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Learning from COVID-19: strengthening Australia's research capacity through preparedness and collaboration

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Summary

The coronavirus disease 2019 (COVID-19) pandemic has highlighted that preparedness for and responsiveness to pandemics requires public health platforms and processes which are nimble and evidence-based and a research ecosystem which is rapidly responsive to the evolving needs of society and decision-makers. The national BEAT COVID-19 research consortium was funded in 2020 by the Snow Medical Research Foundation (Snow Medical). Its Expert Advisory Committee met with the consortium post-pandemic to summarise the research undertaken and to consider lessons learned through the research response to COVID-19 in Australia. The panel observed that philanthropy offered an important 'kick-starter' funding mechanism for urgent research, which facilitated leveraging of additional funds. It further agreed that research requirements for strengthening Australia's pandemic preparedness and response include: (1) development of a national health and medical research strategy for pandemic research; (2) long-term investment in pre-established research partnerships and networks; (3) systemic procedural improvements, e.g. in ethics, governance and resource allocation; (4) responsive funding mechanisms including philanthropy; and (5) integration of research outputs into health practice and decision-making, as illustrated in Figure 1.

Keywords: preparedness; research; pandemic; COVID-19; collaboration

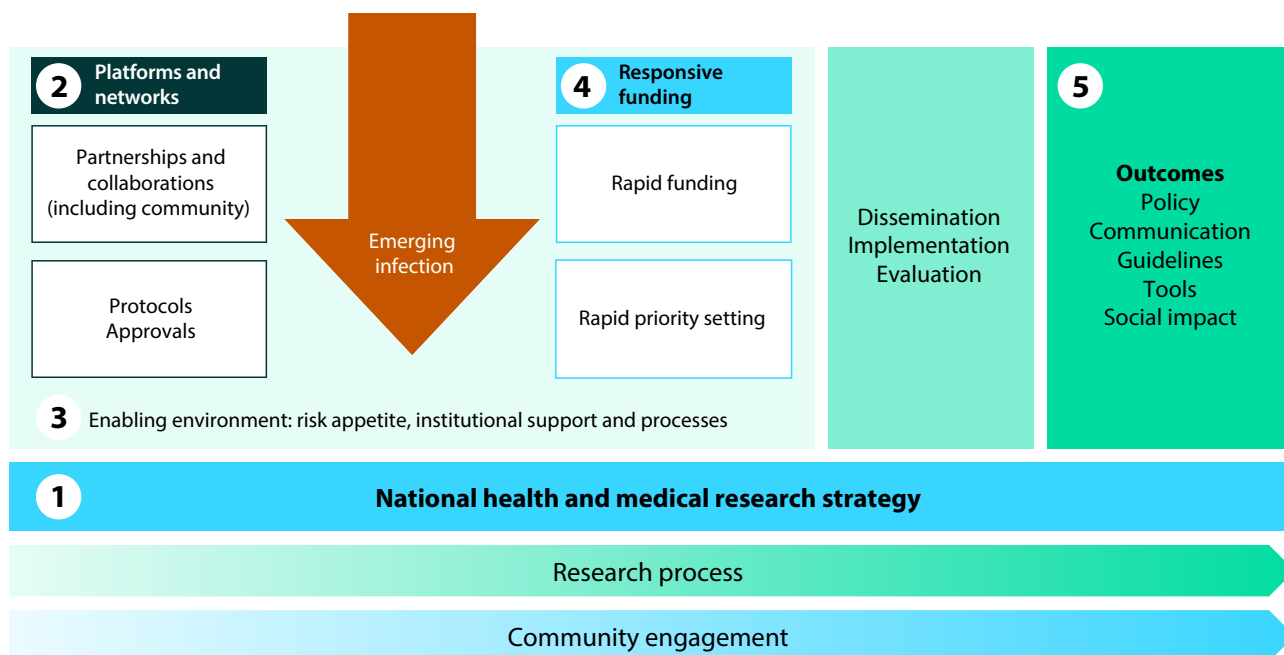
Abbreviations: Australian Partnership for Preparedness Research on Infectious disease Emergencies (APPRISE); COVID-19 clinical data analytic platform (CDAP); The Centre for Research Excellence on Emerging Infectious Diseases (CREID); National Health and Medical Research Council (NHMRC); National COVID-19 Health and Research Advisory Committee (NCHRAC); Medical Research Future Fund (MRFF)

