

## ORIGINAL RESEARCH

### The Murray-Darling Medical Schools Network Research Collaboration: protocol for a longitudinal, multi-university program of work to explore the effect of rurally based medical school programs in the Murray-Darling region

#### AUTHORS



Brie Turner<sup>1</sup> PhD, Lecturer (Teaching and Research) \*



Shane Bullock<sup>2</sup> PhD, Head of School



Sally Butler<sup>3</sup> MBiostat, Senior Lecturer and Research Fellow in Medicine



Linda Ferrington<sup>4</sup> PhD, Associate Professor



Michael Macartney<sup>5</sup> PhD, Senior Lecturer and Phase 1 Coordinator



Laura Major<sup>6</sup> UG Cert Mental Health, Rural Health Education Manager, [laura.major@monash.edu](mailto:laura.major@monash.edu)



Lynn Monrouxe<sup>7</sup> PhD, Academic Lead of Healthcare Education Research



Uchechukwu Levi Osuagwu<sup>8</sup> PhD, Senior Lecturer and Academic Lead



Phillipa Southwell<sup>9</sup> PhD, Project Officer



Lachlan Van Schaik<sup>10</sup> PhD, Lecturer



Georgina M Luscombe<sup>11</sup> PhD, Associate Professor

#### CORRESPONDENCE

\*Dr Brie Turner [brie.turner@sydney.edu.au](mailto:brie.turner@sydney.edu.au)

#### AFFILIATIONS

<sup>1, 11</sup> School of Rural Health, The University of Sydney, 1502 Forest Rd, Orange, NSW 2800, Australia

<sup>2, 6</sup> School of Rural Health, Monash University, Wellington Rd, Clayton, Vic. 3168, Australia

<sup>3</sup> School of Rural Medicine, Charles Sturt University, Leeds Pde, Orange, NSW 2800, Australia

<sup>4</sup> School of Clinical Medicine, The University of New South Wales, Port Macquarie, NSW 2444, Australia

<sup>5</sup> School of Clinical Medicine, The University of New South Wales, Wagga Wagga, NSW 2650, Australia

<sup>7</sup> School of Health Sciences, The University of Sydney, Susan Wakil Health Building, NSW 2006, Australia

<sup>8</sup> Bathurst Rural Clinical School, School of Medicine, Western Sydney University, PO Box 9008, Bathurst, NSW 2795, Australia

<sup>9</sup> Western NSW Regional Training Hub, The University of Sydney, 1502 Forest Rd, Orange, NSW 2800, Australia

<sup>10</sup> Department of Rural Health, The University of Melbourne, 49 Graham St, Shepparton, Vic. 3630, Australia

## PUBLISHED

12 January 2024 Volume 24 Issue

## HISTORY

RECEIVED: 14 March 2023

REVISED: 10 October 2023

ACCEPTED: 14 November 2023

## CITATION

Turner B, Bullock S, Butler S, Ferrington L, Macartney M, Major L, Monrouxe L, Osuagwu UL, Southwell P, Van Schaik L, Luscombe GM. The Murray–Darling Medical Schools Network Research Collaboration: protocol for a longitudinal, multi-university program of work to explore the effect of rurally based medical school programs in the Murray–Darling region. *Rural and Remote Health* 2024; 24: 8306. <https://doi.org/10.22605/RRH8306>

This work is licensed under a [Creative Commons Attribution 4.0 International Licence](https://creativecommons.org/licenses/by/4.0/)

## ABSTRACT:

**Introduction:** There is now strong evidence to support the positive impact of place-based medical education on the recruitment and retention of the rural health workforce in Australia. Much of this work, however, has been undertaken in the context of ‘extended rural clinical placement’ – students undertaking part of their medical degree in a rural location. Until recently, there were only a few places in Australia in which students could undertake the entirety of their medical degree in a rural area. With the introduction of the Murray–Darling Medical Schools Network (MDMSN) initiative, this dynamic is changing. The MDMSN is part of the Stronger Rural Health Strategy and builds on the Australian Government’s existing Rural Health Multidisciplinary Training Program to establish a network of rurally based medical programs in the Murray–Darling region. The MDMSN offers a unique opportunity to explore the effect of complete rural immersion during medical school on subsequent rural practice. This article describes the establishment of a research collaboration intended to ensure the harmonisation of research data collection from the outset of the MDMSN program.

**Methods:** The MDMSN research collaboration is a longitudinal, multi-university program of work to explore the effect of rurally based medical school programs in the Murray–Darling region. Initially it has been agreed that administrative student data will be collected from existing university datasets to help characterise this novel student cohort. Each university will then distribute an entry survey to all first-year MDMSN students. The survey will collect demographic information as well as information regarding rural  
**Keywords:**

background, preferences and future practice intention. Questions have been aligned with and adapted from the Medical Schools Outcomes Database survey, the Australian Bureau of Statistics, and from the literature. This information will be combined with graduate information from the Australian Health Practitioner Regulation Agency.

