

2021-22 PRE-BUDGET SUBMISSION

January 2021

ABOUT RESEARCH AUSTRALIA

Our vision: Research Australia envisions a world where Australia unlocks the full potential of its world-leading health and medical research sector to deliver the best possible healthcare and global leadership in health innovation.

Our mission: To use our unique convening power to position health and medical research as a significant driver of a healthy population and contributor to a healthy economy.

Our role:

Engage	Connect	Influence
Australia in a conversation about the health benefits and economic value of its investment in health and medical research.	researchers, funders and consumers to increase investment in health and medical research from all sources.	government policies that support effective health and medical research and its routine translation into evidence-based practices and better health outcomes.

Established with the assistance of the Federal Government in 2002, Research Australia is the national alliance representing the entire health and medical research (HMR) pipeline, from the laboratory to the patient and the marketplace. Research Australia works to position Australian HMR as a significant driver of a healthy population and a healthy economy.

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TABLE OF CONTENTS

Summary of recommendations	5
Introduction	8
The Australian Government's response to COVID-19.....	10
Why invest in innovation?	11
Australian R&D has declined, but not evenly.....	12
But who funds research in universities?	13
'We aren't capturing the full benefits of our world class science and research'	14
Ambition requires effort and investment.....	15
Clear and ambitious targets needed	16
Building on existing publicly funded investments.....	17
Supporting the development of Medical Products Manufacturing.....	17
Using Government procurement to promote innovation	20
An mRNA Development and Manufacturing Facility for Australia	23
Why invest in health and medical research and innovation?	24
The ongoing impact of COVID-19 on universities.....	25
The nature of researcher employment.....	26
NHMRC and ARC funding	28
NHMRC Programs.....	28
ARC Programs	29
Indirect research costs	30
Universities	30
Medical Research Institutes	31
Funding for research infrastructure.....	32
National Innovation Strategy 2030	33
Measuring Innovation performance.....	33
Investing in Prevention	34

Data for better health and prosperity	35
Artificial intelligence for insights in health	35
Government capacity to share and release data	36
Utilising Health Data	37
Conclusion.....	39

Summary of recommendations

Invest in Innovation	The Government should outline a substantially increased investment in national innovation and commit to increasing its spending on research and development to at least 0.75% of GDP annually, over the forward estimates.
	Australia needs to set some clear and ambitious goals if we are to position ourselves up for the economic success the Prime Minister has stated as his Government's objective. For example, one such goal would be to become a net exporter of pharmaceuticals by 2035.
	The Government should make further investments in areas and programs identified by the Modern Manufacturing Initiative (MMI) Roadmaps that that cannot be delivered within the existing funding.
Medical Products Manufacturing for clinical trials	<p>The Commonwealth Government should undertake a feasibility study into establishing one or more manufacturing facilities for clinical trial materials to capitalise on Australia's global competitive advantage in clinical trials. It should investigate the provision of facilities in partnership with the health and medical research and innovation sector and funding models involving consortia of government and private investors.</p> <p>These facilities could provide a base for establishing full scale production capability for medical products in Australia, enabling new home grown medical companies to manufacture here.</p>
Government Procurement to support medical product manufacturing	<p>The Government should develop an Australian equivalent of the US Government's Biomedical Advanced Research and Development Authority (BARDA) and Centers for Innovation in Advanced Development and Manufacturing (CIADM), with the objective of supporting the development and domestic manufacture of new medical products needed to protect the health of the Australian population.</p> <p>As a major purchaser of healthcare products and services on behalf of the Australian population, medical products provide an ideal opportunity for the Australian Government to use its role as customer to support Australian R&D and manufacturing.</p>
mRNA Development and Manufacture	<p>The Government undertake a feasibility study into establishing a local manufacturing capability in mRNA technology, ascertain market appetite and the potential return to the economy on any Commonwealth investment.</p> <p>Building on discoveries at the CSIRO in the 1990's, Australia is now a global leader in RNA research, in both plants and animals, including humans. The future of many medicines will be RNA-based.</p>

Ongoing Impact of COVID-19	A further \$1 billion of short-term funding should be provided to universities through the Research Support Program to offset the expected continued impact of reduced international student revenue in the 2022 calendar year.
	The Government should establish a modest pool of funding of \$100 million for the specific purpose of providing bridging funding to Government funded health and medical research that will be unable to be completed withing the existing grant budget because of the disruptions and delays caused by the COVID-19 pandemic. This funding would be applied on a contingency basis.
NHMRC and ARC Funding	<p>Funding for the research programs of the National Health and Medical Research Council (NHMRC) and Australian Research Council (ARC) must be increased in real terms and in their own right, in the 2021-22 Budget and over the forward estimates.</p> <p>Funding for these programs underpins the whole of Australia's research and innovation pipeline.</p>
Indirect Research Costs	<p>The cuts to the Research Block Grants outlined in the October 2020 Budget must be reversed.</p> <p>Research Block Grants are essential to our universities' capacity to undertake research.</p>
	The pool of funding for the Research Support Program and the Research Training Program needs to be increased proportionately to reflect the inclusion of MRFF competitive grants in the Programs.
	<p>In a similar manner, an additional stream of the IRIISS program needs to be funded by the Department of Health to cover the indirect costs associated with MRFF funding incurred by IMRIs.</p> <p>This funding should be administered by the NHMRC.</p>
	Research Australia proposes the Chief Scientist lead a review of the funding of indirect research costs to establish a sustainable and equitable funding program.
Research Infrastructure	<p>The Government should make a commitment in the 2021-22 Budget to expand the existing \$1.9 billion, 12 year funding envelope for national research infrastructure.</p> <p>This increase is necessary to better support the 2021 National Research Infrastructure Roadmap.</p>
	The Government should commit the additional funding required to implement the remaining measures outlined in the Australian Government response to <i>Innovation and Science Australia's Australia 2030: Prosperity through Innovation</i>.

National Innovation Strategy 2030	These include, for example, implementation of a framework to identify and implement additional National Missions. (Recommendation 28)
	<p>Industry Innovation and Science Australia should be charged with revisiting the National innovation Strategy and making recommendations based on long term spending of 0.75% of GDP.</p> <p>This review can be supplemented with the work of the National COVID-19 Commission Advisory Board to provide a new direction and drive for Australia's economy. It can also incorporate the Governments' Modern Manufacturing Initiative.</p>
Measuring Innovation Performance	<p>Research Australia urges the Government to make provision in the 2021-22 Budget for the implementation of the Innovation Metrics Review's recommendations.</p> <p>It is vital that we are able to appropriately measure and evaluate the performance of innovation in Australia and the effectiveness of Government programs to ensure transparent and efficient use of public funds with the highest possible positive impact and outcomes.</p>
Investing in Prevention	Research Australia urges the Government to use the Budget to make a significant multi-year commitment to fund implementation of the new 10 Year National Prevention Strategy currently being developed.
AI for insights in health	The Government should commit funding in the 2021-22 Budget for implementation of the measures outlined in the CSIRO Report, <i>Artificial intelligence: Solving problems, growing the economy and improving our quality of life.</i>
Government capacity to share and release data	<p>The Government should make provision in the 2021-22 Budget for the infrastructure needed to support the new Data Availability and Transparency Bill in anticipation of its passage through the Parliament in 2021.</p> <p>Better use of Commonwealth Government data for research purposes will support better delivery of healthcare and innovation.</p>
	<p>The Government should also continue to invest in capacity building in Commonwealth departments and agencies to enhance their ability to capture, manipulate and analyse data, and their capability to link data and to prepare secure, deidentified datasets for public release.</p> <p>This is necessary to support the implementation of the new Data Sharing legislation and improve researcher access to datasets.</p>
Utilising Health Data	Research Australia urges the Government to use the 2021-22 Budget to ensure the AIHW is adequately resourced to prepare for and undertake the significant new role of preparing and providing de-identified My Health Record data for research and public health purposes.

2021-22 PRE-BUDGET SUBMISSION

Introduction

The economic value that health and medical research and innovation offers this country as it emerges from the pandemic must not be underestimated. Real economic stimulation and jobs growth are significant opportunities across the health and medical research pipeline. Research Australia is proposing short and long-term levers to harness the skills and talent that are already part of the national investment portfolio. Realising the ambition of a world's best health system is a natural part of the approach with an incredible return on investment.

Research Australia welcomes the opportunity to make this submission to the Treasurer in relation to the 2021-22 Budget. The focus of our submission is the role of health and medical research and innovation in Australia's medical response to the COVID-19 pandemic, and the manufacturing and innovation opportunities that health and medical research can contribute to Australia's economic recovery.

Our members have played an integral part in Australia's response to the COVID-19 pandemic.

Australian researchers were among the first outside China to grow the virus in the laboratory and to share samples worldwide. Our members have been providing the advice and modelling that has guided Australia's leaders in their response to the COVID-19 pandemic. They are developing vaccines and identifying new therapies to help those who are ill. They are working on new tests and diagnostics, and ways to support our health workforce and health systems. They are investigating the impact of COVID-19 on our most vulnerable communities and helping develop strategies to protect them.

In mid 2020 Research Australia released our national report, *COVID-19 How Australia's health and medical research sector is responding* which outlined more than 200 such responses.¹

The Government has demonstrated it values health and medical research and innovation by the establishment and capitalisation of the Medical Research Future Fund (MRFF). In particular, we acknowledge the announcement in December that the Government will provide additional funding to supplement the disbursement from the MRFF in the next financial year to address the shortfall in projected MRFF earnings caused by the record low interest rates. This decision,

¹ Research Australia, 2020, *COVID-19 How Australia's health and medical research sector is responding*, available at <https://researchaustralia.org/covid-19/>

which enables the MRFF to continue to fulfill the Government's MRFF 10 Year Plan, further demonstrates the Government's commitment to health and medical research and innovation, and the health and economic benefits it brings.

While no country can produce everything it needs and its population wants, in a time of crisis a strong capacity in research, innovation and manufacturing enables a nation to shift its capacity to meet areas of critical need, whether these are medical supplies and equipment (including vaccine production), food, fuel, or defence against cyber and military attack.

