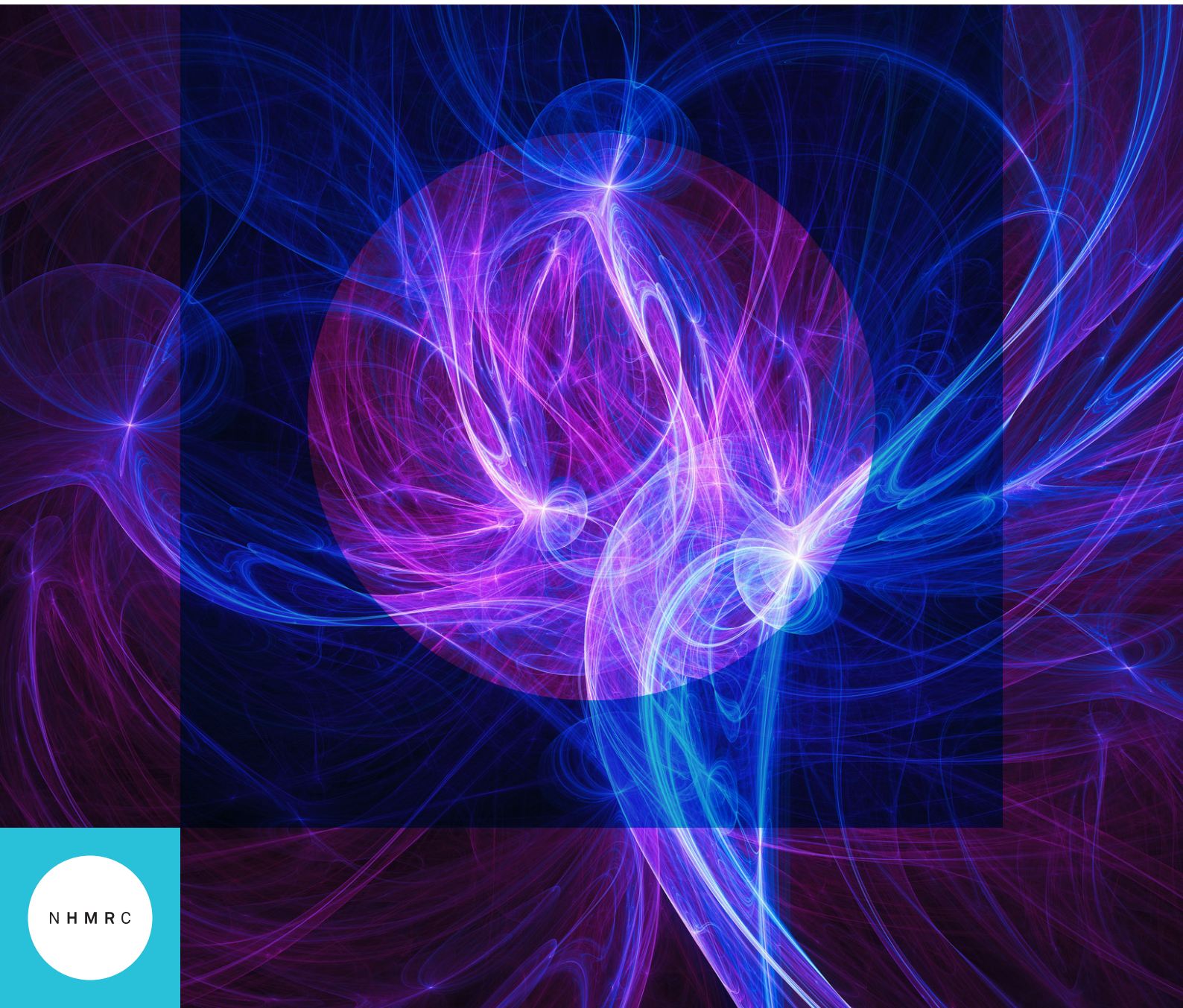
Australian Government
National Health and Medical Research Council

Report

Research Quality Workshop

30 July 2019



NHMRC

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Introduction

High quality research that is rigorous, transparent and reproducible maximises the opportunity for benefits to be gained. High quality research:

- contributes to scientific progress
- is essential for the translation of research outcomes to practical and clinical applications and evidence-based policy that benefits the community
- delivers the highest possible value from research investment
- respects research participants, the wider community, animals and the environment, and
- promotes community trust in scientific findings.

