

BRIEF COMMUNICATION

Research trends in Australia and New Zealand Nephrology: basic science and gender equity in peril

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Abstract

Basic science research remains fundamental to progress in clinical care, understanding of disease pathophysiology and underpinning the evolution of personalised medicine. Exposure to research is pivotal to educating students, but a declining profile of basic science research has the potential to erode research capacity further. The capacity for women to engage in research and remain in academia long term is continually challenged by negative gender-based experiences and institutional barriers. The authors explored themes and authorship of abstracts presented at Australia and New Zealand--based nephrology conferences, as a surrogate marker of trends in research activity and gender engagement. Basic science research and female senior authorship declined during the study period, which has serious implications for the future of nephrology.

Recent commentaries have noted a reduction in basic biomedical research publications in the medical literature.¹ Tier 1 funding rates for biomedical research in Australia have declined significantly from >30% in 2000² to <10% in 2021, and male researchers secure a disproportionately greater amount of research funding.³ Gender imbalances have been noted at medical conferences nationally,⁴ and there are well-recognised barriers to women reaching leadership positions within Science, Technology, Engineering, Mathematics and Medicine (STEMM) academia.⁵

To establish whether these national trends are reflective of research in nephrology, we conducted a retrospective observational study to assess changes in abstracts presented at the annual scientific meetings (ASMs) of two major nephrology societies in Australia and New Zealand, with regard to the type of research and gender distribution of authorship.

Ethics approval was granted by the Western Sydney Local Health District Human Research Ethics Committee (2019/ETH13233) and the Scientific Program and Education Committees of both the Australia and New Zealand Society

of Nephrology (ANZSN) and the Transplantation Society of Australia and New Zealand (TSANZ). The conferences evaluated were from the ANZSN and the TSANZ from 2005 to 2020. We audited official ASM programmes and included all abstracts (poster, oral and prize categories). We excluded meetings run in combination with international societies (2008 for TSANZ and 2018 for ANZSN). The research theme of each abstract (clinical vs basic science) was determined by examining the Aims, Methodology and Results sections and verified by cross-referencing this with the society classification. The binary gender of both the senior and first authors was determined from the publication (where possible), society databases or internet. The proportion of total abstracts submitted was identified for each year and Pearson product-moment test was used to identify the significance level. A chi-square test was then performed to identify whether the proportions of abstracts had changed over time. A linear regression model was employed to identify which changes in abstracts proportions (gender and abstract type) over time were significant. Abstracts with known author genders were also stratified by first and last authors.

Basic science research abstracts submitted to either society's ASM declined over the study period, with the

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proportion submitted to both conferences decreasing from 38.4% in 2005 to 14.7% in 2018 ($P < 0.0001$; Fig. 1A). ANZSN basic science submissions decreased from 30.6% (2005) to 8.6% (2020), and TSANZ showed a comparable decline from 47.7% in 2005 to 20.3% in 2019. Patterns in authorship from both societies demonstrated a significant gender imbalance, with predominantly male first and senior authors ($P = 0.018$). There

was an increase in female first authorship overall, rising from 27.3% in 2005 to a peak of 56.5% in 2020 (only represented by ANZSN ASM data; Fig. 1B, $P = 0.011$). However, this growth was solely accounted for by a rise in clinical research abstracts, as women presenting basic science research decreased over this time period (11.4% in 2005 vs 4.8% in 2020, $P = 0.0131$). A trend towards increased female senior authorship was seen (overall