The COVID-19 pandemic has demonstrated Australia's deficiencies in some critical areas and we congratulate the Government on its swift response, identifying the importance of strengthening our manufacturing capacity in specific areas, including medical products. The challenge is now getting those actions underway efficiently.

The October 2020 Budget started us down the path to a long term, integrated strategy to increase our research, innovation and manufacturing capacity. Success will not only assist us in responding to future pandemics and crises but help diversify, and thus 'de-risk', our economy.

This thoughtful submission encourages the Government to build on that promising start, in a way that will build the sophisticated, high-value-added and export focused economy that will sustain Australians' high quality standard of living for generations to come.

The Australian Government's response to COVID-19

Research Australia congratulates the Australian Government on its response to COVID-19. In an environment in which there was significant uncertainty, the Australian Government has acted quickly and been guided by expert scientific advice. The actions by all Australian governments and the broader community to limit the spread of the disease and 'flatten the curve' have been very effective and make us the envy of much of the rest of the world.

The Government has cushioned the impact on Australian businesses and workers, and has secured supplies of vaccines. In our own domain of health and medical research and innovation, the Government has provided additional funding to support promising vaccine candidates and the development of more effective therapies, and it has targeted research funding to other areas of concern such as mental health.

The Government also made an additional \$1 billion available to universities through the Research Support Program in 2021, providing a vital injection of funds to higher education research to counter the loss of revenue for international student fees and support universities' research efforts, including in response to COVID-19.

Research Australia's survey of more than 1200 health and medical researchers, conducted from late April to mid May 2020, asked respondents to assess Australia's response to the COVID-19 pandemic.

95% agreed that Australia's overall response to the COVID-19 pandemic has been effective. 91% agree that Australia's overall response to the COVID-19 pandemic has been timely. On the question of whether 'Australia's politicians have relied on expert health and medical advice in deciding how to respond to COVID-19', 92% agree.²

Many of the measures in the October Budget were necessarily short-term, designed to address the immediate situation, such as Job Keeper and the \$1 billion injection into the Research Support program. Other initiatives, such as the Modern Manufacturing Initiative and the Strategic University Research Fund are designed to initiate longer term change.

Research Australia believes these measures provide a platform from which to build, and that there is a significant opportunity to harness health and medical research and innovation for Australia's future health and prosperity as part of this plan.

The case for a broader investment in research and innovation is made in the next section.

² Research Australia 2020, COVID-19 series report 2 – The impact of COVID-19 on health and medical researchers

Why invest in innovation?

Per capita, Australia is one of the wealthiest countries in the world. And while it is no longer true that Australia rides on the sheep's back, for a wealthy country our economy remains poorly diversified. This places Australia's long-term future at risk; as recent developments in our relationship with China have demonstrated, a decline in the export value of just a few key commodities can jeopardise our whole economy and our standard of living. COVID-19 has exposed just how vulnerable Australia is because of our relatively small and narrow manufacturing base.

In general, the complexity of a country's economy, measured in terms of the diversity of its international trade, is a good measure of the economy's strength and resilience, and its capacity for continued innovation and growth.

The *Atlas of Economic Complexity*, developed by Harvard University, rates the complexity of Australia's economy as 87 out of 133.³

'Australia is a high-income country, ranking as the 8th richest economy per capita out of 133 studied. Its 25 million inhabitants have a GDP per capita of \$57,395 (\$51,036 PPP; 2018). GDP per capita growth has averaged 1.0% over the past five years, below regional averages.'

Australia ranks as the 87th most complex country in the Economic Complexity Index (ECI) ranking. Compared to a decade prior, Australia's economy has become less complex, worsening 5 positions in the ECI ranking. Australia's worsening complexity has been driven by a lack of diversification of exports. Moving forward, Australia is positioned to take advantage of a moderate number of opportunities to diversify its production using its existing knowhow.'

*Australia is less complex than expected for its income level. As a result, its economy is projected to grow slowly. The Growth Lab's 2028 Growth Projections foresee growth in Australia of 2.5% annually over the coming decade, ranking in the bottom half of countries globally.'*⁴

The risk of this lack of diversity has been exposed by the COVID-19 pandemic in our inability to produce basic medical supplies and medicines. At a more sophisticated level, a lack of manufacturing capability for some types of vaccines leaves Australians exposed in the event of vaccines being developed and manufactured overseas. And these are just some of the consequences of our failure to diversify our economy and manufacturing base.

To summarise:

- **The key to long term, sustainable prosperity is a more complex economy.**
- **Greater complexity requires greater diversification of exports.**
- **Existing knowhow provides some opportunities to diversify our production.**
- **The key to diversifying our exports and our economy is new knowledge creation and innovation that enables domestic advanced manufacturing.**

³ <https://atlas.cid.harvard.edu/rankings>, accessed 30 November 2020

⁴ <https://atlas.cid.harvard.edu/countries/14>

Australian R&D has declined, but not evenly

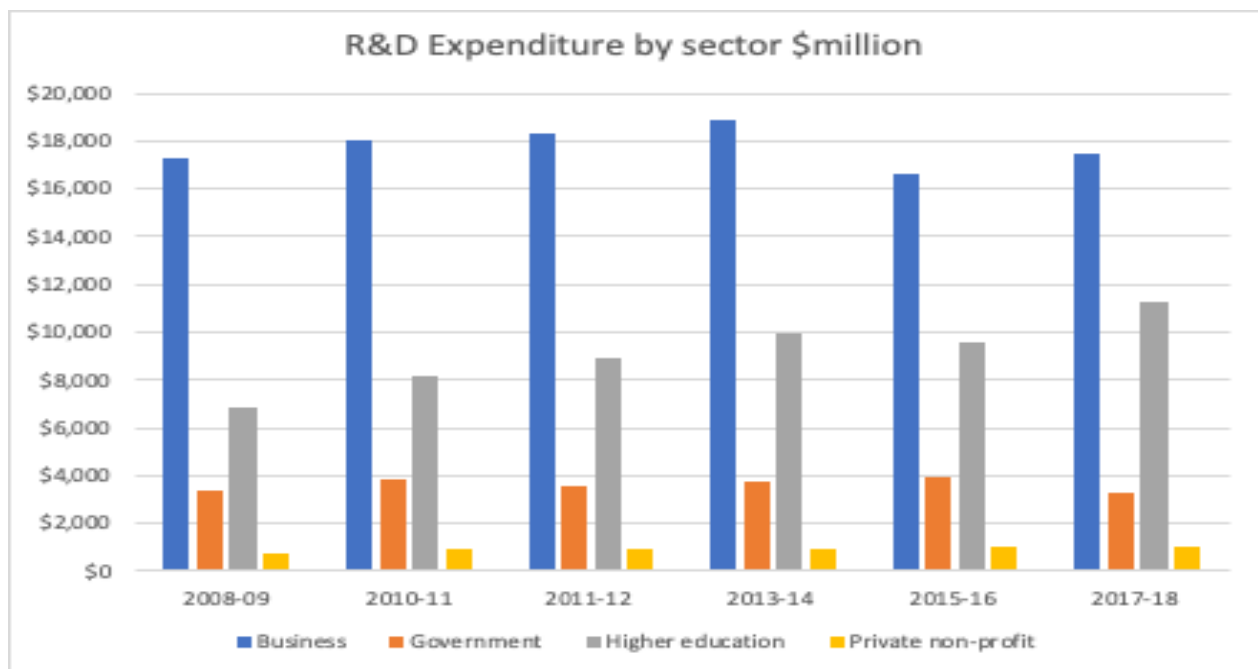
In the decade from 2008-09 to 2017-18, Australia's Gross Expenditure on Research and Development (GERD) declined as a percentage of GDP from 2.25% to 1.79% ⁵

GERD, as a proportion of GDP

2008-09	2010-11	2011-12	2013-14	2015-16	2017-18
2.25%	2.18%	2.11%	2.09%	1.88%	1.79%

But it hasn't declined evenly across all sectors. The decline has been due to reduced investment in R&D by governments and the private sector. The Medical Research Future Fund is an exception in terms of government investment and will provide around \$650 million per annum in additional expenditure over the next 10 years. This is not enough, however, to offset the overall decline in government investment in R&D.

The only significant increase in investment across R&D nationally has been by the Higher Education sector, largely funded by international student revenue, as illustrated in the following table. ⁶



⁵ Australian Bureau of Statistics, 8104.0 - Research and Experimental Development, Businesses, Australia, 2017-18, Gross Expenditure on R&D, accessed on 15 September 2020 at <https://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/8104.0Main%20Features22017-18?opendocument&tabname=Summary&prodno=8104.0&issue=2017-18&num=&view=>

⁶ Ibid, ABS

In 2008, 24% of total Australian R&D was undertaken in universities. By 2018 this had risen to 34%.

But who funds research in universities?

Research undertaken in higher education is funded from a range of different sources, including from business and governments, so it is also important to look at the source of funds expended on research by universities.

Between 2008 and 2018, total Higher Education expenditure on R&D increased by 78%, from \$6.8 billion to \$12.1 billion. The combined contribution from Commonwealth competitive grants and research block grants increased by 68%, (mostly in Research Support Program and Research Training Program), while the contribution from business increased by 54%.

The contribution from 'General university funds' (including international teaching revenue) rose by 88%. The biggest percentage increase in that period (from a much smaller base) is funding from 'Donations, bequests and foundations' which increased by 213% to \$300 million (but only represents 2.5% of all funding).⁷

R&D Higher Education by source of funds \$'000

	2008	2018	% difference 2008 to 2018
General university funds	3,620,624	6,822,562	88%
Australian competitive funds			
Commonwealth schemes	1,142,870	1,700,454	49%
Other schemes	61,926	73,656	19%
<i>Total</i>	<i>1,204,796</i>	<i>1,774,110</i>	<i>47%</i>
Other Commonwealth government	1,001,321	1,891,230	89%
State and local government	402,989	457,013	13%
Business	338,156	521,889	54%
Donations, bequests and foundations	95,902	300,531	213%
Other Australian	41,004	96	-98%
Overseas	138,736	390,396	181%
Total	6,843,526	12,157,826	78%

⁷ Australian Bureau of Statistics, 8111.0 - Research and Experimental Development, Higher Education, Australia, 2014, 2016, 2018 (2014 has historical data for 2008 and 2010)

In summary, between 2008 and 2018, **the proportion of Australian R&D undertaken in higher education has increased, and a greater proportion of it is funded from universities' own funds.**

It is clear that reform is needed. Ultimately, research is valued because it leads to outcomes that benefit the economy and society. This requires the 'D' in R&D, and that needs greater participation in R&D from industry and from governments.