Ensuring the conduct of high quality research is a priority for NHMRC and is reflected in NHMRC's Research Quality Strategy[1] released in May 2019. The Strategy was developed with advice from NHMRC's Research Quality Steering Committee.[2]

NHMRC recognises that partnering with the research sector in Australia is essential to ensure high quality research. NHMRC's Research Quality Workshop on 30 July 2019 provided sector representatives with an opportunity to discuss the Strategy and its implementation. It also assisted NHMRC to identify connections between the Strategy and existing and proposed activities and initiatives occurring in the sector to ensure research quality, and will inform NHMRC's ongoing activities to ensure the highest quality in NHMRC-funded research. While this first workshop was a closed event to facilitate the easy exchange of information during the discussions, ongoing engagement with the research sector is planned throughout implementation of the Strategy.

The workshop was facilitated by Professor Paul Glasziou (Chair, Research Quality Steering Committee). Areas of the sector represented amongst the workshop participants included:

- Universities
- Group of Eight Australia
- Medical research institutes
- Australian Research Council
- Universities Australia
- Commonwealth Scientific and Industrial Research Organisation
- Department of Health's Office of Health and Medical Research
- Peak medical research bodies (Association of Australian Medical Research Institutes, Australian Society for Medical Research, National Association of NHMRC Research Fellows)
- Australian Academies (Australian Academy of Health and Medical Sciences, Australian Academy of Science, Australian Academy of Science Early- and Mid-Career Researcher Forum)
- Council of Australian University Librarians.

The meeting was also attended by Professor Anne Kelso (Chief Executive Officer, NHMRC), representatives from NHMRC's Research Quality Steering Committee and the Chair of NHMRC's Research Committee[3] (Professor Steve Wesselingh).

The workshop agenda is at Appendix A.

[1] https://www.nhmrc.gov.au/research-policy/research-quality

[2] https://www.nhmrc.gov.au/research-policy/research-quality-steering-committee

[3] https://www.nhmrc.gov.au/about-us/leadership-and-governance/committees/research-committee

Key messages

Overview

- Appropriate education and training in good research practices provide researchers with the necessary knowledge, skills and competencies that are essential for the conduct of high quality research.
- Institutional support is essential for the creation and maintenance of a culture that supports the conduct of high quality research.
- Infrastructure and tools to support high quality research should be provided at the local, state, national and international level, and should address discipline-specific needs.
- There are clear benefits to 'research on research' (meta-research) for understanding and improving how research is performed, communicated, verified, evaluated and rewarded.
- Factors that are of most concern to, and have the biggest impact on, early- and mid-career researchers were education and training, research culture, job security and transfer of information and data when changing jobs.
- There are many opportunities for establishing incentives for good research quality and positive cultural change.

The workshop included discussions amongst participants that focused on some of the early initiatives being undertaken by NHMRC as part of implementation of the Strategy. The feedback from these discussions will be used to inform NHMRC's ongoing activities to ensure the highest quality in NHMRC-funded research. The following summarises the key messages from the workshop.

Education and training in good research practices

- Appropriate education and training[4] in good research practices provide researchers with the necessary knowledge, skills and competencies that are essential for the conduct of high quality research. Training also contributes to the establishment of a research culture that supports high quality research and is a crucial part of institutional support for researchers.
- Training in good research practices should be provided to higher-degree research students, and researchers at all levels including senior researchers. Training for supervisors including mentorship training was identified as critical. Some institutions included training in good research practices in undergraduate degree programs.
- Approaches that had a positive influence on the uptake and acceptance of training programs included integration of training about good research practices with other training in research ethics and research integrity, provision of discipline-specific training, provision of specific training at the time when it was needed ('just-in-time' training), a staged approach with non-mandatory and mandatory training requirements depending on the career stage, policies and practices that led to training being viewed as valuable rather than a compliance requirement, and ensuring the engagement of supervisors which had a positive influence on student attitude to training and its outcomes.

[4] In this document, the term 'training' is taken to mean 'education and training' to encompass underpinning knowledge as well as training in specific skills.