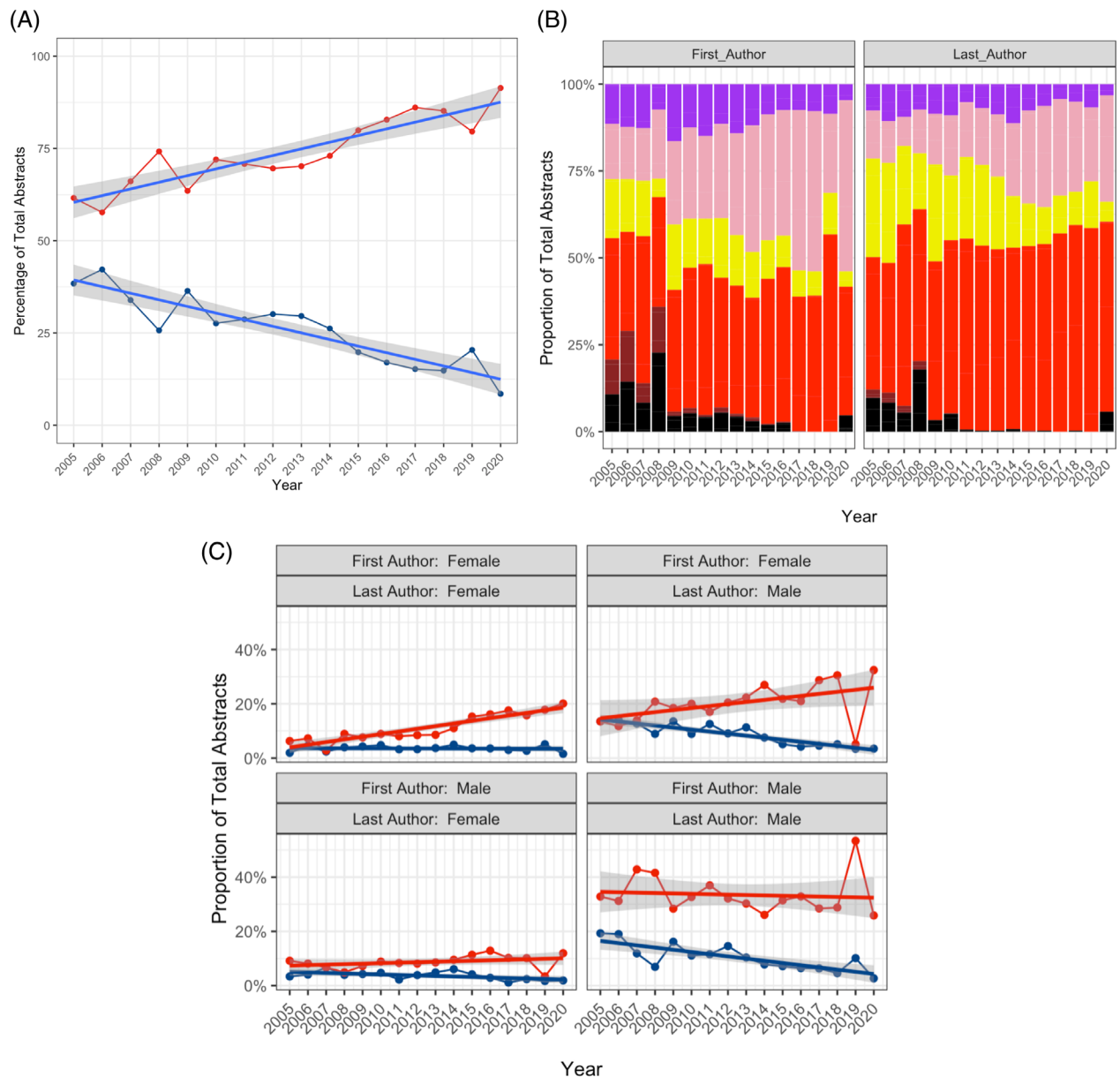


Figure 1 Research trends in Australia and New Zealand nephrology presented at annual scientific meetings from 2005 to 2020. (A) Percentage of basic (blue) and clinical (red) science abstracts presented annually. (B) Percentage of clinical and basic science research abstracts presented according to the gender of first or senior author. (C) Distribution of known first and senior author genders according to basic or clinical science abstracts. (A) (—●—) Basic Science, (—●—) Clinical Science. (B) (■) Female_Basic Science, (■) Female_Clinical, (■) Male_Basic Science, (■) Male_Clinical, (■) Unknown_Basic Science, (■) Unknown_Clinical. (C) (—●—) Basic Science, (—●—) Clinical Science.