'We aren't capturing the full benefits of our world class science and research'

Australian health and medical research has traditionally been world class, but our record in translating our discoveries into new products, treatments and medicines has not been as good.

An assessment by Innovation and Science Australia for the Australian Government in 2016 identified that fewer than 10% of Australian companies across all industries introduced new-to-market product innovations (new products and services) compared to 21% for the top five performing OECD countries.⁸

The encouraging news is that this percentage is slowly increasing. In the health and medical research and innovation sector, the last decade has seen the development of greater expertise in the commercialisation of new discoveries and more sources of funding for the long process of bringing new medicines, vaccines and medical technologies to market.

This expertise has been in the national spotlight during the COVID-19 pandemic, and while we are progressing with clinical trials for several Australian developed vaccines, gaps further down the pipeline, for example in our capacity to manufacture and commercialise some vaccine types, are emerging. These gaps prevent us from capitalising on our world class research and building industries of the future.

There is an opportunity to significantly increase Australia's exports in the trillion-dollar global healthcare sector, adding new jobs in advanced manufacturing and other related industries, and helping to diversify Australia's exports and economy. But we need to act now and capitalise on what has been put in place to date and the opportunity provided by COVID-19. We must dramatically 'scale up' our efforts to support health and medical research and development and innovation across the whole economy if we are to make the most of these opportunities.

In his address to the Business Council of Australia's AGM on 19 November 2020, the Prime Minister drew many of these elements together.

He acknowledged the research sector, business and Government need to work together more effectively.

'Now likewise, we need our higher education sector and our research institutions to support our recovery.... Science and research is not just helping us fight COVID-19. It is at the heart of helping our economy grow back stronger.'

Now, for this to happen, businesses and researchers do need to come together. This has been a real failing in Australia. The reality is Australia is a laggard when it comes to business collaboration

⁸ Innovation and Science Australia, Performance Review of the Australian Innovation, Science and Research System 2016, p.xi.

with higher education and research institutions. And you are both at fault, as is the government. This means we aren't capturing the full benefits of our world class science and research. We aren't capitalising on it enough to improve lives, to grow our wealth or to create jobs. The Government understands this and we understand what we need to do.

.... We do need your ideas as much as we need the ideas of the scientists, your leadership and your dollars to bring out more of our R&D spend to commercial advantage.....

That's step one of having a manufacturing plan in this country and we've made it step one as part of our plan, but our \$1.5 billion manufacturing plan set down in the Budget is also about setting priorities in areas of genuine competitive advantage, resources technology and critical minerals processing, food and beverage, medical products, recycling and clean energy, defence and space.'

Ambition requires effort and investment

The Government commissioned Innovation and Science Australia to develop a plan for innovation, which was delivered to the Government in 2017.⁹ *Australia 2030: Prosperity through Innovation* outlined a plan for how the Australian Government could drive innovation across the whole economy through investment at the medium term average level of 0.63%.

While Research Australia contends that this level of Government investment in R&D is too low, even this modest target has not been achieved, with the **Government's expenditure on R&D across all areas having fallen to less than one half of one percent of GDP.**

Australian Government investment in R&D as a percentage of Gross Domestic Product¹⁰

Financial Year									Forecast		
09-10	10-11	11-12	12-13	13-14	14-15	15-16	16-17	17-18	18-19	19-20	Average
0.64	0.63	0.67	0.64	0.62	0.61	0.58	0.54	0.56	0.48	0.48	0.61

It is clear from the October 2020 Budget that the Government understands the need to increase its investment. New programs such as the Modern Manufacturing Initiative and the Strategic University Research Fund are designed to provide jobs and growth in areas where Australia has been identified as having strategic advantages. Research Australia supports this approach, but we need to do more.

The additional funding committed in the October 2020 Budget is not by itself enough to drive the profound change that is required in Australia's economy to capture the full benefits of our world class science and research. We note the Prime Minister's remarks to the Business Council of Australia's AGM that this was 'step one', and take heart.

⁹ Innovation and Science Australia 2017, *Australia 2030: prosperity through innovation*, Australian Government, Canberra.

¹⁰ Australian Government, Science, Research and Innovation (SRI) Budget Tables, 2019-20, Australian Government investment in R&D by sector and sub-sector, and other analyses Table 6, Australian Government investment in R&D as a percentage of Gross Domestic Product.

Without further sustained investment, Australia will be condemned to a low growth future, and remain highly dependent on just a few key exports. It is essential that we act now, while we still have relatively high levels of wealth, to invest in developing the export industries that can sustain our wealth in the future.

Research Australia submits the Government should outline a substantially increased investment in national innovation and commit to increasing its spending on research and development to at least 0.75% of GDP annually, over the forward estimates.

This new investment should be directed to new programs and to increased support for existing programs. In the remainder of this submission, Research Australia provides a number of proposals for how this additional investment should be utilised in health and medical research and innovation, and more broadly across Australia's world leading research and innovation. These proposals are consistent with the ambition the Prime Minister has outlined for Australia's post COVID recovery, with manufacturing based on our research expertise in areas of competitive advantage.

Clear and ambitious targets needed

Government spending on R&D of 0.75% of GDP is a clear and ambitious target, but we also need others.

The Government has identified Medical Products as a priority area. A broad category, this includes, for example, pharmaceutical products. Australia already has world class research to support the development of new medicines and pharmaceuticals. We also have expertise in the manufacturing and supply chain for pharmaceuticals. The same is true of many other categories within medical products, and we congratulate the Australian Government on playing to our strengths.

26 of the world's nations accounted for 95% of global pharmaceutical exports in 2018, valued at \$570 billion. The world's Number One exporter of pharmaceutical products was Germany at \$94.1 billion, with 16.5% of global pharmaceutical exports. Number 26 was Australia, with exports of \$2.5 billion, or 0.44% of global exports.¹¹

In the same year (2018), Australia imported pharmaceutical products valued at \$7.17 billion, or 1.26% of global pharmaceutical imports.¹²

Pharmaceutical manufacturing, including vaccines and serums, is a sensible area for Australia to seek to expand its capability. It is an area where security of supply is paramount; it is also an area where we have existing expertise in manufacturing and world leading expertise in life sciences that we can leverage. It is a growing market, and one where capability is relatively well dispersed around the developed world.

Research Australia submits Australia needs to set some clear and ambitious goals if we are to position ourselves up for the economic success the Prime Minister has stated as

¹¹ Sourced 19 November 2020 from

<https://atlas.cid.harvard.edu/explore?country=undefined&product=129&year=2018&productClass=HS&target=Product&partner=undefined&startYear=undefined>

¹² Sourced 19 November 2020 from

<https://atlas.cid.harvard.edu/explore?country=undefined&product=129&year=2018&tradeDirection=import&productClass=HS&target=Product&partner=undefined&startYear=undefined>

his Government's objective. One such goal would be to become a net exporter of pharmaceuticals by 2035.

Achieving such a target will involve a focus on the Australian manufacture of new, high value pharmaceutical products in Australia. It would significantly boost our terms of trade in a key world market and create high value jobs. It would also create an ecosystem which would further support new research and commercialisation of new products.

Pharmaceutical products is the case study used here, but similar opportunities exist with other types of medical products, including diagnostics and medical devices. There is increasing evidence we can develop new products in Australia, capitalising on our world class research.

The Medical Commercialisation Research Fund, started in 2007, has an increasing suite of products under development at advanced stages. While there was a tendency even five years ago to license promising new products to international pharmaceutical companies to complete their commercialisation, we have a growing capability to undertake the later stage commercialisation of these products in Australia. The Government's Biomedical Translation Fund is following a similar trajectory, investing in the commercialisation of promising Australian research.

Building on existing publicly funded investments

While Research Australia believes setting clear and ambitious goals is essential, it is not, of course, enough. The key question now is, how do we develop the manufacturing capability here?

The MMI Medical Products Road Map, which is currently under development by the Government in consultation with industry, provides an opportunity to create the right incentives and environment. The Government has set aside \$1.2 billion over 5 years for the MMI. While a substantial amount of money, it is an average of \$40 million per annum for each of the six priorities.

Research Australia submits the Government should make further investments in areas and programs identified by the MMI Roadmaps that cannot be delivered within the existing funding.

Supporting the development of Medical Products Manufacturing

The development of medical products, including pharmaceuticals, therapeutics, diagnostics and medical devices is a long and expensive process, typically taking more than a decade. However the rewards for successful products, and the companies and countries that manufacture them, can be substantial.

Australia already has many processes and programs to support the development and commercialisation of medical products, and many of these components are now working well. The Research and Development Tax Incentive is one such example.

Australia has existing advanced manufacturing capability in key areas, including medical devices.

ROMAR Engineering

'We provide advanced manufacturing and processing solutions for a wide range of highly regulated industries including aerospace, aeronautical, medical, defence and automotive applications.

At the heart of our advanced manufacturing capability is our DMG Mori Lasertec 65 3D 5-axis synchronous laser deposition, welding and milling machine.

It's a 3D printer with unique metal-on and metal-off capability ... and it's the only one of its type in Australia. With the Lasertec 65, our additive manufacturing capability includes metal-on and metal-off manufacturing of even the most complex components.

So, we can engineer creative new designs – or repair, renew and replace existing parts, quickly and cost-effectively.

We are also particularly proud of our contract manufacture of medical devices within the healthcare sector, which we accomplish with leading expertise and superior facilities, including a Class 8 Clean Room.

