maybe unduly narrow for an overarching document such as the strategy. Taken together, the vision statement could be reworded from "clinicians actively involved in health research, enabling effective translation of research results" to "clinicians, healthcare professionals and healthcare organisations actively involved in properly validated health research, enabling effective translation of research results."

The vision should also focus on achieving equity, beyond the currently proposed universalist approach 'of all New Zealanders'. While it is defined in a footnote that the word 'all' reflects the need for a fair and responsive health system that reduces disparities in health outcomes for key groups, including Māori, Pacific peoples, and disabled people, health equity should be defined and explicit in the vision and mission, as well as in the guiding principles and strategic priorities.

3. Does the proposed mission capture key contributions and roles that are needed to achieve the vision – if not, what do you think should be included?

The mission should reflect the contribution and main roles of the various contributors to the health research system in working towards the vision. There needs to be a stronger recognition of the broader determinants of health, and therefore the need for prioritised health research that supports cross-sectoral health promotion and primary prevention. This will align better with the NZ Health Strategy and ensure that there is meaningful collaboration across health, education, environmental, social and non-government sectors. Education sector involvement in the approach is also missing.

The proposed contributions from various actors are to some extent reflected in Figure 1 (Contributors to New Zealand's health research and innovation system) but the diagram is rather simplistic and does not accurately indicate the degree of overlap or multidisciplinary nature of collaborative research undertaken in New Zealand. A different format for presenting these data may be preferable, such as simply listing the different research funders, research organisations, and end users, to illustrate the breadth, depth and collaborative nature of the research scene in New Zealand.



The relationships are typically not as linear as in the example above, but will rather extend in different directions and connect a variety of actors. The National Science Challenges are an example of such networks that could describe consolidated efforts to draw on existing research structures and strengths in the system to achieve a greater good.

Further, it would be useful to extend the illustration to also include national and international collaborations emanating from specific health research disciplines, to identify where New Zealand has strengths. This could be informed by bibliometric measures of output, such as those included in the Health Research Council (HRC) Refresh report.

4. Do these proposed guiding principles clearly state the operating principles and values that are needed to achieve change over the next 10 years?

The “proposed guiding principles” are currently uncoupled from the “proposed mission” and as such, the guiding principles are actually devoid of any principles, and more about process.

5. Do you think additional guiding principles are needed?

No response.

6. Taken together, do you think the proposed vision, mission and guiding principles will set the framework for a more cohesive and connected health research and innovation system?

Although the proposed vision and proposed mission are tightly linked and generally fairly specific and likely to promote, with some modifications, a more cohesive, connected and ambitious health research and innovation system, the guiding principles are currently devoid of any principles or rationale, which is also visible further down in the structure (see strategic priorities).

7. What do you think should be the focus of the strategic priorities in the health research strategy?

A rationale for developing the strategic priorities in the draft health research strategy / public discussion document must be developed. It will be important to the success of the strategy that there is an evidence-based process that is valid and rigorous in developing the strategy in general, and the priorities in particular.

The focus of the strategic priorities should be on addressing health care issues that are common, have the greatest impact on health outcomes and for which the potential to reduce this impact is high. Strategic priorities should include groups within the population for whom the issues are most common and impacting. This will ensure that Maori health disparities are given a priority.

Data on the burden of disease is vital to this process and it will be important to use QALYs and DALYs and their equivalent common metrics in allow comparison between different strategic health priorities. Priorities should be set for example by using data on major causes of hospital admissions, and New Zealand disease burdens and costs of this, using standardised validated data.

The strategic priorities will also need to find a balance between research that addresses current issues and that which seeks to prevent future issues. Within a capped research budget the balance must be struck between research into preventative measures, with long-term uncertain outcomes, and research into pressing and immediate issues.