Background

Despite a generally positive national response to coronavirus disease 2019 (COVID-19), major and evolving challenges within the Australian research and implementation landscape became evident during the pandemic. Details of the challenges and suggested solutions for public health disease prevention and response policies, clinical care, communication and the needs of disadvantaged and culturally different subpopulations have been canvassed in

several consultative clinical, public health and government forums (most notably the Commonwealth Government COVID-19 Response Enquiry).¹ An Australian clinical trials team have highlighted the challenges for clinical research, calling for a co-ordinated national clinical trials strategy, including co-ordinated, pre-approved clinical trials platforms to support future pandemic research.²

Figure 1: Elements of an effective research response to emerging infections



The BEAT COVID-19 consortium was funded in early 2020 by Snow Medical to improve and accelerate the Australian public health response. Researchers were drawn initially from two established, multi-jurisdictional National Health and Medical Research Council (NHMRC)-funded Centres of Research Excellence—The Centre for Research Excellence on Emerging Infectious Diseases (CREID) and the Australian Partnership for Preparedness Research on Infectious disease Emergencies (APPRISE)—plus two computational analytics groups. Four research programs included clinical data analytics, community seroprevalence and rapid diagnostics, natural history cohorts and the exploration of cytokine biomarkers of infection. Members of the Expert Advisory Committee were drawn from the NHMRC, the tertiary education sector, federal and jurisdictional government health departments, and the community. This opinion piece presents the perspective of the BEAT COVID-19 consortium and its multi-sectoral, high-level Expert Advisory Committee.

Recommendations for strengthening Australia's pandemic research response

1. Link translational research to decision-making through a national health and medical research strategy

Proposition: Pandemic research underpinned by a national strategy would support an effective health system response and drive best practice in public health and clinical care.

Diverse translational and implementation research achieves the best outcomes when embedded within health systems and services. Co-design, with community involvement in planning and conducting research, is essential to meet the needs of affected individuals, the community, researchers and decision-makers.³ A national health and medical research strategy can ensure that diverse requirements are reflected in research plans and that strategic priorities are addressed in pandemic research. This could strengthen equity in the research response by integrating diverse perspectives, including those of First Nations people, culturally and linguistically diverse communities, researchers and government in the development and governance of the strategy.

It is hoped that the recently announced National Health and Medical Research Strategy will specifically address the pandemic context.⁴

In some countries, including Singapore and the United Kingdom (UK),^{5,6} a Government-led process informed rapid allocation of strategic research funding, encouraging large groups to collaborate. While these systems differ from Australia's federated system in having a central government responsible for public health, the swift, co-ordinated processes led to impactful research in diverse areas.^{7,8}

Australian research is funded through multiple avenues including Commonwealth and jurisdictional government instrumentalities, industry and philanthropy. Rapid research initiatives, including those led by state governments, were a welcome addition to the research funding pool for COVID-19, but resulted in some duplication and, for clinical trials in particular, failed to generate studies of sufficient size (and representation) to draw meaningful conclusions.²

In future, early national priority setting with an ongoing engagement forum for researchers, community representatives, Chief Medical and Health Officers and research funders, including philanthropists, should be considered to facilitate large national studies complementing international efforts. Such an advisory committee could be incorporated in the new Australian Centre for Disease Control (ACDC) and/or aligned with one of the Joint MRFF and NHMRC Advisory Committees currently soliciting members.⁹ Operationally, there would need to be a streamlined and transparent mechanism for urgent program approval and for rapid allocation and deployment of funds, aligned with the National Health and Medical Research Strategy. The strategy could also inform where and how international partnerships could contribute to and complement Australian research efforts.