Our customers range from large multinational companies to start-ups, but what unites them is a desire for high quality, solutions-driven, strenuously tested and precision-built products that meet the highest standards.¹³

The transition from product development to the manufacture of medical products provides both a particular challenge and an opportunity for Australia. Clinical trials are an essential part of the process of bringing a medical product to market. The conduct of clinical trials requires having thousands (or tens of thousands) of the product being tested available for use with patients. The manufacture of the product for clinical trials requires facilities that are flexible enough to produce batches of products to the required standard for use in clinical trials but at a scale that is beyond research facilities.

Having more of this manufacturing capacity in Australia would:

- help support Australia as a destination for clinical trials,
- build Australian expertise in manufacturing for the latest types of devices, diagnostics, medicines and drugs; and
- support Australian research which is reliant on access to clinical trial materials to be able to continue research into promising new therapies.

This manufacturing capacity would provide direct economic benefits. It is also a good starting point from which to scale up to the manufacture of a range of new medical products on a fully commercial scale for products that prove to be viable.

If the initial manufacturing for clinical trials has been undertaken in Australia, it provides Australia with a natural advantage. It can be easier and quicker to expand the manufacturing capability here, drawing on the skills and expertise developed in the clinical trial production phase, rather than start the whole process from the beginning in another country. This natural

¹³ <https://www.romareng.com.au/manufacturing-expertise/>

advantage does not exist where the manufacturing for the clinical trials has been undertaken overseas.

There are currently very few facilities in Australia with the capacity to produce the volumes of materials required for later stage clinical trials. In part this is because, as noted above, there has been a tendency in the past for Australian entrepreneurs to license promising products at an early stage of development to a foreign multinational company, which results in the further product development and manufacturing occurring overseas.

With an increasing trend towards developing products locally to a later stage, there is a need for greater local manufacturing capability. Australian medical product start ups are typically still 'pre revenue' at this stage of their development and are not in a position to invest the capital needed to establish a new manufacturing facility. We need alternative solutions.

VAXXAS- Home grown technology, to be manufactured here ¹⁴¹⁵

Vaxxas is a privately held biotechnology company focused on enhancing the performance of existing and next-generation vaccines with its proprietary HD-MAP technology platform. The HD-MAP enables vaccines to be administered by a small patch applied to the skin, replacing a needle/syringe. The core technology was developed at the University of Queensland and the company was founded with initial investments from OneVentures Innovation Fund 1, Brandon Capital, the Medical Research Commercialisation Fund (MRCF), and US-based HealthCare Ventures. OneVentures Innovation Fund I and the MRCF are supported by the Australian Government's Innovation Investment Fund (IIF) program.

The HD-MAP is made of biocompatible polymer. It is smaller than a postage stamp and comprises thousands of micro-projections that are invisible to the naked eye. These micro-projections are coated with vaccine and can penetrate the outer layer of the skin to deliver the vaccine directly to dense populations of immune cells. The device is applied to the skin for just 10 seconds by using a disposable applicator.

To date, VAXXAS has developed and manufactured its product within the Translational Research Institute in Brisbane, but there is not sufficient manufacturing capability at TRI for the upcoming trials and early stage production.

In late 2020, the Queensland Government announced that it will partner with Vaxxas to establish a facility at Brisbane's Northshore Hamilton for the manufacture of products for late stage (Phase II and III) clinical studies.

This announcement followed Vaxxas securing US\$22 million, through the U.S. Government's Biomedical Advanced Research and Development Authority (BARDA), to support pandemic deployment of their HD-MAP. The initial focus of the BARDA program will be on a pandemic influenza vaccine, but Vaxxas will also investigate opportunities to improve the performance of other pandemic vaccines, including against COVID-19.

The agreement with BARDA also provides access to manufacturing capability in the USA.

¹⁴ <https://www.mrcf.com.au/2020/10/05/vaxxas-announces-us22-million-a30-6-million-award-from-u-s-government-to-advance-vaxxas-needle-free-hd-map-vaccine-patch-technology-for-pandemic-response/>

¹⁵ <https://statements.qld.gov.au/statements/90979#:~:text=State%20partners%20with%20world%2Dclass%20med%20tech%20company%20to%20create%20Qld%20jobs,-Published%20Sunday%2C%2004&text=A%20Queensland%20medical%20technology%20company,thanks%20to%20the%20Palaszczuk%20Government.>

Readier access to manufacturing facilities to produce medical products for clinical trials could be key to keeping the further development of new medical products in Australia; and it could provide a base for establishing the full scale manufacturing capability for medical products in Australia when the product is in the market and generating revenue.

While Vaxxas has succeeded in this first stage with support from the Queensland Government, there is scope for the development of several manufacturing facilities in Australia able to support the manufacture of devices, pharmaceuticals and other therapeutics for clinical trials.

The provision of manufacturing facilities for clinical trials would contribute to the development of new home grown medical product companies undertaking full scale manufacturing in Australia, and contribute to the goal proposed earlier to make Australia a net exporter of pharmaceuticals by 2035.

Research Australia submits the Commonwealth Government should investigate how it can support the development of domestic manufacturing capability of medical products for clinical trials. This includes funding a feasibility study into establishing one or more manufacturing facilities for clinical trial materials to capitalise on Australia's global competitive advantage in clinical trials. It should investigate the provision of facilities in partnership with the health and medical research and innovation sector and funding models involving consortia of government and private investors.

Using Government procurement to promote innovation

In 2016, Innovation and Science Australia undertook a review of the performance of Australia's innovation performance. One of the ways it identified the Australia Government could better support Australian innovation was through its procurement processes.

'Relative to other countries, government procurement could do more to foster innovation.'

The majority of OECD countries use procurement approaches 'not only to foster value for money but also to pursue other policy objectives'.¹³⁷ Australia ranks 63rd out of 138 countries for the extent to which government purchasing decisions foster innovation.¹³⁸

Australia's relatively poor performance on this measure may be related to the emphasis government procurement guidelines place on value for money. This could discourage domestic innovation and investment in innovation.

Conversely, overseas examples highlight the potential for governments to use procurement as a direct mechanism to increase the incentives for innovation. For example, the government-wide US Small Business Innovation Research programme was established in 1982 to encourage small businesses to participate in US Government R&D and potentially commercialise their outputs. The programme requires government departments spending more than \$100 million on extramural R&D to set aside a portion of this spend for small businesses. Similarly, the UK Small Business Research Initiative was established in 2001 to improve the number of small R&D-based businesses winning contracts from government.¹⁶

¹⁶ Innovation and Science Australia (2016) Performance Review of the Australian Innovation, Science and Research System 2016. Commonwealth of Australia. Canberra. Page 29

Medical products provide an ideal opportunity for the Australian Government to use its role as customer to support Australian R&D and manufacturing. This is because the Australian Government is a major purchaser of healthcare products and services on behalf of the Australian population.

The VAXXAS case study above refers to the funding the company received from the U.S. Government's Biomedical Advanced Research and Development Authority (BARDA). While similar to the US Small Business innovation Research Program referred to in the ISA report, it has a more specific and strategic focus.

Research Australia submits the Government should develop an Australian equivalent of the US Government's Biomedical Advanced Research and Development Authority (BARDA) and Centers for Innovation in Advanced Development and Manufacturing (CIADM), with the objective of supporting the development and domestic manufacture of new medical products needed to protect the health of the Australian population.

BARDA

Biomedical Advanced Research and Development Authority (BARDA), part of the HHS Office of the Assistant Secretary for Preparedness and Response, was established to aid in securing our nation from chemical, biological, radiological, and nuclear (CBRN) threats, as well as from pandemic influenza (PI) and emerging infectious diseases (EID). BARDA supports the transition of medical countermeasures such as vaccines, drugs, and diagnostics from research through advanced development towards consideration for approval by the FDA and inclusion into the Strategic National Stockpile. BARDA's support includes funding, technical assistance and core services, ranging from a clinical research organization network to Centers for Innovation in Advanced Development and Manufacturing, and a fill-finish manufacturing network. BARDA supports a diverse portfolio of medical countermeasures and these products have received a total of 55 FDA approvals, licensures, or clearances.

Our mission is accomplished through successful public-private partnerships with industry to share risk, improve efficiency and accelerate development all while sustaining a marketplace that guarantees continued access to countermeasures vital to our national security.¹⁷

The focus is on products the US Government needs to protect its population and BARDA provides financial and other support from later stage research through to manufacture of the product and then acts as a cornerstone purchaser. The manufacturing capability is delivered through three BARDA sponsored Centers for Innovation in Advanced Development and Manufacturing (CIADM).

Centers for Innovation in Advanced Development and Manufacturing

BARDA has established three Centers to develop and manufacture medical countermeasures, such as vaccines and therapeutics used to protect health in emergencies, which can transition quickly and cost effectively between products. Created as public-private partnerships, the Department of Health and Human Services' (HHS) Centers for Innovation in Advanced Development and Manufacturing (HHS CIADM) will provide a significant domestic infrastructure in the United States capable of producing medical countermeasures to protect Americans from the health impacts of bioterrorism as well as pandemic influenza and other disease in response to public health emergencies.

The HHS CIADMs were created through a public-private partnership model, bringing together the innovative ideas of small biotech firms, the training expertise of academic institutions, and the development and manufacturing experience of large pharmaceutical companies. This helps to ensure a sustainable domestic medical countermeasure infrastructure with unprecedented ability to accelerate development and

¹⁷ <https://www.phe.gov/about/barda/Pages/default.aspx>

manufacture medical countermeasures in time of need. These Centers will also be used to explore emerging and innovative technologies that could be applied to current or future medical countermeasure development efforts to reduce risk, increase yield, and ultimately to reduce total life-cycle costs through flexible manufacturing, consolidating other costly product development expenditures, or any other economy-of-scale opportunities.