**Results:** The MDMSN research collaboration will work toward the co-design of research projects, to facilitate and progress multi-site research addressing nationally relevant research questions. Early research efforts are focused on our ability to better understand the new cohort of students embarking on rurally based medical education, their practice intentions and realisation. Subsequent work of the collaboration may lead to deeper understanding of the rural student experience, any effect of ‘place’, changes in student professional identity over time, and their relationship to subsequent rural practice.

**Conclusion:** The MDMSN research collaboration is a proactive initiative that brings together data and experience from five new rurally based medical programs, and answers calls for multi-institution and longitudinal studies. It is uniquely placed to capture the impact of the MDMSN program, including the effect of complete rural immersion on the future practice location of these graduates. Ultimately, the combined research efforts of the MDMSN research collaboration will add knowledge to address the known rural workforce maldistribution, particularly how to attract and retain medical workforce.

Australia, health workforce, longitudinal study, medical education, medical graduates, medical students, rural pipeline.

## Introduction

Access to health care in rural and remote Australia is a complex and challenging issue that remains unresolved despite continued efforts to improve the distribution of the medical workforce. Underlying this issue is the need to recruit and retain medical health professionals rurally. Despite this being the focus of a plethora of research, much of our understanding of the factors that contribute to attracting and maintaining a rural workforce comes from single-institution and cross-sectional studies focusing predominantly on placement-based medical education<sup>1-6</sup>. Although this work has contributed significantly, it is generally agreed that multi-institution and longitudinal studies are needed to determine the broader and longer term impacts of rural medical education on medical students' future practice location<sup>7-9</sup>. A previous similar large-scale longitudinal investigation of graduate practice destination has been described for nursing and allied health graduates<sup>10</sup>. However, to the authors' knowledge, this collaboration forms the first longitudinal, multi-university program of work investigating the impact of complete rural immersion during medical school on successive cohorts of medical students and graduates.

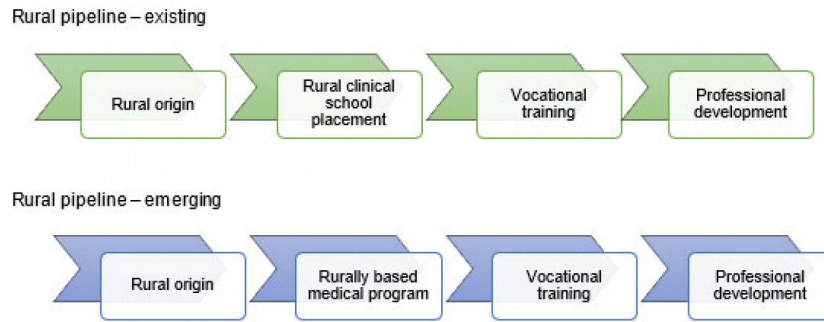
The Australian Government has invested in a number of education and training programs designed to influence rural health workforce distribution, such as the Rural Health Multidisciplinary Training (RHMT) program, which includes the requirement for at least 25% of Australian domestic medical students to undertake a minimum of 1 year of their clinical training in a rural area<sup>11</sup>. The specific target for each university may vary, with some RHMT-funded university programs able to achieve substantially higher than 25%. Independent evaluation of the RHMT program undertaken in 2020 recommended strengthening research networks via multi-site, multi-university and cross-jurisdictional partnerships and identified a number of factors from the literature that are associated with rural medical workforce conversion. These factors, both contextual (eg rural background) and place-based (duration and setting of clinical placement and availability of postgraduate training programs)<sup>12</sup> have, to date, largely been associated with rural workforce conversion in the context of extended rural clinical school placement. Other notable factors that may influence workforce conversion include cost, travel, professional/social isolation, and impact of rural setting on life partners and families (employment and education/school choices). Although important, these factors have not, as yet, been thoroughly investigated in the context of complete rural immersion during medical education and do not identify what it is about the student experience (course content and structure) that impacts on their conversion rate.

For the most part, rural medical education has to date consisted of either short-term or extended rural clinical school placements (*rural pipeline – existing*) and just three entirely rural medical programs. The 'pipeline' to rural practice is a concept described in the literature as a pathway for the recruitment and retention of a rural health workforce<sup>13,14</sup>. Potential engagement points along the rural pipeline include (1) rural background and (2) rural medical education (rural curriculum + rural immersion), followed by (3) vocational medical training (eg GP, specialist, rural generalist) and