Strategic priorities must also take into account the available capacities and capabilities of researchers and research groups within NZ. Building on our strengths is important. Setting a priority that cannot be readily addressed might be wasteful. In the innovation sector, strategic priorities need to have the potential to lead to wealth creation for improved health and social and economic well-being of all New Zealanders. This means that a substantial portion of the total investment in health research is in fundamental biomedical research, research that might lead to new drugs for cancer, new antibiotics, new understanding of the basis of diseases, both chronic and acute, and new monitoring devices.

Ultimately, the strategic priorities need to effect a cultural change in New Zealand towards health issues, such as immunisation, fluoridation, obesity (and consequent diseases) and mental health, in order to achieve better health outcomes and improve social and economic wellbeing of all New Zealanders.

There should also be a strong focus on achieving equity - while it is defined in a footnote that the word 'all' reflects the need for a fair and responsive health system that reduces disparities in health outcomes for key groups, including Māori, Pacific peoples, and disabled people – a specific strategic priority on equity would provide the opportunity to prioritise scientific (health, education, social, cultural) research that provides evidence of effective ways to achieve equity. The Treaty of Waitangi should be included in the strategy as it will provide weight to the ongoing strategic and prioritisation process.

The health research sector further needs to have capacity and resilience to cope with a pandemic in terms of rapidly developing testing and means of control, if not treatment. This is also where connections to the agricultural sector are potentially synergistic (as in Kiwifruit Psa invasion). Being ready for the next health surprises (influenza, highly pathogenic new bacterial strains, especially highly pathogenic fungal strains; new vectors for carrying pathogens) will be essential.

It is important that the health research community has the opportunity to make a substantial contribution to the development of the strategic priorities. There is the risk that public consultation, which is essential, may have undue influence through strong interested parties and individuals. Government has an important role in ensuring sectoral interests are avoided and in promoting a vigorous and effective research community that is not stifled by political agendas.

It is further vital that research without an obvious or predictable outcome is also supported in the strategic priorities. Such research is vital for innovation and research that challenges conventional wisdom across a wide range of research fields and disciplines. For these reasons, more detail is currently required regarding what is proposed, the criteria / methodology to be used, methods of transparency and how it would avoid bias / inappropriate influence from individuals / organisations with potential conflicts of interest.

8. What do you think of the example strategic priorities?

The example priorities are relevant, but there is a lack of rationale for developing the priorities in the draft health research strategy / public discussion document (see Question 7).

9. What specific actions could help us achieve the strategic priorities you have identified?

See above – the actions would follow from the set priorities.

10. How could health research best support the directions of the New Zealand Health Strategy 2016?

1. Develop strategies to lead and implement personalised medicine research.

We can not ignore the personalised medicine revolution that is occurring in health research and practice, across the whole spectrum of diseases and disabilities. There is considerable work to be done to establish facilities that allow routine collection of genomic and epigenetic data from patients in hospitals and the community to guide current and future health care, tailored to the individual.

The research opportunities are massive and it will significantly disrupt current approaches to investigation and treatment. This applies to both communicable and non-communicable diseases. One of the rate-limited steps in New Zealand is the availability of sufficient numbers of clinical geneticists and bioinformatics expertise.

2. Develop and support the clinical trials infrastructure

There are significant gains to be made from supporting clinical trial research infrastructure. This includes clinical research staffing, database management and biobanking. Supporting clinical trial infrastructure through trials networks in all clinical disciplines would make New Zealand a more attractive place for pharmaceutical company investment and would create an environment where clinicians could collaborate with New Zealand and international biotechnology companies to create high-quality clinical evidence that is essential to reap the economic benefits of innovation.

The expansion of the HRC Clinical Research Fellowship program should be strongly endorsed and further expanded, as the leadership of clinical trials is fully dependent on this workforce. This infrastructure should also support health outcomes, safety and quality, and patient-centred outcomes research. Initiatives in these areas exist, but much more could be done to coordinate these important dimensions and to include them as part of strategic priorities.