- Areas where researcher competence is critical for the conduct of high quality research regardless of the discipline (critical core competencies) included:
  - study design – for example, adequate controls (positive and negative), randomisation, blinding, automation
  - study statistics and analysis – for example, adequate protocol, adequate power, data management plan
  - study reporting
  - replication – for example, independent replication within or between centres, biological repeats within the same laboratory, validation of materials or components.
- Discipline-specific areas where competence is required included systematic reviews, registration of studies and establishment of the research question. Specific training in reviewing grant applications and publications was also recommended.
- Formal assessment of competence and accreditation of researchers was identified as a mechanism for supporting the continuing improvement in research quality. Possible approaches included the development of a specific training package for researchers, micro-credentialing aligned with a staged and/or needs-based approach, and the potential engagement of professional bodies or colleges with the provision or management of researcher training and accreditation. Other models included the *Competencies for Australian Academic Clinical Trialists (2018)* which provides core competencies to support the training of staff involved in the conduct and oversight of clinical trials[5], training requirements under hospital accreditation schemes, and the competency-based training developed for animal-based research in some institutions in compliance with state/territory animal welfare legislation.

Appropriate education and training in good research practices provide researchers with the necessary knowledge, skills and competencies that are essential for the conduct of high quality research.

Institutional support that will foster high quality research

- Institutional support was identified as essential for the creation and maintenance of a culture that supports the conduct of high quality research. Key elements included provision of effective training, promotion and performance review policies that reward good research practices and research quality, engagement with and advocacy by senior researchers, and policies and practices that drive a positive culture and support reporting of poor research practices at all levels.
- Examples of support provided within Australian institutions included systems to facilitate tracking and internal and external reporting of research programs of work and research impact, awards for research quality and good research practices, centrally funded statistical support for research groups, statisticians as advisors to/members of ethics committees (Human Research Ethics Committees and Animal Ethics Committees), support centres and standard frameworks for specific types of research (e.g. clinical trials, Indigenous research), mandated use of Electronic Laboratory Notebooks, provision of mentors outside of the research group, communities of practice, collaborations between research groups across institutions, and internal independent peer review of publications (prior to and after publication).

Institutional support is essential for the creation and maintenance of a culture that supports the conduct of high quality research.

[5] https://www.nhmrc.gov.au/about-us/publications/competencies-australian-academic-clinical-trialists

Infrastructure for research quality (including study registration, study design, study reporting)

- The provision of infrastructure and tools to support high quality research should be addressed at the local, state, national and international level. The heterogeneity of research affects the nature of infrastructure required with variations in discipline-specific needs. Training about study design, registration and reporting was identified as an essential element of this infrastructure.
- Collaboration hubs at all levels with sharing of expertise, and multi-centre rather than single-centre studies, can contribute to high quality research.
- Clinical trials are well-supported by current systems and infrastructure for registration and collaborative networks. Similar systems and infrastructure do not exist for other disciplines, in particular for the registration of preclinical studies which is an emerging area of development.
- Researchers need guidance about the registration of all types of research including the timing of registration, information and data sets that should be registered and available registries. Factors that could impede uptake of study registration included concerns about confidentiality and intellectual property.
- Support for research quality provided by university library services included research infrastructure to support compliance, reporting and open access publishing (for example, via institutional repositories) and infrastructure for research data management.
- Internationally accepted reporting guidelines exist for many research disciplines. However, further guidance and infrastructure may be needed for the reporting of negative or neutral results.
- Critical points for assessment of the quality of a research proposal included review by an ethics committee and peer review of a grant application. Research proposals should be reviewed by a statistician at the institutional level. Scientific advisory committees for ethics committees should provide advice so that ethics committees can be assured about the quality of the research proposal and to ensure that poorly designed studies do not proceed. Potential approaches for working with researchers to improve research quality included iterative feedback to applicants throughout the grant application process and identification of common areas of misunderstandings, with the US National Institutes of Health proposed as a useful international model.

Infrastructure and tools to support high quality research should be provided at the local, state, national and international level, and should address discipline-specific needs.