(4) continuous professional development for rural health workers. With the expansion of rurally based medical programs, a new rural pipeline is emerging (*rural pipeline – emerging*) that will allow students to undertake the entirety of their medical degree in a rural area (Fig1). Numerous studies have shown that extended rural clinical school placement is effective and associated with subsequent rural practice<sup>3,4,6,15-17</sup>. Studies have also shown that the length of rural immersion has a positive impact on graduates' future practice location<sup>1,3,5,16</sup>. O'Sullivan and colleagues, for example, demonstrated a concomitant increase in rural practice with increased length of rural immersion<sup>3</sup>. Evidence of an additive effect of rural background and rural medical education is also building<sup>1,3,5,6,18</sup>. However, one recent study has shown that 'openness' to rural practice may be more nuanced than the effect of rural background and rural immersion alone<sup>19</sup>. Bingham and colleagues postulate that connection to community during rural immersion may be particularly important for future rural practice. Limited evidence is available regarding the effect of complete rural immersion on medical students' practice intentions and realisation. It is possible that, with complete rural immersion, students may form a deeper connection to community over time; however, this remains to be seen.

The Murray–Darling Medical Schools Network (MDMSN) is an Australian Government initiative that has established a network of rurally based medical programs in New South Wales and Victoria<sup>20</sup>. MDMSN rural clinical schools are located in the southern part of the Murray–Darling Basin, in regional centres or large rural towns, classified as MM2 or 3, using the Australian Government Modified Monash (MM) Model geographical classifications<sup>21</sup>. For the purposes of this article, the term 'rurally based' will be used to encompass medical programs based in both regional (MM 2) and rural (MM 3–7) areas. The MDMSN is part of the Stronger Rural Health Strategy and builds on the existing RHMT program to allow students to study medicine entirely in a rural area. The initiative is intended to give students a broad understanding of rural life, the health of rural communities, and the organisation and delivery of rural and remote health services, with the goal of encouraging more practitioners to consider a career in rural or remote medical practice.

The MDMSN initiative offers a unique opportunity to undertake multi-institution and longitudinal research into rurally based end-to-end medical training programs. The current literature lacks a comprehensive, nationwide analysis of these programs, which could lead to the use of inconsistent methodologies and a lack of comparable data. Recent systematic reviews have also called for a more consistent approach to study design and use of definitions for critical concepts such as rurality<sup>18,22</sup>. This research collaboration is well placed to address this gap by developing a comparable national cohort dataset and applying a consistent methodology. By doing so, we aim to better understand the characteristics of students who embark on longitudinal rural training, and how their experiences and perceptions inform their career decisions regarding place of practice. The findings of this research could have important implications, such as informing policy decisions and guiding strategies to recruit and retain healthcare professionals in underserved rural areas.



**Figure 1: Australia's rural medical education pipeline – existing and emerging.**

## Methods

### Context

The MDMSN research collaboration was established to ensure collaboration of partner universities from the outset of the MDMSN program and to harmonise prospective data collection. The collaboration was initiated by the University of Sydney (Dubbo – MM 3), who invited partner universities – the University of New South Wales (Wagga Wagga – MM 3), Charles Sturt University (Orange – MM 3) in partnership with Western Sydney University, Monash University (Churchill, Gippsland – MM 3, Bendigo – MM 2, Mildura – MM 3), and the University of Melbourne (Shepparton – MM 3) in partnership with La Trobe University – to discuss and develop a combined research initiative. Specifically, this is a longitudinal, multi-university program of work to explore the effect of rurally based medical school programs in the Murray–Darling region.

### Aims and objectives

The aim of this research program is to develop a greater understanding of students undertaking rural medical education and ultimately add knowledge to address rural workforce maldistribution. Initial objectives were developed via expert consensus and a thorough study of the literature including existing national quantitative measures<sup>7,23</sup> and the work undertaken by

Sutton et al in the Nursing and Allied Graduate Outcomes Tracking (NAHGOT) study<sup>10</sup>:

- contextual factors of the new cohort of students embarking on rurally based medical education (objective 1)
- changes in practice intention over time (objective 2)
- place-based factors influencing intention (objective 3)
- rural practice realisation (objective 4).

Potential future objectives include:

- availability of rural internships, training places and professional development (objective 5)
- motivations for embarking on rurally based medical education (objective 6)
- changes in student professional identity over time (objective 7).

### Participants

All students and graduates of the five participating medical programs will be invited to participate in this research. The inaugural cohort of medical students includes 147 potential participants from across the five participating medical programs (Table 1). Additional cohorts will be added annually, and each respective cohort will be tracked longitudinally following graduation.