Moreover, the HRC could also collate a list of suitable projects funded by overseas agencies so that New Zealand clinicians could decide which research projects were the most relevant to their clinical sphere. This strategy would be an effective way to increase clinician engagement in research, and allow the HRC to devote their resources to research initiated by New Zealand investigators.

3. Enable more multi-centre international randomised controlled trials

Many urgent clinical questions with the potential to change practice and outcomes can only be answered through multicentre randomised controlled trials. New Zealand is often disadvantaged by low patient numbers for the conduct of randomised clinical trials. This can be countered by multi-centre collaborative studies. And these often need to be international, which requires an extra level of support.

It is important that the levels of evidence provided by the different types of research are acknowledged, because the ability to inform and change clinical practice is very different. Randomised controlled trials (RCTs) provide the highest level of evidence, and for many of the key questions that have the potential to change clinical practice, high quality RCT's are essential.

The Netherlands provides an excellent national example, across multiple fields of clinical and translational research, of how a smaller nation can make substantial contributions through the provision of level 1 evidence (randomised controlled trials). At a fundamental level the culture of clinical research is engendered through the training systems of clinicians and through the expectations of employers regarding participation to clinical research.

4. Set up structures for harnessing research outcomes in the clinical space

An important question is how to operationalise research outcomes in the clinical space (from RCT studies and others). No clear statement is made in the discussion document regarding the relative importance of the integration of disease-specific assessment and management guidelines – is this a priority? There is currently a lack of cohesion within the system, and consideration needs to be given to a national guidelines group, such as was previously the case with the Ministry of Health.

Clinical translation and implementation of research outcomes are different sciences and complementary. Efficacy demonstrated in a clinical environment is not the same as establishing sustainable change in practice and outcomes. Implementation science is relatively new but vital for the future of health research. These are sciences in their own right, and expert leadership is required.

The evaluation and adoption of medical technologies is not done in a systematic way. Pharmac is now involved, but the effectiveness is yet to be established. The HRC could assist in the funding of evaluation studies that ensure that the best alternatives are delivered to most appropriate cohorts in a limited number of centres able to carry out these studies.

5. Acknowledge the importance of social research as a part of health research

There is insufficient recognition of the important role that the social sciences have in meeting the vision of the strategy. This absence occurs throughout the discussion document but is clearly signalled on page 2, where it states that: "Health research includes biomedical sciences, public health, clinical and health services research". Research in the social sciences should be included here, too. It may be implied in the document that social science health research can be incorporated as a subset into some of these domains of health research (for instance, social medicine has a strong sociological component, merged with clinical perspectives). However the important contribution of medical and health sociologists, anthropologists, political scientists and others currently remains insufficiently acknowledged.

There is also a need to acknowledge important contributions to health research from evaluation methodology, other quantitative and qualitative tools, Kaupapa Maori research, and research within the other sectors that are important for the determinants of well-being (including environmental and educational).

6. Ensure continued funding and management of unique data from New Zealand's longitudinal studies

The strategy needs to acknowledge those New Zealand's longitudinal studies that have a strong health component (see further Question 14 for a description of these).

7. Adopting the HRC model

It may be preferable to adopt the HRC model more widely, in which the rationale and potential to improve health outcomes are major components of the assessment process.

8. Identify the role of system leadership and governance in promoting, targeting and using research

Understanding and analysing the machinery elements of the health system is key to successful reform and improvement – health system-wide organisational structures including governance structures and effectiveness need to be understood and fit for purpose. In this context, the organisational structure of the health system itself is an important area of research, to ensure that the system is fit for the purpose of delivering improvements in the health, social and economic well-being of all New Zealanders.

11. Where do the challenges and opportunities lie for health research in New Zealand?

Opportunities

The proposed vision - to create a health research system that supports research that has the potential to improve healthcare outcomes, and to support the development of New Zealand-based and internationally competitive healthcare-related industries - address two main areas for potential and opportunity. The commercial aspects are advocated with a suggestion that there should be 'widespread use and adoption' without due consideration of efficacy, safety, or cost-effectiveness.