To date BARDA has funded three Centers with contracts capable of renewal for up to 25 years, representing a long-term commitment to this partnership with industry and to national security. Under these contracts, the HHS CIADM performers will retrofit existing facilities, or build new facilities to incorporate flexible, innovative manufacturing platforms that can be used to manufacture multiple products. These facilities will be capable of using modern cell- and recombinant-based vaccine technologies that have the potential to produce vaccines for not only pandemic influenza but also other threats more quickly and economically.

Emergent Manufacturing Operations Baltimore LLC, with facilities in Baltimore and Gaithersburg, MD, will lead one Center, working with a network of partners; Michigan State University, Kettering University of Flint, Michigan, and the University of Maryland, Baltimore. This contract is for approximately \$163 million over the first eight years.

Novartis Vaccines Division will head a second Center, leveraging existing public-private investments by HHS in a state-of-the-art, multi-purpose facility in Holly Springs, NC, and working with North Carolina State University and Duke University. The Novartis contract is valued at approximately \$60 million over the first four years.

Texas A&M University System will lead a third Center collaborating with GlaxoSmithKline Vaccines of Marietta, PA, Kalon Biotherapeutics of College Station, TX, and their extensive network of institutes. This contract is valued at approximately \$176 million over the first five years.

Establishing the centers achieves a core recommendation cited in the 2010 Public Health Emergency Medical Countermeasure Enterprise Review; a comprehensive, government-wide review called for by Secretary Sebelius to address challenges encountered in developing biodefense medical countermeasures. These centers also address concerns raised by the President's Council of Advisors on Science and Technology in the August 2010 Report to the President on Reengineering the Influenza Vaccine Production Enterprise to Meet the Challenges of Pandemic Influenza, which called for flexible, nimble, and modern vaccine manufacturing technologies.¹⁸

BARDA and the CIADM have been critical components of the US Government's vaccine development response to the COVID-19 pandemic.^{19,20,21}

Medical products provide an opportunity for the Australian Government to use its role as customer to support Australian R&D and manufacturing, while also protecting Australia's population and ensuring supply of essential medical products, including in emergencies. The Government could support the development of products in areas where it thinks the product will be useful and it will be a potential purchaser- this includes pharmaceuticals, therapeutics and medical devices, as well as drug delivery mechanisms like Vaxxas.

¹⁸ <https://medicalcountermeasures.gov/barดา/core-services/ciadm.aspx>

¹⁹ <https://www.hhs.gov/about/news/2020/07/27/hhs-reserves-and-rapidly-expands-manufacturing-capacity-for-covid-19-vaccines-at-texas-center.html>

²⁰ <https://www.tamus.edu/update-on-production-of-covid-19-vaccine-candidates-by-texas-am-system-subcontractor/>

²¹ <https://www.medicalcountermeasures.gov/newsroom/2020/emergent-plasma/>

The Australian Government already provides some of this support on an adhoc basis. An example is the recent agreement reached with CSL in which the Government has supported the development of a new manufacturing facility here and has committed to buying vaccines.

‘Global biotechnology leader CSL Limited (ASX:CSL; USOTC:CSLLY) today announced that Seqirus, a wholly owned subsidiary of CSL, plans to invest more than AUD\$800 million in the construction of a new biotech manufacturing facility in Melbourne to supply influenza vaccines to Australia and the rest of the world.

This investment decision follows the agreement with the Australian Government for the supply over 10 years of influenza pandemic protection for the Australian population, anti- venoms for Australian snakes, spiders and marine creatures and Q-Fever vaccine.’ 16 November 2020²²

Point of Care diagnostics (POCDs) enable conditions to be diagnosed in the GP clinic without the need to send samples to an external laboratory. While centralised pathology laboratories work well in our capital cities, this model can mean patients in remote communities wait days to get vital results, and the cost of transporting samples is much greater.²³

In addition to delaying the commencement of treatment, pathology lab testing requires follow up appointments to act on the results when received. All this can lead to additional workload for practitioners, poorer treatment and greater inconvenience for patients, and extra costs to the Australian Government.

Supporting the development and production of accurate and cost-effective POCDs could provide benefits to the Australian Government, the population and our medical products industry. POCDs could be a good target area for an Australian BARDA style program.

An mRNA Development and Manufacturing Facility for Australia

In the 1990s a group of scientists at the CSIRO discovered how to activate one of the most fundamental gene control pathways in plants. Building on this Australian discovery, Australia is now a global leader in RNA research, in both plants and humans. The future of many medicines will be RNA-based.

Australia has world-leading research capacity in RNA and the opportunity to become a world leader in the large-scale manufacture of RNA medicines, creating jobs in advanced manufacturing and opening up new global export markets. Without a local manufacturing capability, there is a future sovereign risk that Australia will need to rely on foreign imports of RNA-based medicines.

A large-scale RNA medicines manufacturing facility, funded under a similar model to the USA’s CIADM, has the potential to:

- Ensure security of local supply to a whole range of next-generation medicines and act as the regional gateway to export markets

²² <https://wcsecure.weblink.com.au/pdf/CSL/02309014.pdf>

²³ <https://www1.racgp.org.au/newsgp/clinical/are-we-about-to-see-a-new-dawn-for-point-of-care-t>

- Capitalise on Australia's existing scientific excellence in this field and accelerate research outcomes by translating findings into access to better medicines and commercial outcomes for Australians.
- Act as a model for how Australia can establish the medical industries of the future using its existing scientific expertise.

Research Australia recommends the Government undertake a feasibility study into establishing a local manufacturing capability in mRNA technology, ascertain market appetite and the potential return to the economy on any Commonwealth investment.

Why invest in health and medical research and innovation?

In addition to the increased export revenue and new jobs, all Australians benefit from strong investment in health and medical research and innovation.

Improving the health of the Australian population is central to improving national productivity. Australian health and medical research leads to new medicines, technologies and treatments that cure us when we are ill or injured. It plays a significant role in disease prevention through the development of vaccines, as well as technologies for early disease diagnosis. More immediately, health and medical research in Australia continues to tackle how to best deliver healthcare, providing critical evidence that addresses clinically important unanswered questions.

COVID-19 has provided examples of the critical role played by Australian researchers and the quality of our research. Epidemiologists supporting government decisions in relation to COVID-19 by modelling the effects of different policy responses. Rapid work commenced in Australia to analyse the virus genome, and to develop vaccines and treatments. Research Australia has already referred to our report, *COVID-19 How Australia's health and medical research sector is responding* which outlines more than 200 such responses.²⁴

Health and medical research and innovation can lead to efficiencies that help constrain health expenditure; reducing the call on the taxpayer, and the cost to consumers through health insurance premiums and out of pocket expenses. For every dollar invested in Australian health research and development, an average of \$3.90 in health benefits is returned.²⁵

The greatest opportunities for improvement and innovation in our healthcare system lie in the systematic application of evidence-based healthcare, driven by the best research. COVID-19 and the search for treatments and vaccines have highlighted the vital link between research and health care. All the advice has been evidence based, including around the role of masks, physical distancing, and the use of Personal Protective Equipment.

²⁴ Research Australia, 2020, COVID-19 How Australia's health and medical research sector is responding, available at <https://researchaustralia.org/covid-19/>

²⁵ KPMG, Economic Impact of Medical Research in Australia, October 2018, commissioned by the Australian Association of Medical Research Institutes

Beyond COVID-19, with Australian healthcare expenditure in 2018-19 estimated to be \$196 billion, even relatively small efficiency improvements can have significant economic benefit.²⁶ For example, adverse events in hospital are events that lead to harm to patients. Approximately 5% of patients experience an adverse event, and these patients stay an average of 10 days longer in hospital. Screening for risks such as falls and medication errors are recognised ways of reducing adverse events that that can be addressed with digital solutions, leading to millions of dollars in annual savings.²⁷

According to the Australian Commission on Safety and Quality in Healthcare, there is a \$5.80 return on each dollar invested in clinical trials conducted by Australian networks.²⁸ For example, a clinical trial conducted in Australian intensive care units demonstrated that it was just as effective to treat patients with normal saline rather than the far more expensive human albumin solution. This discovery has led to a change in international guidelines and practice, saving hundreds of millions of dollars per year, not only in Australia but also worldwide.²⁹

The Productivity Commission has reported that the healthcare sector is ripe for significant productivity improvements. Health and medical research and innovation will be one of the key drivers of this change- providing new technologies and approaches to improve efficiency, and new platforms to support the quicker uptake of new practices into healthcare.

The Third Atlas of Healthcare Variation, published in December 2018, continues to highlight unwarranted variation in the delivery of healthcare, pointing to a lack of consistent adoption of evidence-based care across the system.³⁰

While undertaking the research to establish the best type of care to deliver is essential, it is not enough. We must redouble our efforts to ensure that this knowledge is communicated and implemented more quickly and consistently throughout our healthcare system and the broader community.

The ongoing impact of COVID-19 on universities

As outlined earlier in Research Australia's submission, one of the few areas of increased expenditure on R&D in Australia has been in the universities, supported by revenue from teaching international students.

The impact on universities of the loss of this revenue was recognised by the Government in the October 2020 Budget with an injection of \$1 billion into the Research Support Program in the calendar year 2021. This has been a vital injection of funding, which will help support jobs and research in the higher education sector throughout 2021.

While difficult to predict accurately, COVID-19 is expected to reduce enrolments from international students at Australian universities for several years beyond 2021. There are several

²⁶ Australian Institute of Health and Welfare 2020. Health expenditure Australia 2018–19. Health and welfare expenditure series no.66. Cat. no. HWE 80. Canberra: AIHW

²⁷ <https://www2.health.vic.gov.au/hospitals-and-health-services/patient-care/older-people/resources/improving-access/ia-adverse>

²⁸ <https://www.safetyandquality.gov.au/our-work/clinical-trials/>

²⁹ See ACTA and NHMRC, 2015, Report on the Activities & Achievements of Clinical Trials Networks in Australia 2004 – 2014 for this and other examples

³⁰ The Australian Commission on Safety and Quality in Healthcare, 2018, *The Third Australian Atlas of Healthcare Variation*

reasons for believing international student numbers will not rebound to pre-COVID numbers in 2020. International travel around the world is significantly disrupted and travel is both more difficult and expensive than it was before. COVID-19 is having a devastating effect on the health and economies of countries we draw students from, such as India. China has threatened to prevent international students coming to Australia. COVID-19 has disrupted education worldwide, affecting senior secondary students' preparation for tertiary education. Students who were in Australia and have returned may face different economic circumstances and be unable to resume their studies.