**Table 1: Characteristics of the cohorts of the five universities participating in the Murray–Darling Medical Schools Network**

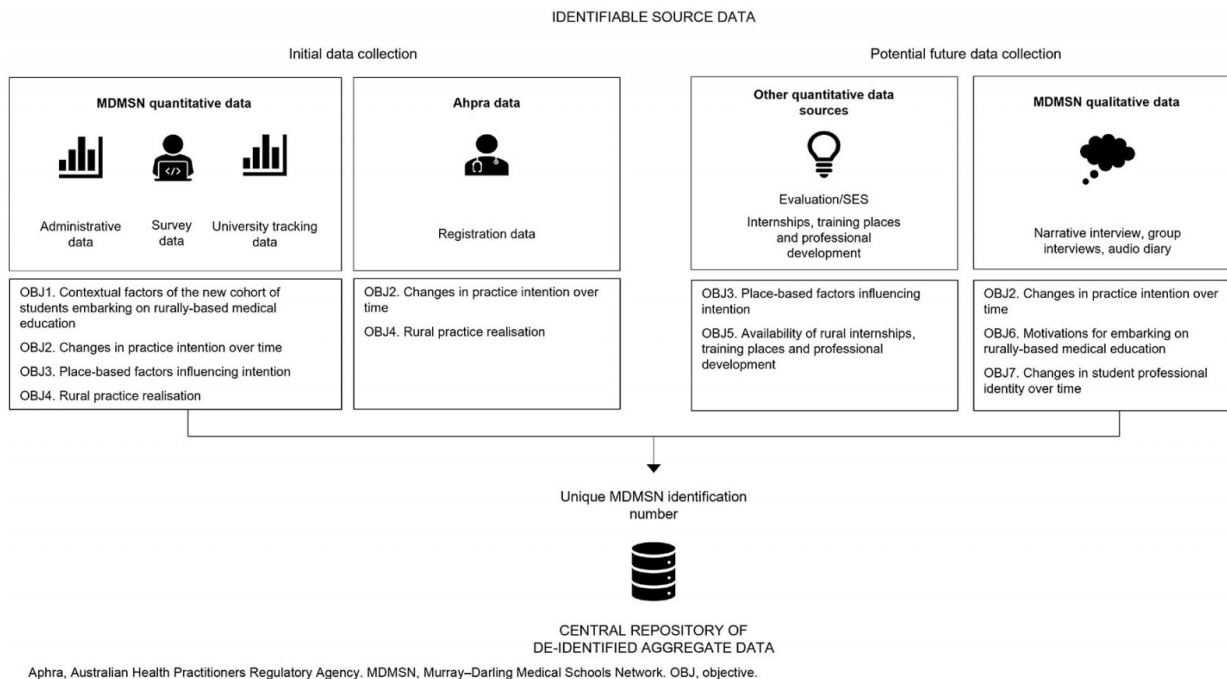
	University of Sydney	University of New South Wales	Charles Sturt University	Monash University	The University of Melbourne (La Trobe University)	The University of Melbourne
Cohort	Postgraduate	Undergraduate	Undergraduate	Postgraduate	Undergraduate	Postgraduate
Cohort size (2023)	25	25	37	30	15	15
Entry pathways	Rural applicants	Rural applicants Local applicants	Rural entry Non-Rural entry	30 CSPs available in the Monash Graduate Entry MD course for Monash End-to-End Rural Cohort.	15 bonded CSPs are reserved for graduates of the La Trobe University's Bachelor of Biomedical Sciences (Medical) degree.	15 bonded CSPs will be available for students who have completed an undergraduate degree with a minimum GPA of 5.0 or above and are able to demonstrate their rural origins.
Admission requirements	Rural applicants: minimum GPA of 4.5 GAMSAT: minimum score of 50 in each section	Rural applicant: ATAR of 91 Tertiary entry: WAM of 70 or equivalent UCAT	REAS-ATAR 91.5 (or equivalent) Non-Rural ATAR 95.5 (or equivalent) UCAT	Students need to have completed a stipulated Monash degree with a WAM of 70.	WAM of 70	GPA (a minimum of 5) will contribute 30% and their MMI score will contribute 70% to their final ranking for a course offer. Students entering the Doctor of Medicine Rural Pathway are not required to undertake GAMSAT.
Further requirements	Personal Statement demonstrating a genuine interest, intention, and aptitude for practising medicine in rural and regional. Meet the Australian Government definition of Rural Origin.†	Complete a statutory declaration providing evidence of Rural Origin† as well as providing detailed information about rural residential and schooling locations.	Complete an MMI and MAQ. Submit a Community Member Confirmation form. Confirm Rural Origin.†	Students complete an MMI and submit a statutory declaration evidencing their Rural Origin.†	Complete a rural specific MMI. Doctor of Medicine Rural Pathway rurality form including evidence of Rural Origin.†	Complete a rural specific MMI. Doctor of Medicine Rural Pathway rurality form including evidence of Rural Origin.†
Facilitated admission	Rural Origin Facilitated Entry Scheme Indigenous Facilitated Entry Scheme Indigenous Entry Pathway	Gateway Entry Scheme Rural Entry Scheme Indigenous Entry Scheme	REAS First Nations Pathway	Dean's Rural List Indigenous Student Access Scheme	MD Rural Pathway MD Indigenous Pathway	MD Rural Pathway MD Indigenous Pathway

† The Australian Government currently defines 'Rural Origin' or 'Rural Background' as residency for at least 10 years cumulatively or any 5 years consecutively, from birth, in an Australian Statistical Geography Standard – Remoteness Areas (ASGS-RA) 2 to 5. ATAR, Australian Tertiary Admissions Rank. CSP, Commonwealth Supported Place. GAMSAT, Graduate Medical School Admissions Test. GPA, Grade Point Average. MAQ, Medical Admissions Questionnaire. MD, Doctor of Medicine. MMI, multiple mini interview. RA, Remoteness Area. REAS, Rural Entry Admissions Scheme. UCAT, University Clinical Aptitude Test. WAM, weighted average mark.