Research on Research

- The objective of 'research on research' (meta-research) is to understand and improve how research is performed, communicated, verified, evaluated and rewarded. While the benefits of meta-research were recognised, there were no clear avenues in Australia for funding for this type of research. The *National Health and Medical Research Council Act 1992* restricts NHMRC funding under the Medical Research Endowment Account to health and medical research.
- The establishment of an independent virtual 'Research on Research Institute' was proposed, with pooled funding from the sector. Potential funding sources included the Commonwealth and state/territory governments, industry, funders and universities. Philanthropic funding as well as the involvement of health insurers was also proposed.

There are clear benefits to 'research on research' (meta-research) for understanding and improving how research is performed, communicated, verified, evaluated and rewarded.

Early- and mid-career researchers (EMCRs)

Factors that were of most concern to, and have the biggest impact on, EMCRs were:

- The training undertaken by EMCRs and being responsible for the training of other people as supervisors. Concerns included whether poor training was contributing to the promulgation of poor research practices.
- The research culture and poor relationships and power imbalances with supervisors and as a supervisor, which can create an environment where poor research practices cannot be discussed openly and without adverse consequences.
- Lack of job security which may affect a researcher's capacity to raise concerns about or reject poor research practices.
- The mobility of the work-force and the consequent implications for transfer of information and data on leaving a place of work.

Factors that are of most concern to, and have the biggest impact on, early- and mid-career researchers were education and training, research culture, job security and transfer of information and data when changing jobs.

Incentives and barriers for good research quality

- Metrics such as number of publications, publications in high impact journals and grant income were often taken as proxies for research quality. However, these metrics were not accurate measures of research quality and acted as incentives for poor research quality. High quality research may not have a measurable impact and research that contributed to high quality research (for example, reproducibility studies) did not often attract funding.
- Incentives for good research quality and cultural change included the development and use of correct metrics for research quality, institutions making public statements about expectations and support for research quality, recognition and reward by the research community for good research practices and quality, promotion practices that consider and credit research quality, ensuring that research quality was adequately considered as part of a researcher's track record, development of a checklist for grant applicants to ensure that all criteria for research quality are addressed in the grant application, and support for the publication of negative or neutral results.

There are many opportunities for establishing incentives for good research quality and positive cultural change.

Initiatives and potential opportunities for collaboration

Many areas of the research sector, both nationally and internationally, have initiated actions to ensure the conduct of high quality research. The workshop participants identified some of these activities and initiatives and potential opportunities for collaboration within the sector.

Education and training in good research practices

- Training provided by university library services included publishing and dissemination of research findings, research data management, copyright and appropriate acknowledgement of the work of others, measuring research impact, ORCID and other research identifiers.
- One institution offered Certificate II qualifications in community-based research that included cultural knowledge and working with Indigenous and remote communities.
- The *Hong Kong Manifesto for Assessing Researchers: Fostering Research Integrity* was being developed following the 6th World Conference on Research Integrity (June 2019, Hong Kong). It includes components related to the promotion of research staff and assessment of research quality.

Institutional support that will foster high quality research

- The Institute Capability Framework (ADEPt) used by one institution included a scientific capability framework that provides a common foundation tool describing the expected accountabilities and behaviours of students, researchers, clinicians and leaders at the institution. The framework outlines the standard of excellence that staff and students should display and aspire to across four key accountabilities: research; people development and management; finances, resources and planning; and institutional culture.
- Systems for tracking and reporting of research impact, and for research programs, were being used/developed at several institutions.
- The *Research Bazaar* model used by some institutions had proven popular as the training was independent of formal institutional training.
- The UK Reproducibility Network[6] was a potential model for a network for gathering and disseminating information about improving research quality.

Infrastructure and tools for research quality (including study registration, study design, study reporting)

- A project supported by the Council of Australian University Librarians was examining the need for a central repository, rather than university-based repositories, for information and data management plans.
- One institution was examining a system for the registration of all studies involving the use of animals performed by the university.
- The application of the F.A.I.R Principles (Findable, Accessible, Interoperable, Reusable)[7] ensures the discoverability and impact of research publications and data.
- The Open Science Foundation[8] provides a platform for open science and collaboration. Other international resources included the *Experimental Design Assistant*[9], which was a free online tool designed to guide researchers through the design of animal-based studies, helping to ensure that they use the minimum number of animals consistent with their scientific objectives, methods to reduce subjective bias and appropriate statistical analysis.