The challenge here is that healthcare-related technologies are often expensive, and adopting such technologies without careful evaluation of whether they improve outcomes is simply a recipe for driving up overall healthcare expenditure. In order to manage healthcare costs, New Zealand needs to create a system that supports researchers to conduct investigator-initiated research using New Zealand technologies. High-quality, independent research demonstrating that such technologies improve patient outcomes is probably the most effective pathway to ensuring the adoption of technologies in New Zealand and around the world.

New Zealand's remote location need not be a disadvantage for our opportunities in developing high-value products for e-medicine and IT. New Zealand further has immense opportunities to develop the links between the biological community, the manufacturing sector and food industries and health care, whether that is sustainable production of healthy food (both plant and animal), production of value-added products (from plants and animals) that are designed to improve human health, or reducing the

impact of food production on human health (e.g. better control of campylobacter in chickens or reduction in use of antibiotics in farm animals).

There could also be some acknowledgement of entities involved in health research with a NZ-unique capability in food safety/HVN/nutraceuticals and marine bioactives as pharmaceuticals. This endorses some aspects of the proposed vision re opportunities for growing high value exports linked to world-leading research and collaborations, as well as preventing food-related illness and death in NZ. One main actor in this field is Cawthron, which has collaborations with Malaghan and Christchurch Clinical Trials Trust and network, through to European multinationals.

Challenges

One of the challenges for health research in NZ is the structure of the health system. The ability to readily transfer new knowledge around rare and complex diseases to centres of excellence is now hampered by the fractured DHB structure. The MRC in the UK funds units that combine excellent clinical care with excellent research. The government, over a decade ago, mandated regionalised care. The centres provide vital leadership, guidelines for care, and opportunities for training. These centres of excellence not only improve health outcomes but they promote and facilitate clinical and basic science studies.

The HRC needs to look seriously at how it can promote leadership, ensure high quality research and deliver improved health outcomes through the establishment of funded centres of clinical and research excellence.

Another challenge is infrastructure for research activities. Government and funding agencies have to fully support necessary infrastructure - the current policy of 50-50 partnerships, as for example with investment in the Australian Synchrotron, high-performance computing and Next-Gen sequencing creates a huge overhead on researchers' time, either in terms of finding matching contributions from grants (where success rates are <10%) or by persuading University administrations that this is an essential infrastructure for research. There are other infrastructure items that New Zealand could usefully buy into in Australia, such as the animal facility in Geelong and the neutron facility run by ANSTO at Lucas Heights, Sydney.

The current Crown/University/CRI partnership approach to large-scale infrastructure is cumbersome and highly inefficient. Internal university policies for investing in expensive equipment can be highly complex. Most countries adopt a top-slicing approach to items of large-scale infrastructure. The current policies encourage a "think small" approach. While NZ struggles to extract AUD750,000 to match the Crown contribution of AD750,000 to contribute to OpEx of the Australian Synchrotron, and efforts to get Universities to match possible Crown funding towards CapEx are stalled, Denmark and Sweden (combined population 10 m) are funding half of the Eu1.84 billion for a neutron spallation source, currently under construction and scheduled for completion in 2025.

Currently, more than half of NZ's use of the Australian Synchrotron is health-related research. We do not have a NZ Inc. investment in the OPAL neutron facility in Australia, and could benefit from funding models to support researchers working across traditional boundaries and disciplines in interdisciplinary teams are required.

12. How can we build a more cohesive and connected system?

1. Strengthen the academic cumulative knowledge-chain

Lack of career opportunities causes a considerable weakness to any chain of knowledge development and completely counteracts the ambition of a “cohesive and connected” system. New Zealand’s brightest PhDs who are working in the health area are frequently lost to overseas research teams. Without mechanisms to encourage young researchers to stay in New Zealand, or to attract back students who have completed their PhDs overseas, New Zealand will not have the opportunity to benefit from their knowledge and expertise.