**Data collection**

Each medical program will collect its own administrative, survey and registration data as relevant to the study objectives (Fig2). Data consistency will be maintained through the use of a data dictionary and standardised survey instruments. Australian medical graduates receive a medical registration number from the regulator, the Australian Health Practitioners Regulatory Agency (Ahpra), following graduation; prior to this, student identification

number is the primary means of student identification. Participant confidentiality will be maintained through the de-identification of all research data and allocation of a random participant identifier. Only the chief investigator and project officer for each university will have access to the code used to link respondents' student identification numbers or medical registration numbers with their random participant identifier. De-identified aggregate data will be held in a central repository. A data custodian has been appointed to oversee the management and security of these data.



**Figure 2: Components of data collection in relation to the study objectives.**

**Administrative data:** Administrative student data (admissions, enrolments and completions) will be collected from existing

university datasets. Key demographics of interest include sex, age, marital status, indigeneity, country of birth and student status

(domestic or international).

**Survey data:** Collaborators from each respective university will distribute an entry survey to all first-year students undertaking rurally based medical programs. The entry survey will collect demographic information as well as information regarding rural background, students' journeys to medicine, preferences, and

future practice intention (Table 2). The survey instrument has been carefully designed to collect only information that is not available from other sources (eg administrative data). Survey questions have been aligned with and adapted from the Medical Schools Outcomes Database survey<sup>7</sup>, the Australian Bureau of Statistics, and from the literature with permission from the authors<sup>5</sup>.

**Table 2: Entry survey for the Murray–Darling Medical Schools Network research collaboration**

<b>General</b>	Last name
	First name
	Other names
	Your student ID
	What is your current medical school?
	What was your sex recorded at birth?
	How do you describe your gender?
	What is your relationship status?
	Do you currently provide care for someone other than yourself?
<b>Background</b>	In which country were you born?
	What is your ancestry?
	Do you speak language(s) other than English at home (or as a first language)?
	Please specify language: <sup>†</sup>
	Please specify language TWO: <sup>†</sup>
	Do you consider yourself to come from a rural background?
	If in a relationship, does your partner consider themselves to come from a rural background?
<b>Journey to medicine</b>	Did you attend your final year of school in a secondary school/college/ senior high school in a regional centre, rural town or remote community (≤100 000 population size)?
	Previous work/study history
	Please indicate discipline(s) of your highest tertiary qualification BEFORE COMMENCING medical school. <sup>†</sup>
	Did you receive any information or assistance from a Regional Training Hub about applying for or studying medicine?
	Did you seek information or assistance from anywhere else (not a Regional Training Hub) about applying for or studying medicine?
	What additional information would you have liked to receive about applying for or studying medicine?
<b>Training and medical practice</b>	What was the main reason for choosing the clinical school that you are currently attending?
	On completion of your medical degree, which of the following most accurately reflects your plans for training in your preferred discipline?
	Once fully qualified, where would you most like to practice medicine?
	Would you prefer to be at a coastal or an inland location?
<b>Preferred type of medical practice</b>	Please indicate the general areas of medicine you are currently interested in pursuing.
	As part of your medical career are you interested in becoming involved in medical teaching, research, indigenous health?

<sup>†</sup> Questions not adopted by all participating medical programs.

**University tracking data:** University-level graduate tracking data will also be collected by individual university partners. Potential data sources include state-based postgraduate medical councils, the Medical Schools Outcomes Database and alumni. Other quantitative data sources may involve student experience surveys or data on medical internships, training places and professional development.

**Registration data:** Registration data will be collected from Ahpra. Medical practitioners are required to be registered to practice in Australia, and Ahpra is the single national registration authority. Ahpra maintains and publishes an online database including an annual update of practitioners' principal place of practice and specialist registration. Rurality of location will be determined using the Modified Monash Model geographical classifications<sup>21</sup>.

### Data analysis

Descriptive statistics will be used to summarise survey results. Analyses will be undertaken to explore interrelationships among survey responses. Comparative statistics will compare survey results and future practice location between successive cohorts of the five medical schools in the MDMSN.

### Ethics approval

Ethics approval was obtained from the University of Sydney Human Research Ethics Committee (HREC; ref. no. 2022/015). Lead

HREC approval was ratified by all partner university HREC. University-held student personal information (eg administrative student data) will be used in accordance with each university's policies, procedures and HREC approvals.