2. Capitalising on existing platforms and networks for addressing urgent research needs

Proposition: Pre-established research partnerships and networks enable rapid research initiation but require long-term investment.

Overlap between two NHMRC Centres of Research Excellence provided an established network of cross-disciplinary researchers poised to address COVID-19 research questions. These were APPRISE, funded initially in 2016 to enable a rapid response to infectious disease emergencies,¹⁰ and the CREID network, funded in 2015 to focus on the application of genomics technologies for understanding and responding to emerging infectious diseases.

APPRISE and CREID allocated a small tranche of funding (\$AUD630K) for urgent COVID-19 research in early 2020. This seed funding supported several projects, allowing research programs to move fast, but requiring investigators to apply for further funds elsewhere. In particular, it supported rapid activation of pre-approved protocols, leading to the first description of the immune response to COVID-19,¹¹ and expansion of the REMAP-CAP platform trial in intensive care.¹² CREID researchers were able to identify critical missing links in New South Wales COVID-19 clusters by adapting and linking their validated genomics and analytics platforms with epidemiological and modelling data.¹³

The BEAT COVID-19 consortium rapidly leveraged these existing investments in protocols, platforms and networks for further COVID-19 research. The Snow Medical funding enhanced the implementation of newly-developed serological tests to identify the extent of COVID-19 spread.¹⁴ Patient cohorts and linked specimen biobanks supported detailed investigations into both natural COVID-19 infection and vaccination, informing vaccination policy.^{15,16} An open source COVID-19 clinical data analytic platform (CDAP) was adapted from existing web-based tools to facilitate clinical decision support and the design of Bayesian adaptive trials.^{17,18}

Long-term investment in research partnerships and networks would enable similar swift responses to new or emerging public health challenges. These partnerships must include community representatives and are particularly important for First Nations communities and organisations where trusted relationships are fundamental for any research undertaking and essential for effective response.^{19,20}

3. Creating and maintaining an enabling environment for urgent research

Proposition: Systemic and permanent institutional and process changes are needed to facilitate urgent research.

Pandemic urgency drove widespread changes to research initiation processes. These were facilitated by a desire to rapidly contribute to the crisis response and by an increased public appetite for and endorsement of pandemic-related activity.

Some previously lengthy standard research requirements (e.g. in ethics and governance) were accelerated and streamlined. Social research projects reinforced confidence in the systems of participant protection and strengthened the social licence for research.^{21,22}

Together with improved internal and inter-institutional processes, pre-existing ethics-approved protocols enabled swift research initiation. While not every research question can be anticipated, basic platforms for pandemic research—including the establishment or expansion of participant cohorts with plans for longitudinal biological sampling which underpin multiple areas of research—are best initiated within weeks of an emergent infection. Australia did well in this area, specifically by leveraging existing involvement in a global intensive care-based adaptive trials network and in observational trials.

Consumer and community engagement was another challenge that was addressed in some areas of COVID-19 research but not in others. Such engagement is best established well before an emergency arises; working closely with affected communities and consumer representatives strengthens research responses including for implementation and, importantly, for uptake by communities.

4. Enabling responsive funding for research collaboration

Proposition: Responsive funding mechanisms, including philanthropy, are a key research enabler for addressing emerging threats.