The need for more funded post-doctoral positions is an acute problem in the health sciences. A distinction is made between clinical scientists (who have clinical responsibilities) and basic scientists. While both have training and administrative responsibilities, the clinical scientist in general needs more, not less, support. The delivery of research requires the continuity and the dedicated time of scientists at the post-doc level.

2. Facilitate for increased connectivity between clinical work and academic research

To truly embed research in the health system, medical students and health professionals will need to have the incentives, resources and skills to train, conduct and participate in health research. Being a clinical researcher often entails competing demands, and the shared appointments that many clinicians have in New Zealand between universities and hospitals entails limiting conditions – including finding time in the lab, completing a clinical speciality, and being subject to two or more different systems for ethics approval.

To address this, consideration could be given to recognising these competing demands in the funding and teaching systems, perhaps via clinical PhD programs.

The first two bi-national summits have been convened to address the ad hoc and disconnected approach taken to training academic clinical specialists or clinical scientists¹. The HRC has been represented at these summits and could take a greater leadership role in what needs to happen in NZ. The UK has a system in place that allows for parallel training opportunities from within medical school through to beyond definitive appointment as a Senior Lecturer.

The establishment of HRC recognized and funded centres of clinical and research excellence, as mentioned earlier, will greatly improve the connection between clinical practice and health research. It will also help shift the locus of research more towards the clinical environment. Professionals who are both health providers and researchers have an integral role as champions of innovation. Long term career support for these individuals may therefore be one way to support this goal.

3. Encourage collaborations and networks that are built on top of existing governance structures

The strategic refresh of the HRC identified that stronger connections and alignment between agencies, health research and the health care sector are needed, as well as the need for pathways for taking concepts for new innovations through to commercial opportunities.

¹ Windsor JA, Searle J, Hanney R, et al. Building a sustainable clinical academic workforce to meet the future healthcare needs of Australia and New Zealand: report from the first summit meeting. *Internal Medicine Journal* 2015; 45: 965-971.

There are a number of international initiatives underway encouraging behavioural changes through system levers that could function as inspiration:

- The Scottish Academic Health Sciences Collaboration (SAHSC) provides an integrated platform to undertake collaborative, patient-oriented, translational medicine research. SAHSC builds on the close links between the National Health Service and its academic partners which already exist in Scotland's four University Teaching Hospitals, and through these to other Scottish Health Boards and universities. One result coming out of the setting up of the collaboration is a noted rapid increase in the approval rate of clinical studies.

- Canada has set up the Evidence-Informed Health Care Renewal (EIHR) initiative to support researchers and decision-makers to work together to advance the current state of knowledge, to generate novel and creative solutions, and translate evidence for uptake into policy and practice to strengthen Canada's health care systems. This initiative is said to provide timely and high-quality evidence for the perennial topics of how best to finance and govern the healthcare system.

– UK model of MRC funded centres of clinical and research excellence: The MRC has a mission to support research and training with the aim of maintaining and improving human health. To address important scientific opportunities and health needs, and when stand-alone grant support alone is insufficient, our three main support mechanisms are:

1. **Institutes** – very long-term flexible multidisciplinary investments
2. **Units** – more focused investments established for as long as needed to support a scientific need and/or deliver a research vision
3. **Centres** – build on existing MRC, support to add value and help establish centres of excellence

All three are mission-focused and carry out ground-breaking research including innovative methodology and technology development. Developing strategically driven initiatives, led by an expert scientific director, can help promote novel, high risk approaches, cooperative research programmes, or the development of shared infrastructure.

The three support mechanisms are all expected to recruit and, in partnership with the HEIs and other organisations, develop outstanding researchers with specialist and transferable skills for academic research, the health services and the national economy. They work in partnerships to ensure maximal knowledge transfer for health benefit. All institute/unit/centre investments are reviewed every five years.