### Results

Participating medical programs are responsible for collecting their own internal university survey and registration data as relevant to the study, and will provide access to de-identified data related to their own students and graduates. In the short term, the MDMSN research collaboration will focus on the rural cohort, not surveying the entire cohort where there are metropolitan schools, and on deep dives rather than large-scale quantitative analyses. However, it is hoped that meaningful comparison with the existing system of extended rural clinical school placement and between rural and metropolitan cohorts will also be possible in future. Longer term, the group will work towards the development of a central repository of de-identified aggregate data designed to increase the power of the data collection and the potential for the group to co-design research of national relevance. In the first instance, access to de-identified data in the aggregate dataset will be granted only to those university partners named in the ethics application. This may be modified in future with approval from the lead HREC. To support research capacity building in rural areas, the MDMSN research collaboration is also exploring the possibility of cross-collaborative higher degree research projects.

## Discussion

Health workforce maldistribution in rural and remote areas relative to metropolitan cities is a global issue that can compound pre-existing geographical and socioeconomic disadvantage, leading to poorer health outcomes in these communities<sup>24</sup>. Policymakers and educators have taken a multifaceted approach to strategies designed to increase the recruitment and retention of a rural health workforce<sup>25</sup>. However, the scope of the challenges faced, including the availability of a skilled and motivated workforce, is broad<sup>24</sup>. One potential solution is to provide medical education to students in place (eg in rural areas).

Until recently, there were only a small number of universities in Australia in which students could undertake the entirety of their medical degree in a regional or rural area. These include James Cook University (JCU) in North Queensland<sup>26</sup>, the Flinders University Northern Territory Medical Program<sup>27</sup> and the University of New South Wales in Port Macquarie. However, with the expansion of rurally based medical programs a new rural pipeline is emerging. JCU Medical School, established in 2000, has accumulated the most evidence in this area<sup>26</sup>. In 2019, it was reported that just under half of JCU medical graduates (46.1%, postgraduate years 5–14) were working in a regional, rural or remote area<sup>28</sup>. JCU also employs a number of initiatives to encourage graduates to practise rurally, including an extended rural clinical school program, integrated rural placement and Longitudinal Integrated Clerkship<sup>28</sup>. The Flinders University Northern Territory Medical Program, a younger program that commenced in January 2011, also reports a high retention rate in (73.2%, MM 2–7), with just over half of all graduates in working in MM 2 (mostly in Darwin). The program includes a 2-year return of service obligation, which further extends the rural immersion of this cohort but also makes direct comparisons difficult<sup>29</sup>.

The immediate focus of the MDMSN research collaboration is on the first two engagement points in the rural pipeline. However, it is important to acknowledge that rural background and rural medical education form only part of the possible pipeline to subsequent rural practice. More work is also needed to improve the availability of rural vocational medical training and continuous professional development for rural health workers. This work is commensurate with the roles of the RMHT funded Regional Training Hubs, which work with Local Health Districts, medical students and rural Doctors in Training to support rural medical workforce development. In time, systemic shifts in prevocational and vocational training pathways such as the implementation of the new John Flynn Placement Program and the shift to college-led training in general practice, among others, will also influence career opportunities for graduates of these rurally based medical programs. The MDMSN research collaboration is working to remain aware and responsive to the milieu of personal, contextual and place-based factors that influence postgraduation decision-making at the level of the individual but sit outside of the scope of the current study. This collaboration will seek further engagement with Regional Training Hubs as part of potential future progression of this work.

## Limitations

The limitations of longitudinal programs such as this have been discussed previously<sup>10</sup> and are also relevant to this work. Initially, the main limitation for the MDMSN research collaboration will be

the size of the cohort. The authors concede that numbers are small within each of the individual medical programs. Nationally, the rural cohort is small in comparison with its metropolitan counterparts. Participating medical programs also differ in their entry requirements and school level demographics. It is for this reason, however, that it is imperative for collaborations such as the MDMSN research collaboration to produce more solid evidence through combined effort, both across institutions and longitudinally. Other potential challenges associated with long-term collaborative programs include the ability to ensure consistent data collection methods across universities to maintain reliability and validity of data, difficulty in sustaining the commitment of university partners, and facilitating productive collaboration among diverse stakeholders with varying interests and priorities. To date these challenges have not been an issue. Minor, program-specific variations in the entry survey have been negotiated and recorded, and the enthusiasm of the group is high. A quorum of a least one member from each medical program is requested at meetings as per the terms of reference for the group; however, most meetings are attended by two or three members from each program, demonstrating an ongoing commitment to working together. Data fragmentation and accuracy, governance and managing loss to follow-up will be elements of ongoing focus for the collaboration.