The networks that underpinned the BEAT COVID-19 collaboration were well established when COVID-19 emerged. They initially leveraged rapid funding opportunities provided by philanthropic donors and jurisdictional Departments of Health, and redirected funds from their existing grants. These funds supported a range of existing and new collaborative projects including a national serosurvey,¹⁴ social research on infection control, quarantine^{22,23} and COVID-19 testing behaviours,²⁴ and a substantial First Nations-led research program on pandemic planning for and impacts on First Nations communities.^{25,26}

Additional funds for COVID-19 research in Australia were rapidly mobilised by the MRFF through regular calls in key areas. As of May 2024, over \$AUD124M had been allocated for diverse projects including vaccines, diagnostics and pathogenesis.²⁷ The processes for review of these grants were accelerated and supported by the NHMRC, which had the significant challenge of supporting researchers at a time of great disruption. Necessarily, significant delays to distribution of funding were still incurred by the nature of the application, review and assessment processes, though these research calls maintained the critically important processes of open competition and external peer review. Perhaps the most challenging area to fund with this model were clinical trials. With only two states affected for much of the pandemic and with low numbers of infections until late 2021, Australian trials were limited in the absence of national co-ordination. In contrast, strategic UK funding efforts initiated early, large-scale national projects with extensive collaboration.²⁸

Funding research in a crisis is a trade-off between strategic fund allocation to inform response (which is fast and targeted but may lack transparency) and opening opportunities for competitive application (which is slower and less predictable but provides greater accountability).

Philanthropic funding enabled a fast start to the four translational and implementation research programs in the BEAT COVID-19 consortium. Ultimately, the consortium expanded to include 36 collaborating groups and more than 120 researchers across Australia, leveraging more than \$AUD26M in subsequent, mainly competitive, funding. The consortium contributed multiple publications, presentations at national and international meetings, media interviews and a community forum on vaccines. Most importantly, it enabled impactful research including rapid development of SARS-CoV-2 diagnostic and surveillance tools, identification of biomarkers, a large (international) digitised image bank of CT scans, and web-based adaptive clinical trial designs to evaluate treatments and/or vaccines. The combination of existing research networks and rapid funding mechanisms was beneficial in enabling rapid research responses as well as in setting the scene for expanded networks and longer-term research projects.

5. Integrating research outputs into health practice and decision-making

Proposition: Ensuring that research is linked to health and social impact requires community relevance, strategic dissemination and implementation of results and ongoing evaluation.

The COVID-19 pandemic highlighted the importance of research and brought the process of evidence generation and evaluation more openly into the public domain. The use of preprint servers exploded, expanding the availability of research findings and highlighting the challenge of ensuring the quality of study design, data and analysis in the absence of formal peer review. Fast publishing and open access to data is critical in an emergency, with huge advances during the pandemic, for example in genome sequencing and publishing, though mechanisms for routinely reviewing and summarising emerging evidence were challenging to identify and maintain.

For policy and decision-makers in Australia, there were multiple sources of synthesised evidence. These included (i) the Rapid Research Information Forum led by the Australian Academies of Science (AAS) and Health and Medical Sciences (AAHMS) and (ii) the National COVID-19 Health and Research Advisory Committee (NCHRAC) to advise Australia's Chief Medical Officer. Both committees provided evidence synthesis and briefing to government, but there were sensitivities about making these reports public. The National COVID-19 Clinical Evidence Taskforce was rapidly established and funded by the NHMRC and philanthropy. This taskforce provided essential and cohesive publicly available guidance to clinicians using real-time evidence review. State governments also commissioned their own evidence synthesis. In summary, many groups were providing input through diverse channels. Evidence review and communication for different audiences is an essential component of the research process, and critical in the context of pandemic response when the international evidence base is constantly shifting. A co-ordinated response to evidence review should be considered to minimise duplication of effort, while acknowledging the different purposes and audiences for different bodies.

Concluding statement

The COVID-19 pandemic was a disruptive challenge for the Australian health and medical research sector. Well-established research networks, combined with new and adaptive funding mechanisms, contributed to impactful research and policy outcomes; however, there were a number of challenges and areas where a more co-ordinated and strategic approach would be beneficial. We have presented a perspective from the Advisory Committee of one large research consortium, with recommendations for strengthening and enabling more community-responsive, relevant and co-ordinated research and use of research findings for future pandemic response.

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