26-30 August 2018, Melbourne

Joint International Society for Clinical Biostatistics and Australian Statistical Conference 2018

Statement of Action on Statistics in Health and Medical Research

This statement identifies urgent priority areas for action by relevant stakeholders (funding agencies, academic sector, biostatistics research community and professional societies) to protect and grow Australia's capacity and leadership in the critical field of biostatistics. The statement emerged from a meeting of conference delegates held on Thursday 30 August 2018 to discuss the importance of biostatistical methodology to ensuring the value of health and medical research, and our national capacity and needs in this area. The background to these discussions is summarised and the action points identified.

Delegates involved in statistical research from 37 countries came together in Melbourne in the last week of August 2018. This was the largest gathering of statisticians working in health and medical applications that has ever occurred in Australia. New theoretical developments motivated by health research challenges were presented, alongside practical advances in computational methods, which together will allow scientists to extract reliable, defensible knowledge from data.

Statistics has matured and broadened as a scientific discipline, and is an essential partner in meeting 21st century challenges in clinical and population health research. In these areas, valid statistical reasoning is critical throughout the entire process from study design to data analysis and reporting. Statistics is not just about computing and calculation. It is a key component of the scientific process, providing a theoretical basis for extracting knowledge from data. Statistical methodology research seeks to develop rigorous methods to quantify uncertainties in inferences arising from variation in populations, to identify and correct sources of bias, and to avoid over-confidence in conclusions. Through these developments, statistical research underpins our ability to efficiently extract reliable evidence from data as new questions and data structures arise. Methodological research programs are also a vehicle for developing research-grade statistical expertise, at doctoral and postdoctoral level, and for training the future biostatistical leaders needed in a changing data landscape. Given the recent push for reproducibility of research findings and reduction of waste in health research, there is a clear and urgent need to protect and grow our national capacity and leadership in biostatistical methodology.

What systems are in place in Australia to nurture a strong and sustainable culture of research and development in biostatistics as a core discipline? As stated by the Australian National Health and Medical Research Council (NHMRC), biostatisticians are "rare specialists" whose presence in research teams is critical for securing competitive funding and achieving successful study outcomes. However, Australia lags behind leading countries internationally in terms of funding for the development of biostatistics. In particular, in the UK and the USA, there has been enduring investment in the development of research-grade biostatistical expertise, via protected funding for methodology workforce development (including doctoral and postdoctoral training as well as research hubs) embedded in the medical research sector. This has been recognised as a cost-effective strategy for underpinning the quality and reliability of medical research and hence its credibility among both the scientific community and the general population. Such investments enhance health and save lives by improving the quality of care, disease treatment and prevention throughout the health system, and yet are lacking in Australia.

The academic sector also has a role to play in developing biostatistics departments and programs that meet the challenges of the 'data science' era. Worldwide the statistical sciences are adapting to new

advances in communication and computing: are Australia's undergraduate and graduate training programs keeping pace with these changes? As for biostatistical methodologists, are we taking responsibility for keeping the discipline present and relevant, considering both today's new computational advances and our leadership role in medical research?

To protect and grow Australia's biostatistical methodology capacity and leadership, there is a need to:

1. Stimulate specific investment in this core discipline within health and medical research. Initiatives could include working with the NHMRC and the Medical Research Future Fund (MRFF) in developing protected streams and targeted calls for:
    - Career support and research project funding in biostatistical methodology embedded in the Australian health and medical research system.
    - The establishment of networks or centres in biostatistical methodology research.
2. Continue to develop within the Australian academic sector innovative higher education programs that incorporate the most up-to-date biostatistical methods, align theory with practice, and emphasise the development of statistical thinking over a "toolbox" approach, within a cross-disciplinary context incorporating computer science and communication skills training.
3. Within the biostatistics discipline, ensure that methodological investigations are responsive to the needs of modern data-intensive health and medical research.
4. Mobilise our professional societies, such as the Statistical Society of Australia, to raise the profile of biostatistics and influence change in these areas.

This statement calls for initiatives to address these needs.

Australia can claim remarkable achievements in health and medical research. To continue striving for innovation and excellence in this area, it is vital that a healthy methodological core exists to underpin new analytical developments and innovative study designs, to accommodate new data structures and intensity of data collection, and to guide sound inference from data for novel application to clinical and public health practice.