Over-surveying of medical students in general, and rural medical students in particular, is known to be an issue at both a local and national level. The formation of a cross-MDMSN student advisory group is one strategy employed by the collaboration to assist with loss to follow-up. These students will represent their cohort throughout their medical degree, increasing student engagement by providing results to other students and feedback to the research team to guide the development to the project. Considerable effort was also made to ensure that the entry survey was aligned with other existing survey instruments such as the Medical Schools Outcomes Database survey to allow for suitable comparison and possible future collaboration.

In addition to the quantitative longitudinal work, qualitative research programs are being undertaken by individual university partners (eg narrative interviews, group interviews and audio diaries)<sup>30,31</sup>. It is proposed that these programs will be aligned in future. However, a consistent methodology that can be implemented by all partner universities requires further time and consideration. The coordinated collection of qualitative data has considerable challenges but will be invaluable for the realisation of potential future research objectives.

## Conclusion

The partner universities in the MDMSN research collaboration form a diverse, multi-institutional team that is working to maximise the unique opportunity provided by the MDMSN program. The group is taking a combined, longitudinal approach to explore medical training capacity in the Murray–Darling region by developing an evidence base with which to undertake research of national relevance and to inform and influence policy and practice. Although initial efforts are focused on understanding the new cohort of students embarking on rurally based medical education, there is enormous scope to expand this research to gain a deeper understanding of the rural student experience, the effect of place, development of professional identity, and relationship to subsequent rural practice. The ultimate goal of the MDMSN

research collaboration is to work together to help grow the rural medical workforce.

### Acknowledgements

The authors thank Professor Catherine Hawke, a member of the MDMSN research collaboration, for critical review of the study protocol. We also thank academic and professional staff from all participating universities, including the Regional Training Hubs.

### Funding

The partner universities are funded by the Australian Government under the Murray–Darling Medical Schools Network.

### Conflicts of interest

The authors declare no conflicts of interest.

## REFERENCES:

- 1 Kondalsamy-Chennakesavan S, Eley DS, Ranmuthugala G, Chater AB, Toombs MR, Darshan D, et al. Determinants of rural practice: positive interaction between rural background and rural undergraduate training. *Medical Journal of Australia* 2015; **202(1)**: 41-45. DOI link, PMID:25588445
- 2 Moore M, Burgis-Kasthala S, Barnard A, Hall S, Marks S. Rural clinical school students do come back: 'But it may take time'. *Australian Journal of General Practice* 2018; **47(11)**: 812. DOI link, PMID:31207682
- 3 O'Sullivan B, McGrail M, Russell D, Walker J, Chambers H, Major L, et al. Duration and setting of rural immersion during the medical degree relates to rural work outcomes. *Medical Education* 2018; **52(8)**: 803-815. DOI link, PMID:29676022
- 4 Playford D, Ngo H, Gupta S, Puddey IB. Opting for rural practice: the influence of medical student origin, intention and immersion experience. *Medical Journal of Australia* 2017; **207(4)**: 154-158. DOI link, PMID:28814216
- 5 Kwan MMS, Kondalsamy-Chennakesavan S, Ranmuthugala G, Toombs MR, Nicholson GC. The rural pipeline to longer-term rural practice: general practitioners and specialists. *PLoS ONE* 2017; **12(7)**: e0180394. DOI link, PMID:28686628
- 6 Fuller L, Beattie J, Versace V. Graduate rural work outcomes of the first 8 years of a medical school: what can we learn about student selection and clinical school training pathways? *Australian Journal of Rural Health* 2021; **29(2)**: 181-190. DOI link, PMID:33982843
- 7 Humphreys JS, Prideaux D, Beilby JJ, Glasgow NJ. From medical school to medical practice: a national tracking system to underpin planning for a sustainable medical workforce in Australasia. *The Medical Journal of Australia* 2009; **191(5)**: 244-245. DOI link, PMID:19740041
- 8 Johnson GE, Wright FC, Foster K. The impact of rural outreach programs on medical students' future rural intentions and working locations: a systematic review. *BMC Medical Education* 2018; **18(1)**: 196. DOI link, PMID:30107795
- 9 O'Sullivan BG, McGrail MR, Russell D, Chambers H, Major L. A review of characteristics and outcomes of Australia's undergraduate medical education rural immersion programs. *Human Resources for Health* 2018; **16(1)**: 8. DOI link, PMID:29386024
- 10 Sutton KP, Beauchamp A, Smith T, Waller S, Brown L, Fisher K, et al. Rationale and protocol for the Nursing and Allied Health Graduate Outcomes Tracking (NAHGOT) study: a large-scale longitudinal investigation of graduate practice destinations. *Rural and Remote Health* 2021; **21(3)**: 6407. DOI link, PMID:34587455
- 11 Australian Government Department of Health. *Rural Health Multidisciplinary Training (RHMT) 2016–2018 – Program Framework*. 2018. Available: [web link](#) (Accessed 12 July 2022).
- 12 Battye K, Sefton C, Thomas J, Smith J, Springer S, Skinner I, et al. *Independent evaluation of the Rural Health Multidisciplinary Training Program: final report to the Commonwealth Department of Health*. Orange: KBC Australia, 2020.
- 13 Tesson G, Curran V, Pong R, Strasser R. Advances in rural medical education in three countries: Canada, the United States and Australia. *Education for Health (Abingdon)* 2005; **18(3)**: 405-415. DOI link, PMID:16236588
- 14 Fisher KA, Fraser JD. Rural health career pathways: research themes in recruitment and retention. *Australian Health Review* 2010; **34(3)**: 292-296. DOI link, PMID:20797360
- 15 McGirr J, Seal A, Barnard A, Cheek C, Garne DL, Greenhill J, et al. The Australian Rural Clinical School (RCS) program supports rural medical workforce: evidence from a cross-sectional study of 12 RCSs. *Rural and Remote Health* 2019; **19**: 4971. DOI link, PMID:30827118
- 16 O'Sullivan BG, McGrail MR. Effective dimensions of rural undergraduate training and the value of training policies for encouraging rural work. *Medical Education* 2020; **54(4)**: 364-374. DOI link, PMID:32227376
- 17 Seal AN, Playford D, McGrail MR, Fuller L, Allen PL, Burrows JM, et al. Influence of rural clinical school experience and rural origin on practising in rural communities five and eight years after graduation. *The Medical Journal of Australia* 2022; **216(11)**: 572-577. DOI link, PMID:35365852
- 18 Ogden J, Preston S, Partanen RL, Ostini R, Coxeter P. Recruiting and retaining general practitioners in rural practice: systematic review and meta-analysis of rural pipeline effects. *The Medical Journal of Australia* 2020; **213(5)**: 228-236. DOI link, PMID:32696519
- 19 Bingham A, O'Sullivan B, Couch D, Cresser S, McGrail M, Major L. How rural immersion training influences rural work orientation of medical students: theory building through realist evaluation. *Medical Teacher* 2021; **43(12)**: 1398-1405. DOI link, PMID:34280328
- 20 Australian Government Department of Health and Aged Care. *Stronger Rural Health Strategy's Murray-Darling Medical Schools Network*. 2018. Available: [web link](#) (Accessed 6 October 2022).
- 21 Australian Government Department of Health and Aged Care. *Modified Monash Model*. Available: [web link](#) (Accessed 14 October 2022).
- 22 Russell D, Mathew S, Fitts M, Liddle Z, Murakami-Gold L, Campbell N, et al. Interventions for health workforce retention in rural and remote areas: a systematic review. *Human Resources for Health* 2021; **19(1)**: 103. DOI link, PMID:34446042
- 23 Federation of Rural Australian Medical Educators. *FRAME Survey*. Available: [web link](#) (Accessed 14 September 2023).