There is also the option of consolidating research institutes (e.g. Auckland Cancer Society Research Centre + Malaghan Institute of Medical Research) to create an NIH-like organisation in New Zealand.

13. In what areas could health research in New Zealand make the greatest difference to the health and wellbeing of all New Zealanders over the short term and into the longer term?

1. More efficient clinical trials infrastructure for change of practice can improve health outcomes

There are likely gains to be made from supporting clinical trial research infrastructure. Currently, support for research infrastructure (particularly for clinical trials) is ad hoc and dependent on individual grants. Supporting clinical trial infrastructure through trials networks in all clinical

disciplines would make New Zealand an attractive place for pharmaceutical company investment and would create an environment where clinicians could collaborate with New Zealand biotechnology companies to create high-quality research.

Increasingly, clinical research is being globalised. Supporting clinical trial research infrastructure would allow clinical researchers to contribute to high quality investigator-initiated research that is funded by government funding bodies in other countries. To address this, the HRC could help collate a list of suitable projects funded by overseas agencies. New Zealand clinicians and healthcare professionals could then decide which research projects were the most relevant to their clinical sphere. This type of strategy would be an effective way to increase clinician and healthcare professionals' engagement in research.

It could also be argued that many key clinical questions can only come through multicentre international randomised controlled trials. Some acknowledgement should be given to the levels of evidence provided by the different types of research that could inform clinical practice. Randomised controlled trials (RCTs) provide the highest level of evidence and for many of the key questions that have the potential to change clinical practice, international RCTs are required.

2. Healthcare automation and technology can improve productivity

Improving productivity is an important issue for healthcare costs. New Zealand – like most OECD countries - will increasingly need to achieve more care delivery for the same costs, due to increasing demands from an aging demographic and the growing impact of chronic disease. In this respect, the use of automation and technology has the potential to contribute, through automated care and personalised care well beyond improving patient electronic records.

New Zealand has already conducted research linking engineering and clinical schools to accomplish these outcomes, with outcomes implemented in care. The Research Strategy could therefore reflect government funding of MedTech CoRE and a NSC7 portfolio on MedTech designed specifically to achieve these outcomes and improve the unit cost of care.

3. Longitudinal studies will improve the evidence-base for scientific information and for interventions

New Zealand has proved to be an influential site for longitudinal health and social research. Longitudinal studies can help explain the science behind health and illness, and they can provide a solid foundation for interventions that work (see further Question 14 below). Application of longitudinal data can provide scientific information on the underlying processes associated with health and development, by examining the ways in which combinations of genetic and environmental factors influence the development of outcomes, including crime, depression and social problems.

An alternative application is to use longitudinal data to provide the foundations of the development of interventions. An example of this approach has been the Christchurch Health and Development (CHDS) work in developing the Early Start home visiting programme. Research from the CHDS found that children reared in homes facing multiple disadvantages have massively increased risks of later problems in life.

These findings led to a search for methods for reducing early childhood disadvantage. This search suggested that regular home visiting by trained Family Support Workers provided the most promising method. This in turn led to the development and evaluation of the Early Start programme.

Results from a randomised controlled trial with nine-year follow up showed that regular home visit during childhood led to a number of important outcomes including: improved health care utilisation; reduce risks of childhood accidents; increased positive parenting and reduced risks of child abuse. These are real results that have direct and real consequences for the health of New Zealanders, for generations.

4. Give priority to research focused on New Zealand's unique conditions

The strategy should give priority to research that capitalises on unique opportunities or responsibilities in New Zealand. If we do not study our own health problems, who else will?

Again, such studies may not generate the most citations, because the issues will be mainly relevant to this country, but they may provide the best investment for our research system in the long run. Common conditions in New Zealand are hepatitis, pancreatitis, colon cancer and gout.

