

# Still on the outer edges? Progress towards and prospects for the development of a rural and remote evidence base for clinical practice

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## ABSTRACT

One of the most significant issues in clinical practice for rural and remote Australia is the need for improved evidence about the most effective and appropriate interventions. Clinical research is fundamental to effective evidence-based practice. This paper assesses the extent to which an Australian rural evidence base for clinical practice has emerged over the past five years. The methodology for this study involves an analysis of one input (research funding) and one output (published evidence) concerning Australian research that specifically addresses rural health issues and includes rural, regional and/or remote populations in clinical research. The first project involves the analysis of extant databases of rural clinical research funding and funding for Aboriginal and Torres Strait Islander (ATSI) research allocated during the period 2000 to 2004 by two major national organisations: the National Health and Medical Research Council (NHMRC), and the National Institute of Clinical Studies (NICS). Data are analysed in terms of the number of grants allocated and the level of funding. The results show that, of the 5995 grants (exceeding \$1.3 billion) awarded by the NHMRC, only 126 grants (2.1%) amounting to \$21 million (1.6% of the total dollars) were allocated to rural/regional/remote and ATSI research. NICS has funded one rural/remote clinical research project, and has commissioned a literature review and conducted a workshop on the use of evidence by rural and remote health practitioners. The second project involves the analysis of Australian rural, clinical, peer-reviewed research published during the period 2000 to 2004 that focuses on injuries, cardiovascular disease and mental health – three of the highest priority health issues affecting rural Australians. A total of 142 papers have been published over the five year period, with more than half of these focusing on mental health. These results suggest that there is a lack of large-scale, programmatic, clinical research specifically addressing rural health issues. The reasons include the (only recently) emerging research capacity in rural Australia, the work pressures on clinicians, the high infrastructure costs for clinical research, the status of rural health on the national scene, the bias in favour of funding for biomedical and clinical trial research, and constraints on the local adaptation of metropolitan-based research. This study presents compelling evidence for the need to develop a national strategy for a large scale, collaborative, programmatic approach to rural clinical research as the foundation for improving rural clinical practice.

## INTRODUCTION

Effective clinical practice, based upon a systematic and well-resourced program of rigorously conducted research, is fundamental to improving our health and well-being. Evidence-based practice provides the best available information to ensure that treatment decisions will reduce “unnecessary, ineffective or harmful interventions, and to facilitate the treatment of patients with maximum chance of benefit, with minimum risk of harm, at an acceptable cost.”<sup>1</sup> Based upon increasingly sophisticated epidemiological information, there is now general agreement

about the priority health issues across Australia. A key emerging issue in clinical practice is the production and application of clinical knowledge to address these priorities.

Clinical research is defined as:

research involving human subjects in health and illness. It is done in response to a clinical research question, in order to inform clinical practice through the application of pathophysiological, population-based, behavioural or qualitative research methods. The research may be observational or interventional.<sup>2</sup>

In clinical research, the investigator usually has clinical experience and has direct interaction with his or her patients/subjects. Under this definition, clinical researchers do not have to be practising as clinicians while conducting the research. This recognises that clinical researchers may occupy non-practising positions, such as full-time clinical research fellowships.

There are compelling arguments for conducting clinical research that addresses rural health issues, rather than simply attempting to translate or generalise knowledge from metropolitan populations and settings. Two forms of bias weaken the generalisability of findings from metropolitan samples across to rural and Indigenous people. Intensity bias occurs when the evidence-based treatment is not applied as effectively due to a resource deficiency or poor compliance. Population bias occurs when the treatment effect varies because of genetic, environmental or cultural differences.<sup>3</sup> In rural and remote areas, health status, pathways to care, cultural beliefs about health and illness, service systems, and clinical practice are constructed differently.<sup>4,5,6,7</sup> Furthermore, the problems with getting research into practice are well known, but become almost insurmountable when clinical guidelines produced for one type of practitioner in a particular environment are adapted for another context.<sup>8,9</sup> This justification for conducting health research on rural populations is clearly articulated in the Healthy Horizons Outlook 2003–2007. Goal 3 is to undertake research and provide better information to rural, regional and remote Australians:

It is important that this information is developed from a range of sources and is based on research undertaken in rural, regional and remote Australia. There is an expectation that research funded by government will adopt this approach.<sup>10</sup>

In essence, this means funding research that specifically addresses rural health issues.

Reviews of pre-2000 funding for rural and clinical research indicate that minimal funding has been awarded specifically to rural health. Between 1994–95 and 1998–99, the NHMRC allocated a total of \$767 million for research funding. Only about \$11 million was directed to rural health research.<sup>7,11</sup> During the period 1990–1999, it was calculated that an average of \$3 million per year was directed to rural health research from conventional funding sources, with a similar amount coming from other sources.<sup>11</sup> Reviews of clinical research draw attention to the myriad funding streams and initiatives, and present some evidence about under-funding and the lower success rates of clinical research applications compared to non-clinical projects. There is little doubt that we lack comprehensive and accurate information about funding awarded for rural clinical research in Australia.