The Mitchell Institute has used visa data to track the movement of international students.³¹ There were more than 600,000 international students enrolled at Australian universities in April 2020, of whom around 500,000 were in Australia. Using best and worst case scenarios provided by Treasury in the October 2020 Budget, the Mitchell Institute has modelled the likely impact on international student enrolments. By July 2021, the Mitchell Institute expects total enrolments to be between 450,000 (best case) and 350,000 (worst case). The number actually in Australia is expected to be significantly lower, at between 290,000 and 165,000.

It is likely to take several years for international student numbers to return to 2019 levels. In the meantime, universities and medical research institutes continue to incur both direct and indirect costs associated with research projects that commenced before the pandemic, and new projects that have commenced since. In the next few years, they will continue to have less of the revenue from international student fees that they have relied on in recent years to subsidise these costs.

In the October 2020 Budget, the Government made an additional \$1 billion available to universities in 2021 through the Research Support Program, providing a vital injection of funds to higher education research to counter the loss of revenue for international student fees and support universities' research efforts, including in response to COVID-19.

Research Australia submits the Government should provide a further \$1 billion of short term funding to universities through the Research Support Program to offset the expected continued impact of reduced international student revenue in the 2022 calendar year.

The nature of researcher employment

The COVID-19 pandemic has revealed differences in the security of employment of different workers and occupations across our economy. Most people would be surprised to learn that for many, a career in health and medical research and innovation is insecure.

A survey of health and medical researchers undertaken by Research Australia in May 2020 survey included questions about employment status. 54% of researchers at universities and 74% of researchers at MRIs were employed on a contract basis. By far the most common contract term was 12 months. A further 5.27% are employed on a casual basis. The number of

³¹ Hurley, P. (2020). Coronavirus and international students. Mitchell Institute, Victoria University. Melbourne.

respondents on fixed term contracts at universities and MRIs is far higher than the national average across the economy.³²

This type of fixed term contract employment is very insecure. These researchers' incomes and careers are dependent on their ability to attract research income such as NHMRC and ARC grants. If the funding they are able to attract is insufficient to fund the research or is exhausted before the research can be completed because of delays and disruptions, they must try to find other funding. If they are unable to do this, the research can't be completed, and they are out of a job. Apart from the loss of income this directly affects their careers, which are driven by being able to publish research findings.

Australian Government funding for research through the National Health and Medical Research Council, the Australian Research Council and the Medical Research Future Fund is provided to an individual or group of researchers for a fixed period and for the delivery of specific outcomes.

It rapidly became clear in March and April that COVID-19 was going to significantly disrupt and delay research projects. In our survey we asked respondents to estimate the financial impact of these delays and disruptions to their research. The total financial impact reported just by survey respondents is conservatively estimated at \$75 million; the impact across the whole sector is estimated to be hundreds of millions of dollars.³³

It is also clear that many research projects will not be able to be delivered on time or on budget and some may not be restarted at all. However, while the NHMRC, ARC and MRFF are in a position to extend the time available for research projects, they have not been able to increase the funding available.

This places research projects at risk of not being able to be completed. It also presents the real risk of these projects' researchers being left without salaries.

Research Australia submits that the Government should establish a modest pool of funding of \$100 million for the specific purpose of providing bridging funding to Government funded health and medical research that will be unable to be completed within the existing grant budget because of the disruptions and delays caused by the COVID-19 pandemic. This funding would be applied on a contingency basis.

The major benefit of this measure is that it would enable the existing research to be completed, effectively protecting the investment the Commonwealth Government has already made in the research and the outcomes it will deliver for our community. It will also help to preserve jobs at a time of high unemployment and when job creation and protection is critical to both the health and medical research sector and the economy more generally.

It would not address the problem of researchers who are entirely reliant on funding from their institutions, and institutions would still need to cover the continuing 'funding gap'. But it would be a start, and one in which the Commonwealth was leading by example.

So how could this bridging funding be distributed? Like the Australian Research Council (ARC) and the Medical Research Future Fund (MRFF), the National Health and Medical Research

³² G, Gilfillan, Trends in use of non-standard forms of employment, December 2018, Australian Parliamentary Library

³³ Research Australia, 2020, The impact of COVID-19 on health and medical researchers, available at https://issuu.com/researchaustralia/docs/covid-19_series_report_final

Council (NHMRC) is offering extensions to grant periods for the research it funds. Researchers could also be invited to make applications for additional funding when they seek the grant extension. The amount would be calculated to enable the research to be completed.

Such a process could allow for a staggered application period, in the last year of the current grant; only research grants due to conclude this year would apply this year and so on. Where researchers were successful in securing other additional funding over the next few years, or in making up time, they may not need to apply for the additional funding, or only for a reduced amount.

Implementation of this measure would require the Commonwealth Government to provide an injection of funds to enable the NHMRC to create a specific pool of funding within the NHMRC's Medical Research Endowment Account for this purpose. This contingency fund could only be used for the outlined purpose and any unexpended funds could be returned to the Commonwealth. Equivalent mechanisms could be put in place for the MRFF and ARC.

NHMRC and ARC funding

Australia's universities and medical research institutes are the foundation on which Australian health and medical research and innovation is built, and the Commonwealth Governments' premier funding bodies are the National Health and Medical Research Council (NHMRC) and the Australian Research Council (ARC).

The NHMRC's funding programs are clearly aligned with health and medical research; the importance of the Australian Research Council's own programs to health and medical research is less obvious but just as real. While the ARC does not fund 'medical and dental research', it funds basic life sciences research. It also funds the application of research in a range of disciplines, including biochemistry, engineering, computing and the social sciences, which directly and indirectly support health and medical research and its application.

NHMRC Programs

The 2020/21 Budget revealed funding for the NHMRC's programs continuing to decline in real terms, as it has done for many years now. The nominal increase in this financial year is less than 1%, with annual increases of around 1% thereafter. This is lower than the forecast CPI of 1.75% for this financial year and the slightly higher CPI expected in subsequent years.

NHMRC MREA Funding 2020 Budget

\$m.	19-20	20-21	21-22	22-23	23-24
Funding to the MREA 2020 Budget	846,554	853,864	862,412	872,770	884,960
Funding to the MREA 2019 Budget	842.766	856.250	869.950	883.870	N/A

ARC Programs

The Australian Research Council's funding programs are critical to Australian publicly funded research including to the life sciences and medical technologies.

Over the forward estimates provided in the 2020 Budget, the funding to the ARC for the Discovery Program declines slightly this financial year before recovering slightly in 2021-22. Critically, the funding is at significantly lower levels than forecast in the 2019 Budget. In real terms, funding to the Discovery Program declines over the forward estimates.

2020 Budget

\$m.	18-19	19-20	20-21	21-22	22-23	23-24
Discovery (2020 Budget)		485.754	483.272	487.016	487.860	490.610
Discovery (2019 Budget)	493.951	507.044	513.542	525.537	538.350	N/A

The ARC Linkage Program has been singled out by the Government as an important component of Australia's innovation system. Funding over the forward estimates is higher than forecast in last year's budget, with a significant increase in this financial year, but future years fail to keep pace with inflation.

2020 Budget

\$m.	18-19	19-20	20-21	21-22	22-23	23-24
Linkage (2020 Budget)		289.102	322.181	323.871	325.240	327.074
Linkage (2019 Budget)	265.974	279.168	288.788	295.246	301.741	N/A

While not funding 'medical and dental research', the ARC Linkage program remains important to the health and medical research and innovation sectors for the reasons outlined earlier.

The trend of funding NHMRC and ARC research program increases at less than inflation cannot continue if Australia is to develop the more diversified and knowledge driven economy that we need to secure our future. We are currently missing a real opportunity to capitalise on the sector's expertise to make technological advances and address current and emerging issues, such as our ageing population. We are also at risk of jeopardising the 'golden opportunity to become a leader in future medical research and clinical trials, bringing not only new medicines but new jobs to the country', outlined by Health Minister Greg Hunt in July.³⁴

We also know that COVID-19 is creating a range of issues for our community, directly through the impact of the virus but also through the economic disruption it is causing. These include the long-term effects of COVID-19 post recovery and evaluating the impact of new innovations such

³⁴ <https://www.abc.net.au/news/2020-06-14/coronavirus-opportunity-australia-medical-research-global-leader/12353754>

as telehealth. All of these are areas that could benefit from new research, and additional funding.

And if the MRFF is to achieve its full potential it is essential that the financial assistance it provides ‘complements and enhances’ existing government funding sources, as specified in the MRFF’s enabling legislation. It was not designed to be, and nor should it be seen as, the panacea to existing funding challenges. Sustainable and consistent funding at the basic end of the pipeline must occur if there is to be research for translation at the other end, including via the MRFF.

Research Australia submits that funding for the research programs of the NHMRC and ARC must be increased in real terms and in their own right, in the 2021-22 Budget and over the forward estimates.

Indirect research costs

The funding from the ARC, NHMRC and MRFF meet only part of the costs of the research to which they are directed. They are a contribution to the direct costs of research, such as paying researchers’ salaries and purchasing necessary equipment and experimental materials. They do not cover the cost of ‘keeping the lights on’, quite literally and metaphorically: paying utility bills, administrative staff, maintenance on buildings and facilities.

Securing appropriate levels of funding for the indirect costs of research conducted in Australia’s higher education institutions and medical research institutes is a longstanding problem and far from international best practice. It has been exacerbated by recent developments, including an emphasis on universities partnering with industry on research projects and reductions in the revenue of higher education institutions. It is widely recognised that teaching revenues from domestic and international students subsidise research expenditure, including covering indirect costs. The reduction in universities’ international teaching revenues caused by COVID-19 has further limited the ability of universities to contribute to meeting indirect research costs.