Further, the consequences that climate change will have for public health, for example an increase in insect-borne pandemics and new influenza variations, creates an urgency around increasing our global awareness, and a realisation of the ethical responsibility New Zealand has to its Pacific neighbours with less developed research and health care systems.

New Zealand is further one of the few developed countries where agriculture and agri-farming are major parts of the economy. Given that the veterinary profession is increasingly focusing on wellbeing (rather than health), the huge value and strong and ever growing evidence-base on the impact on wellbeing provided by companion animals and pets, especially for the elderly and for persons with dementia, needs to be acknowledged and developed in the strategy.

14. How can we ensure health research generates knowledge and understanding that can help address the health needs of all New Zealanders?

1. Encourage a "joined forces"-approach to issues of national importance

Collaborative structures of the kind as described in Question 12 could provide a useful foundation for monitoring needs and ensure consolidation of efforts to achieve identified priorities.

To further build a shared understanding of health-related research, there is also the option of seconding researchers into and out of central administrative roles in universities and in government departments in Wellington. Government departments need to translate their investments in research and reports into actions, for instance by high-level researchers spending some time in government departments helping to enact research findings.

This mainly applies to the public health sphere and requires a higher level of leadership, since much of public health research requires government departments to enact, rather than the private sector.

2. Translation of research results: encourage end user participation and treat them as collaborators

There should be an additional emphasis on translation of research results in the strategy, not just by having clinicians actively involved in research. Co-development, co-design, and inclusiveness across sectors will result in research that is: more likely to achieve equity gains; enhance cost-effectiveness; evidence the impact of both risk and protective factors; enhance implementation; and also encourage innovation and community sustainability.

User involvement and co-design further has the potential to increase research productivity, delivering data, provide evidence, and generate a wide sense of ownership and user acceptance (by addressing real world needs and problems). This sense of ownership can further underpin improvement of knowledge transfer, including dissemination, implementation, and the development of better products and services.

Project funding could rest not only on scientific excellence but also on the quality of the knowledge exchange and user engagement plans. Dedicated funding could be reserved for these activities.

3. Longitudinal studies can provide the answers that the health care sector needs to prevent and treat with higher reliability and for better outcomes over time

New Zealand has proved to be an influential site for longitudinal health and social research. There are a number of other studies developed using longitudinal designs. These studies all demonstrate in various ways the value and advantages of carefully collected data for both research and policy purposes. These include:

- The Dunedin Multi-Disciplinary Health and Development Study (DMHDS)
- The Christchurch Health and Development Study (CHDS)
- The Pacific Island Families Study (PIF): This study has followed a cohort of 1398 Pacific children from birth to the age of 13
- Growing Up In New Zealand (GUINZ). This study has followed a cohort of approximately 7000 children from the antenatal period to the age of five
- The New Zealand Longitudinal Study of Ageing (NZLSA). This study has followed a sample of 3127 individuals aged 50 – 80 over the period from 2006 to 2012
- Te Hoe Nuku Roa. This study has followed a sample of 1719 Maori children born in 1994 on three occasions.
- The Longitudinal Immigration Survey: New Zealand (LisNZ). This study followed a cohort of approximately 7,000 immigrants into NZ during a specified period in 2006/07 for three years with interviews at 6 months, 18 months and 36 months after arrival.

The main advantage of longitudinal designs is that they provide a natural history account of human health and development by studying these processes over time. More specifically, this approach reduces problems of recall and recall bias that may arise in studies which ask respondents about their life history and as such, these studies have a very high recognition when it comes to evidence strength. This makes longitudinal data sets rich sources of descriptive information about the incidence and prevalence of health and related problems alongside changes in personal and social processes. In turn, this type of data gathering makes it possible to place health and development issues in a wider context.