[6] https://www.bristol.ac.uk/psychology/research/ukrn/

[7] https://www.fair-access.net.au/fair-statement

[8] https://osf.io/

[9] https://www.nc3rs.org.uk/experimental-design-assistant-eda

Research on Research

- Organisations that expressed interest in progressing the establishment of a virtual 'Research on Research Institute' included the Association of Australian Medical Research Institutes, Australian Academy of Health and Medical Sciences and the Commonwealth Scientific and Industrial Research Organisation.
- A suggested approach for progressing this initiative included an initial meeting between interested parties, establishment of how groups within the sector might contribute (for example, through funding, provision of relevant data such as information about research outcomes, coordination role, researcher) and a workshop to identify, refine and prioritise the research questions to be addressed by the Institute. The process followed by the James Lind Alliance[10] was proposed as a useful model for establishing these research questions.
- Potential 'research on research' questions identified during the workshop included:
  - How should incentives and barriers to research quality be measured?
  - How can the research sector and specific sections of the sector be influenced to modify existing barriers to research quality and achieve cultural change?
  - What are the incentives and barriers to publication of research results?
  - What are the key markers for research quality and how should these markers be defined and assessed?
  - What are the appropriate measures for research quality in publications and how should these measures be assessed?

Communication and engagement

- Participants supported the establishment of a *Community of practice* for research quality as part of the research quality agenda. The success of such a network was dependent on an individual(s) or organisation assuming responsibility for its management. Potential tools and models included SLACK (an example of a web-based collaboration hub) and the UK Reproducibility Network.[11]

> *There was strong support for a research quality 'community of practice' for gathering and dissemination of information and sharing of ideas and experiences.*

- The Australian Academy of Science Early- and Mid-Career Researcher (EMCR) Forum provides opportunities for communication and engagement with EMCRs through the EMCR Newsletter, E-update, workshops, annual conference and funding/co-sponsorship for initiatives that benefit EMCRs.
- The Australian Centre for Health Services Innovation (AusHSI) Workshop at the Queensland University of Technology 'What can researchers do to improve research quality in health and medical research in Australia?' (May 2019)[12] identified incentives for good research quality and education and training of researchers and supervisors as major issues in a pre-workshop survey.
- Existing international networks included the EQUATOR Network[13] and the Ensuring Value in Research (EViR) Funders' Collaboration and Development Forum.[14]

[10] http://www.jla.nihr.ac.uk/about-the-james-lind-alliance/

[11] https://www.bristol.ac.uk/psychology/research/ukrn/

[12] http://www.aushsi.org.au/what-can-researchers-do-to-improve-the-quality-of-health-and-medical-research-in-australia/

[13] http://www.equator-network.org/

[14] https://sites.google.com/view/evir-funders-forum/home

Appendix A: Workshop Agenda

Date: Tuesday, 30 July 2019

Time: 10.00am – 3.00pm

Venue: NHMRC Offices, 16 Marcus Clarke Street, Canberra, ACT 2601

Facilitator: Professor Paul Glasziou
Chair, NHMRC Research Quality Steering Committee

Time	Item	Format	Presenter
10.00am	Welcome and opening.	Presentation	Professor Anne Kelso
10.05am	Outline of workshop format.	Presentation	Professor Paul Glasziou
10.15am	Background and key issues. Introducing NHMRC's Research Quality Strategy. Introducing early initiatives in the Strategy.	Presentation	Professor Paul Glasziou
11.00am	Themed discussion amongst participant groups: 1. Education and training for good research practice 2. Institutional support that will foster high quality research 3. Infrastructure for research quality (including study registration; study design, study reporting) 4. Research on Research	Table discussion	Professor Paul Glasziou
12.05pm	Reporting back on themed discussions.	Verbal reports	Professor Paul Glasziou Representative from each discussion group
12.25pm	LUNCH		
1.25pm	Potential opportunities for collaboration through existing and proposed activities occurring within the sector.	Facilitated discussion	Professor Paul Glasziou
2.40pm	Wrap up and summary by facilitator. Final thoughts from CEO.	Presentation	Professor Paul Glasziou Professor Anne Kelso
3.00pm	Close		