Universities

Currently, universities receive funding from the Department of Education and Training’s Research Support Program (RSP). The RSP distributes a pool of money to universities in proportion to the research income each university received in the reporting period.

The Government is using the Research Support Program to provide an injection of \$1 billion into higher education research in the 2021 calendar year. However, funding in subsequent years is actually lower than was forecast in the 2019 Budget.

2020 Budget

\$m.	18-19	19-20	20-21	21-22	22-23	23-24
2020 Budget		902.062	1918.298	926.490	929.270	938.107
2019 Budget	894.016	902.062	920.573	941.748	962.455	

Funding for the indirect costs of research funded by the MRFF is now provided from the Research Support Program. Because the RSP is not increasing, the inclusion of MRFF grants and the increases in MRFF funding are set to reduce the amount of Research Block Grant funding awarded for each dollar of direct grant funding by around 10 cents next financial year, with the impact increasing further over the forward estimates.

With the MRFF providing hundreds of millions of dollars in funding to universities over the next few years, beyond this financial year **a substantial increase in the Research Support Program is needed just to maintain the levels of research support funding for research projects at their current already inadequate level.** Combined with increased MRFF funding, the cuts to the Research Support Program beyond the one-off boost in 2020-21 represent a real and continued threat to the capacity of our universities to undertake vital health and medical research, and indeed research in all disciplines.

Similar issues arise with the Research Training Program (RTP), used to fund the training of Higher Degree by Research students. More than half of research in universities is undertaken by PhD students, and more grants from the MRFF is creating greater demand for PhD students to undertake the research.

The RTP is also falling in real terms over the course of the forward estimates and like the RSP the level of funding is lower than forecast in the 2019 Budget. These cuts further undermine the ability of universities to undertake research, and they increase the component of indirect research costs which is unfunded.

Medical Research Institutes

While their circumstances and sources of funding for indirect costs are different, the situation is at least as difficult for Independent Medical Research Institutes (IMRIs), those not affiliated with a university. IMRIs are ineligible to participate in the RSP or to receive funding from the ARC. IMRIs receive funding to partially subsidise indirect research costs from the NHMRC through the Independent Research Institute Infrastructure Support Scheme (IRIIS). IRIIS provides funding to IMRIs to assist with indirect research costs, at a rate of up to 20% of the value of NHMRC grants awarded to IMRIs. **No funding support for indirect research costs associated with MRFF grants is available to IMRIs.**

Funding for indirect research costs was raised as an issue during the public consultation on the inaugural five-year strategy and two-year priorities for the MRFF conducted by the MRFF Advisory Board in 2016. While the MRFF Advisory Board subsequently drew attention to the issue of funding for indirect research costs, it did not offer a solution:

A whole-of-government approach is needed to address the issue of research costing to ensure the research sector can continue to thrive. MRFF funding cannot in isolation solve the conundrum that surrounds indirect costs and may with the injection of new funds increase the need for a solution. The Advisory Board, while advocating for a whole-of-government and research sector agreed solution, must therefore abstain from implementing yet another funding model. In the short term MRFF program investment should adhere to existing costing approaches. Collaboration between Government and funded bodies to identify an equitable solution should be prioritised.³⁵

Indirect research costs were also examined by the House Standing Committee on Education, Employment and Training at the request of the Minister for Education. The Committee's report,

³⁵ Australian Government, MRFF Advisory Board, 2016, Australian Medical Research and Innovation Strategy 2016-2021, p.7

tabled on 26 November 2018, recommended that ‘the administration of research block grants be reviewed to provide more timely and adequate support for the indirect costs of research.’

The following four recommendations reiterate Research Australia’s position outlined in our Pre-Budget submissions in 2016, 2017, 2018 and 2019. They remain valid. Beyond the short term COVID response of the \$1 billion injection into the Research Support Program, long term reform is required.

The cuts to the Research Block grants outlined in the October 2020 Budget must be reversed.

The pool of funding for the Research Support Program and the Research Training Program needs to be increased proportionately in the 2021-22 Budget to reflect the inclusion of MRFF competitive grants in the Programs.

In a similar manner, an additional stream of the IRIISS program needs to be funded by the Department of Health to cover the indirect costs associated with MRFF funding incurred by IMRIs. This funding should be administered by the NHMRC.

In the longer term, Research Australia supports the call of the MRFF Advisory Board for a whole of government approach to the issue of funding indirect research costs. **Research Australia proposes that the Chief Scientist lead a review of the funding of indirect research costs to establish a sustainable and equitable funding program.**

Funding for research infrastructure

Commissioned by the Australian Government, the 2016 National Research Infrastructure Roadmap outlines national research infrastructure required over the coming decade so that Australia’s research system continues to improve productivity, create jobs, lift economic growth and support a healthy environment.

In the October 2020 Budget, the Government announced several new funding initiatives as part of the 2020 NCRIS Investment plan, including the BioFoundry, and committed funding to several scoping studies for new infrastructure, including biobanking.

The 2021 National Research Infrastructure Roadmap is currently under development and is due to be completed by August 2021. The new Roadmap replaces the 2016 Roadmap and provides an opportunity to consider Australia’s future research infrastructure needs in the context of the Government’s current strategy to increase the commercialisation of research, and Research Australia’s call for a substantially increased investment by the Government in R&D.

Research Australia submits the Government should make a commitment in the 2021-22 Budget to expand the existing Government’s \$1.9 billion, 12 year funding envelope for national research infrastructure in support of the 2021 National Research Infrastructure Roadmap.

National Innovation Strategy 2030

The National Innovation Strategy is an important piece of public policy; it is intended to set the direction for Australian science, research and innovation through to 2030, at a time when this has arguably never been more important to Australia's future. If we get this right it will help establish Australia as a leading player in Industry 4.0, the fourth industrial revolution, and lay the foundation for prosperity for decades to come. And, of course, this will only happen if the Strategy's implementation is supported by sustained national investment in:

- our education system,
- our publicly funded research organisations, institutes and universities; and
- an innovation system that supports private sector investment and innovation.

While the Government provided a response to the report accepting the majority of the recommendations in principle, there has been little progress since in implementing the report's recommendations.

In the 2021-22 Budget the Government should commit the additional funding required to implement the remaining measures outlined in the Australian Government response to *Innovation and Science Australia's Australia 2030: Prosperity through Innovation*. These include, for example, implementation of a framework to identify and implement additional National Missions. (Recommendation 28)

When Innovation and Science Australia (now Industry Innovation and Science Australia) was commissioned by the Government to develop the National innovation Strategy, it was asked to do so within the existing medium term average level of Government expenditure of R&D of 0.63% of GDP.

Research Australia submits Industry Innovation and Science Australia should be charged with revisiting the National innovation Strategy and making recommendations based on long term spending of 0.75% of GDP. This review can be supplemented with the work of the National COVID-19 Commission Advisory Board to provide a new direction and drive for Australia's economy. It can also incorporate the Governments' Modern Manufacturing Initiative.

Measuring Innovation performance

With innovation so central to Australia's future, it is essential that we are able to measure Australian Research and Development activity across the economy.

The Australian Bureau of Statistics undertakes two-yearly surveys of Research and Development activity in Government, Higher Education, Business and the Private Non-profit sectors. (It undertakes two surveys each year alternating between the sectors, so that each sector is measured every second year.) While the surveys are useful, the two-yearly 'staggered' nature of the data collection and analysis makes it difficult to capture an accurate snapshot of progress.

More significantly, the data are not reported in enough level of detail to enable an assessment of the performance of particular sectors, or the impact of particular Government programs. Data on Research and Development are reported by the Australian Bureau of Statistics using the Standard Research Classification Codes of Socioeconomic Objective (SEO) and Field of Research (FOR). These codes use a system whereby activity is initially grouped at a high level; for example, the broad activity of Manufacturing is assigned the Code 86. Specific industries

within Manufacturing are assigned a specific code within this division; for example, Human Pharmaceutical products is 8608.

Human Pharmaceuticals manufacturing is a strategic target of the Australian Government's investment in innovation, however the ABS does not provide data on R&D at the four-digit code of 8608. Data is only available at the level of Manufacturing, making it impossible to distinguish expenditure on pharmaceuticals from any of the other 18 categories in the Division. A similar issue arises with Fields of Research, with data on research and development only reported at the two-digit code level. It is not possible, for example to distinguish expenditure on biochemistry and cell biology from expenditure on genetics, physiology, plant biology or zoology. All are simply reported in the ABS statistics as expenditure on '06 Biological Sciences'.

This issue was identified in *Australia 2030: Prosperity through Innovation*, and the Government has acted on the report's recommendation to commission a review of how innovation is measured. The Innovation Metrics Review, originally due to publish its report in December 2019, is expected to make recommendations for improved collection of data around Australian innovation.

It is vital that we are able to appropriately measure and evaluate the performance of innovation in Australia and the effectiveness of Government programs to ensure transparent and efficient use of public funds with the highest possible positive impact and outcomes. Research Australia urges the Government to make provision in the 2021-22 Budget for the implementation of the Innovation Metrics Review's recommendations.

Investing in Prevention

One of the most cost-effective ways of improving Australians' health outcomes is through investment in prevention.

Research Australia congratulates the Health Minister and the Government on the current initiative to develop a 10 Year National Health Prevention Strategy. This strategy will bring together existing initiatives as well as lead to new programs, and preparatory workshops have already identified areas where new resources will be required; for example in better data collection to ensure that we can effectively monitor and evaluate new programs.

While there are many elements to a Health Prevention Strategy, changing Australians' behaviour is key. And while we know this is difficult, we also know that we have been successful in doing so in the past, for example with reducing smoking rates, and with Sun Smart campaigns to reduce the risk of melanoma.