15. How can we get more excellent science and high-impact research?

1. Encourage a “joined forces”-approach to issues of national importance

Collaborative structures and co-design of the kind as described in Question 12 could provide a useful foundation for monitoring current and evolving needs and ensure consolidation of efforts to achieve identified priorities.

2. Ensure an appropriate balance between innovative approaches and (excellent) accumulated knowledge

The strategy rightly emphasises innovation, but it should be equally acknowledged that – for instance in the social sciences – there has been an accumulation of knowledge and experience in the use of techniques that are appropriate to address the research issue. To push researchers towards “cutting edge” approaches is not always the best way of addressing research problems. So the Research Strategy should use language such as: “use the best approaches available to address research issues” and where appropriate “use cutting edge approaches and techniques”.

One of the areas of focus for the Research Strategy will be to look to improve investment settings and provide research infrastructure and building skills. For social science health research, the Marsden Fund panels have the capacity to fund social science health research, but applied research (and health research is often applied) is not specifically encouraged in Marsden Fund applications.

The HRC on the other hand is dominated by biomedical, clinical and public health assessing committees, so if social science research is to deliver to anything like its potential, the lack of a clear position for the assessment and funding of social science-related health research needs to be addressed.

3. Support clinical trials infrastructure

Supporting clinical trial infrastructure through trials networks in all clinical disciplines would make New Zealand an attractive place for pharmaceutical company investment and would create an environment where clinicians could collaborate with New Zealand biotechnology companies to create high-quality evidence.

4. Treat New Zealand’s longitudinal studies as national data treasures

New Zealand has a strong history of longitudinal research which has had substantial impacts both internationally and locally. For this research, it is important that any Health Research Strategy includes mechanisms that recognise the value of longitudinal studies and put in place mechanisms that ensure assessment methods support long-term planning and continuity of productive longitudinal research.

While it is possible to produce strong arguments for supporting longitudinal research, implementing these studies poses a number of challenges. Perhaps the most important of these concerns the stability of funding for studies. Currently, most longitudinal studies are supported by funding from research funding organisations such as the Health Research Council, The Royal Society of New Zealand, the Ministry of Business, Innovation and Employment, and other funding bodies.

A difficulty with the current model of contestable funding is that it makes the long-term planning of research difficult and the process of conducting longitudinal research capricious, because of the risk of discontinuous funding investment. A recent example of this process was the Health Research Council's decision in 2015 to decline further funding support for the DMHDS. While this issue has now been satisfactorily addressed in the 2016 round of funding, it does illustrate the ways in which committee-based decision-making can disrupt long-standing research where major investments have already been made over long time.

Against this background, there is a case for developing alternative methods for funding long-term research to avoid some of the problems of committee-based contestable funding decisions. One approach would be to return to the methodology used by the earlier Medical Research Council, which used a system of site visits in which assessors could meet with the researchers and discuss research issues and planning.

16. How can we improve the uptake of research results and innovations?

One fundamental problem is the shortage and the disconnection of clinical scientists. Establishing centrally funded and accountable centres of clinical and research excellence will enable clinical volumes and critical mass of scientific endeavour, encourage efficiencies and help to break down the barrier of DHB structure to national collaborative clinical research. The specific focus on the training and appointment of clinical translational and implementation scientists will be important to ensure the durable uptake of research results.

Innovation can not be legislated, but creating environments and funding structures that allow for risk taking will help. Identifying those with a track record of innovation and finding ways to fund their activities is important. Career HRC Innovation Fellowships might not be necessary but it might be possible to create residencies for 2-3 years, analogous to what we see in the humanities, where creativity is fostered by putting outstanding prospects in settings where they can focus on disruptive proposals. Innovations dissipate without them being nurtured. Access to incubators, angel investors, and mentorships are some of the ways that innovations can be helped to see the light of day. The commercial sector needs stronger incentives to invest in R&D, especially in IT, where there are real opportunities to export some valuable IT systems developed by individual DHBs such as Canterbury (see the NZ Health Strategy – Future Directions document).