21.4% in 2005 and 30.2% in 2018; $P < 0.001$; Fig. 1B). In 2005, only 22.9% of ANZSN abstracts had female senior authors compared with 36.1% in 2020. Female senior authorship for TSANZ abstracts also rose over the same period, from 17.4% (2005) to 28% (2019). Once again, this increase was confined to clinical research activity. Senior male authorship for basic science abstracts also decreased over time ($P < 0.0001$). We also analysed the combined gender distribution of first and senior authorship by abstract type (Fig. 1C).

ANZSN and TSANZ female membership was 44% and 50%, respectively, in 2020, which is at odds with the gender imbalance in research participation, although information regarding potential changes in membership over the same time periods was not available.

Discussion

Our results illustrate a significant bias in the types of research conducted and presented within the nephrology field, showing a continued decline in basic science research over the past ≥ 10 years. Basic science is a foundation of medicine, underpinning medical education, informing clinical research and contributing to cohesive medical understanding and the development of precision medicine.⁶ It provides a crucial platform upon which clinicians develop an integrated understanding of disease aetiology, pathophysiology, diagnosis and management.⁷ Despite its significance, the feasibility of basic science research and the allure of clinician involvement is clearly waning. The paucity of exposure to basic science presented at national conferences potentially sends a subconscious message to trainees that it is irrelevant or uninteresting, so they are less likely to pursue this career path. At best, we are simply lazy by failing to train adequately the next generation of clinicians in molecular medicine, and at worst we are negligent by not engaging them in discovery research that revolutionises clinical practice.

In recent years, much has been made of the 'dying breed' of clinician–scientists, which appears to be a universal phenomenon across all medical specialties.⁸ Australia and New Zealand clearly lack integrated academic tracks for medical trainees (even if they have made the decision about career development so early), and the time spent in undergraduate/postgraduate medical schools, internship, residency and advanced training clearly impact the attractiveness and practicality of further schooling in the form of a PhD (and related postdoctoral work). This is particularly important in relation to family responsibilities and pay

disparity that predominantly affects female doctors. This hemianopic view of biomedical research also neglects the attrition of nonmedical basic scientists within medical specialty societies who provide unique investigative perspectives and academic dialogue and, crucially, train the next generation of scientists.

Our findings also reveal an ongoing gender imbalance in abstract authorship (both senior and first), albeit with a significant improvement in female representation over the study period that was confined to clinical research. This limited study reveals a clear failure among nephrology research leaders to attract and retain women within basic research because this disparity does not reflect gender distribution in the workforce or society membership. These results raise an important question – how do we retain the current generation of discovery researchers, attract their successors and ensure equity and diversity within research? Low rates of female representation in academia are symptomatic of ongoing gender inequity, signalling to students and graduates that such career trajectories are not friendly to women. There are numerous, well-documented barriers to successful academia, including lack of support for early and midcareer scientists,⁹ limited protected time for clinicians wanting to undertake research¹⁰ and declining national funding rates leading to hypercompetitive research environments.¹¹ There are additional factors driving gender disparity in biomedical research, including a glaring gap in grant funding dollars,¹² a lack of support for flexible working arrangements and subsequent career disruptions, as well as a paucity of middle- and senior-level female academics to act as suitable mentors due to higher attrition rates.¹³ Despite more women initially entering the medical field, women remain underrepresented at senior-level medical programmes including college fellowships,¹⁴ international and national medical conferences,⁴ and leadership and professorial positions.⁵

While abstract publications provided limited data for research activity in a specific field of research, there is some evidence of relatively poor rates for conversion to publications,^{15,16}

which is of further concern for overall productivity in the field. Fostering basic science research and gender equity needs to be urgently addressed in nephrology and the wider medical community. ANZSN and TSANZ have worked towards gender parity at a societal level, with the provision of childcare services at ASMs, as well as developing Equity, Diversity and Inclusion committees.¹⁷ However, this is unlikely to be sufficient given more systemic barriers. It is imperative to establish whether similar trends in research activity are reflected in other specialties. If we want science to contribute to

national prosperity, we cannot do it by clinging to the narrow focus provided by one type of research that now predominates. These findings must be a catalyst for discussion around necessary changes to research training and funding that must be made to STEMM the tide.

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