- 24** World Health Organization. *WHO guideline on health workforce development, attraction, recruitment and retention in rural and remote areas*. 2021. Available: [web link](#) (Accessed 22 October 2021).
- 25** Abelsen B, Strasser R, Heaney D, Berggren P, Sigurðsson S, Brandstorp H, et al. Plan, recruit, retain: a framework for local healthcare organizations to achieve a stable remote rural workforce. *Human Resources for Health* 2020; **18(1)**: 63. DOI link, PMID:32883287
- 26** Hays RB. Rural initiatives at the James Cook University school of medicine: a vertically integrated regional/rural/remote medical education provider. *Australian Journal of Rural Health* 2001; **9(s1)**: 2-5. DOI link
- 27** Worley P, Lowe M, Notaras L, Strasser S, Kidd M, Slee M, et al. The Northern Territory Medical Program – growing our own in the NT. *Rural and Remote Health* 2019; **19(2)**: 4671. DOI link, PMID:31129974
- 28** Woolley T, Sen Gupta T, Paton K. Mid-career graduate practice outcomes of the James Cook University medical school: key insights from the first 20 years. *Rural and Remote Health* 2021; **21(4)**: 6642. DOI link, PMID:34781690
- 29** Campbell N, Kennedy E, Rissel C, Gill E, Bergin S, Noutsos T, et al. Workplace locations of 2011-2017 Northern Territory Medical Program graduates. *Rural and Remote Health* 2021; **21(4)**: 6662. DOI link, PMID:34644504
- 30** Monrouxe LV. Solicited audio diaries in longitudinal narrative research: a view from inside. *Qualitative Research* 2009; **9(1)**: 81-103. DOI link
- 31** Hamshire C, Willgoss TG, Wibberley C. What are reasonable expectations? Healthcare student perceptions of their programmes in the North West of England. *Nurse Education Today* 2013; **33(2)**: 173-179. DOI link, PMID:22444185

This PDF has been produced for your convenience. Always refer to the live site <https://www.rrh.org.au/journal/article/8306> for the Version of Record.