Research Australia conducts annual polling of the Australian public on matters relating to health and medical research. In our 2019 Poll we asked people about managing their own health. While individuals reported a high awareness of what they need to do to maintain their health physical health (97%) and mental health (83%) a majority of Australians would welcome more information and practical advice about what they can do to maintain their own health, again with a greater emphasis on mental health (58%) than physical health (52%).³⁶

³⁶ Research Australia, 2018, *Australia Speaks! 2018 Opinion Polling for Health and Medical Research*, p.16 available at <http://researchaustralia.org/reports/public-opinion-polling/>

There is clearly a role for more health prevention measures as part of a new National Health Prevention Strategy, and while cost effective in the long term, effective national prevention programs need to be adequately funded. We also need to ensure we have the resources in place to develop effective programs and to monitor and evaluate the outcomes.

Research Australia urges the Government to use the Budget to make a significant multi-year commitment to fund implementation of the new 10 Year National Prevention Strategy currently being developed.

Data for better health and prosperity

The potential value of publicly held data has been recognised by the Australian Government and action is being taken to improve the value Australia derives from this data.

Initiatives in this area include the Department of Prime Minister and Cabinet's work on the Public Sector Data Management Strategy, the creation of the Australian Government Public Data Policy Statement, and the Government's response to the Productivity Commission Inquiry into the Availability and Use of Public Data.

The experience in 2017 with the opt out period for the My Health Record illustrates the need to ensure the Australian population is better engaged with and informed about both the risks and benefits of the digitisation of healthcare.

Artificial intelligence for insights in health

Advances in computing power and the development of artificial intelligence are powerful tools that can be utilised to improve health outcomes and build future export industries but are reliant on the data being made available to provide the insights. The 2019 CSIRO report, commissioned by the Government, *Artificial intelligence: Solving problems, growing the economy and improving our quality of life* has identified health, ageing and disability as one of the high potential areas of artificial intelligence specialisation for Australia.

*'This involves the use of AI to improve human health (either via prevention or treatment), achieve healthy ageing and support people living with disability. Solutions relating to this proposed AI specialisation are of high value considering rising or high rates of chronic illness, ageing populations and unsustainable growth healthcare expenditure. Disability support enabled by AI will benefit the 4.3 million Australians who live with disability, as estimated by the Australian Bureau Statistics. AI can be transformative for disabled people by improving their life opportunities and helping them get good jobs. Australia already has world-leading capabilities in AI for health, ageing and disability support. These issues are shared by countries worldwide and we can export our solutions into the global marketplace.'*³⁷

³⁷ Hajkowicz SA1+, Karimi S1, Wark T1, Chen C1, Evans M1, Rens N3, Dawson D1, Charlton A2, Brennan T2, Moffatt C2, Srikumar S2, Tong KJ2 (2019) Artificial intelligence: Solving problems, growing the economy and improving our quality of life. CSIRO Data61, Australia., page 2

The Report outlines a range of actions that need to occur over the next decade and beyond to support this development, including:

- developing an AI specialist workforce;
- upgrading the skills of the broader workforce;
- access to high quality datasets;
- strong Data Governance to enhance public trust;
- research to apply the insights from AI in the real world (e.g. engineering solutions for surgical robots, bionics and automated cars);
- digital Infrastructure and cybersecurity; and
- standards for interoperability and ethics.³⁸

Making the most of the opportunities outlined in the Report will require significant leadership and investment from the Australian Government; we are pleased that the Minister for Industry, Science and Technology, the Honourable Karen Andrews, has welcomed the report, and we look forward to a more detailed response.

Research Australia submits that the Government should commit funding in the 2021-22 Budget for implementation of the measures outlined in the CSIRO Report, *Artificial intelligence: Solving problems, growing the economy and improving our quality of life*.

We also acknowledge the MRFF initiative for Applied Artificial Intelligence Research in Health as a positive step in this direction.

Government capacity to share and release data

A critical part of the Government's response to the Productivity Commission report is the work it has undertaken to encourage Government departments and agencies to share and release data, and to build their capacity to do so. This includes the appointment of a National Data Commissioner and the development of new legislation.

Research Australia has been actively involved in the consultations to develop the new Data Availability and Transparency Bill. In addition to supporting Government departments and agencies to share and release data, it will implement a process for accrediting researchers and research institutions as 'trusted users' of data. Draft legislation is expected to be released for consultation in the next few months before being finalised and ready for introduction to the Parliament.

Research Australia submits the Government should make provision in the 2021-22 Budget for the infrastructure needed to support the new Data Availability and Transparency Bill in anticipation of its passage through the Parliament in 2021.

The Government should also continue to invest in capacity building in Commonwealth departments and agencies to enhance their ability to capture, manipulate and analyse data, and their capability to link data and to prepare secure, deidentified datasets for public release.

This funding will complement the legislative steps being taken with the Data Availability and Transparency Bill and build on the investment the Government has already made in modernising

³⁸ Ibid, Chapter 9

Government Departments through the Data Integration Project for Australia (DIPA), which concluded on 30 June 2020.³⁹

Utilising Health Data

The Government has made a significant commitment over many years to the development and implementation of the My Health Record. This is an important initiative with the potential to save lives, improve the delivery of healthcare, and increase the health system's efficiency and productivity.

The report of the Productivity Commission Inquiry into Data Availability and Use has highlighted the significant social and economic benefits to be derived from making public data more available. The relative importance of health data was highlighted by the Commission's Report.⁴⁰ It concluded that across all of Government, some of the greatest gains could be made through making health data more available.⁴¹ Many of these recommendations relate to better access to data for researchers and innovators.

An earlier report of the Productivity Commission looking at the opportunities for productivity improvements in health highlighted the role of data in this regard:

*'More generally, administrative data — including performance data, patient health records and government-held datasets on patients' use of medications or procedures — can support development of a more rigorous evidence base on the clinical and cost effectiveness of health interventions. Among other things, these data (subject to appropriate privacy safeguards) enable researchers to investigate the burden of disease, access to health care across the community, and the effectiveness of specific health interventions. This can help health care providers to choose the best treatments for individual patients. It also helps governments and insurers to make better overall funding decisions by directing funding to where the greatest health benefits can be achieved (including to preventive health measures), and away from interventions with low or no clinical value.'*⁴²

Some of the greatest opportunities for better health outcomes lie in preventive health measures and public interventions. The burden of non-communicable disease has increased rapidly in the last two decades, linked to obesity and population wide changes in daily activity. Health data can be used to monitor changes in populations and sub-populations, and to identify emerging issues and solutions.

Access to reliable and current health data makes public health interventions both more effective and more cost effective, making it possible to respond more quickly to emerging issues. In addition to making the data available, it requires a commitment to use this data and a meaningful commitment by governments to evidence-based policy development and implementation.

The secondary use of My Health Record data for research and public health purposes is central to achieving this ambition and is supported by the Australian public. In public polling undertaken

³⁹ <https://www.pmc.gov.au/public-data/data-integration-partnership-australia>

⁴⁰ Productivity Commission 2017, *Data Availability and Use*, Report No. 82, Canberra Pp. 509

⁴¹ Productivity Commission 2017, *Data Availability and Use*, Report No. 82, Canberra Pp. 5-6

⁴² Productivity Commission 2015, *Efficiency in Health*, Commission Research Paper, Canberra. p.75

on behalf of Research Australia in mid 2018, ninety percent of respondents supported the use of patients' medical records for research purposes.⁴³

The Australian Institute for Health and Welfare (AIHW) has been appointed to manage and release datasets for the My Health Record secondary use of data. The first data releases are expected to occur as early as 2020.

Research Australia urges the Government to use the 2021-22 Budget to ensure the AIHW is adequately resourced to prepare for and undertake the significant new role of preparing and providing de-identified My Health Record data for research and public health purposes.

⁴³ Research Australia, 2018, *Australia Speaks! 2018 Opinion Polling for Health and Medical Research*, available at <http://researchaustralia.org/reports/public-opinion-polling/>

Conclusion

The COVID-19 pandemic has highlighted the world leading health and medical research being undertaken in Australia and the critical role research and innovation has played in helping us navigate this health crisis.

At the same time, it has highlighted successive Australian Governments' historic underinvestment in health and medical research, leading to an over reliance on the capacity of universities to generate international student revenue and direct it to funding research, and on philanthropy to fill the gaps.

In the longer term, economic recovery from the pandemic creates an opportunity for a healthier and more prosperous Australia.

All Australians benefit from strong investment in health and medical research and innovation. The opportunity provided through the health, medical research and innovation sector is immense for both the health and wealth of our nation. From a national security perspective, a strategic investment in enhanced medical production can help ensure Australians have access to vital medical products at times of crisis, such as the COVID-19 pandemic. The USA provides a useful model for how this can be achieved.

Improving the health of the Australian population is central to improving national productivity. Australian health and medical research leads to new medicines, technologies and treatments that cure us when we are ill or injured. It plays a significant role in disease prevention through the development of vaccines, as well as technologies for early disease diagnosis. More immediately, health and medical research in Australia continues to tackle how to best deliver healthcare, providing critical evidence that addresses clinically important unanswered questions.

The 2021-22 Budget provides the opportunity for the Australian Government to consolidate the reviews and policy changes it has initiated in the last few years and in the October 2020 Budget to improve the health and wellbeing of the Australian population and to reposition Australia as a modern and innovative nation with a knowledge-based economy. However, this requires a renewed commitment to significant investment in innovation to reverse the declines in recent years that are evident when investment in R&D is considered as a proportion of GDP.

In addition to raising national prosperity and diversifying our economy, smarter investment in health and medical research and innovation can improve the effectiveness of our health system; constraining the rise in health costs that accompany an ageing population. It can also provide a sustainable pathway to addressing modern lifestyles factors such as obesity. Smarter investment also drives skilled employment in vibrant new pharmaceutical, medical device and biotechnology industries.

An overarching national health and medical research strategy which ensures smarter, coordinated, strategic public investment in all stages of research would maximise impact on national priorities such as burden of disease, the stronger translation of evidence-based research into healthcare delivery, and exploit areas of international competitive advantage. Imagining and preparing for the Australia we want in 50 years' time has to start today.

Research Australia is pleased to have had the opportunity to make this submission on behalf of our broad membership which is drawn from across the health and medical research pipeline. We are also willing to provide further information and/or contribute further.

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