A range of significant initiatives to build rural health infrastructure and research capability over the past decade should, by now, be expected to start yielding noticeable results in research performance.<sup>12</sup> These include the expansion of the National Rural Health Alliance as the peak body, the Healthy Horizons Framework, the biennial National Rural Health Conference, the establishment of the Australian College of Rural and Remote Medicine, the funding of University Departments of Rural Health and Rural Clinical Schools across Australia, the Rural Health Stocktake, and the NHMRC Rural Health Review. In 2000, an editorial in the Australian Journal of Rural Health concluded that rural health research in Australia was a 'Cinderella',

characterised by disconnected, short-term projects with limited funding.<sup>5</sup> What progress has been made since then?

The aim of this paper was to measure clinically focused research activity concerning rural, regional and remote health in Australia over period 2000–2004 with results from the previous five years.<sup>11,12,13</sup> Underpinning this study is a conceptual framework of research activity comprising three major elements: inputs, outputs and outcomes. These elements have been synthesised from analysis of strategic reviews and investigations into research productivity.<sup>7,14,15</sup> Inputs include investment in research infrastructure, training programs, and funding for research positions and projects. Outputs refer to the generation and publication of research findings. Bibliometric analysis captures publication output and can be measured by the number of publications and the citations they attract.<sup>14,15</sup> Outcomes are assessed by the application of evidence-based research findings and the measurable improvements in clinical outcomes. The logic of this framework is that a greater investment in inputs yields increases in the quantity and quality of research outputs which ultimately contributes to improvements in health outcomes. It is important to note that the unit of analysis in this study is not individual or institutional,<sup>15</sup> but sectoral. That is, by calculating research funding and publications, we are not matching the inputs with the outputs of individual clinical researchers or organisations. Nor are we attempting to link the publication output of grant schemes.<sup>14</sup> This study focuses on aggregated research activity across the rural, regional and remote health sector.

## METHODOLOGY

This study concerns the first two elements of the conceptual framework. For the purposes of this study, research inputs were measured by research funding into rural, regional and remote health awarded by two major research funding agencies in Australia from 2000–2004 inclusive. The second element—research outputs—were measured by the publication of peer-reviewed papers reporting clinical research on three priority issues in rural, regional and remote health in Australia from 2000–2004 inclusive.

There were three main methodological problems in conducting this review. First, routinely collected data and reports on research grants awarded do not record whether the research is 'clinical' or 'non-clinical'.<sup>2</sup> Nor does it record whether the research specifically addresses rural health issues, draws its data from non-metropolitan samples, or includes a rural/urban comparison. For these reasons, projects that had a national focus but did not specifically address rural and remote health issues were excluded. Second, it is acknowledged that funding for clinical and rural health research comes from a diversity of sources and schemes (including the pharmaceutical industry, NHMRC, Commonwealth, State and Territory health departments, teaching hospitals, Divisions of General Practice, General Practice Evaluation Program, Rural Health Support Education and Training, Primary Health Care Research Evaluation and Development, universities, clinical and specialist colleges, rural clinical schools, foundations). Because of the plethora of classificatory systems used by these schemes, it is very difficult to arrive at a definitive statement about how much of the research provided by these agencies is dedicated to rural, clinical research.<sup>2</sup> Third, because publications do not always acknowledge the source and level of research funding, this approach has its flaws. These methodological problems in calculating research funding levels have been encountered in other reviews.<sup>2,11,14</sup>

For the purposes of this study, the analysis of research funding allocations was limited to two major national organisations: the National Health and Medical Research Council, and the National Institute of Clinical Studies. Data were collated and analysed in relation to three variables: the clinical problem; the number of grants allocated; and the level of funding for the period 2000–2004 (inclusive).

NHMRC funding was analysed through reviewing the Grants Books for the years 2000–2004. Eligibility criteria were all those NHMRC grants for rural, regional and remote clinical research that met the following criteria: involved an urban/rural comparison; and/or specified a focus on rural, regional or remote locations or needs; and/or involved Aboriginal health (unless specifically identified as focusing on urban Aboriginal health issues).

Analysis of available grants data was problematic due to the fact that the NHMRC funding schemes changed (including the shift towards the funding of research centres and fellowships) within the data collection period. Excluded from consideration were schemes where it was not possible to readily identify what funds had been committed with regard to research infrastructure, capacity building and training. This meant that funding given directly, as a block, to an institution or Centre of Clinical Research Excellence or Research Unit, for unspecified research purposes, were excluded, as were non-specific Research Fellowship funds, equipment and transitional funding. The only exception was the inclusion of the Centre for Clinical Research Excellence in Aboriginal and Torres Strait Islander Health, which was an identifiable part of the ATSI funding pool for 2004. Eligibility criteria were further refined to ensure consistency across the period 2000–2004. All NHMRC grants whose focus and scope was readily identified were included. Given these parameters, the results presented below probably do not accurately report all rural, regional and remote funding for clinical health research, but the figures offer a reasonable estimation.

Project funding allocated by the National Institute of Clinical Studies for 2000–2004 (inclusive) was examined, as was the Grants and Submissions database from the Commonwealth Department of Health and Ageing for the five year period. Data were checked against relevant reports and databases accessed through the Primary Health Care Research and Information Service.

The second component of the project involved electronic searches of English language, peer-reviewed publications listed in the following national and international databases for 2000–2004 (inclusive): Academic Search Premier; Australian and New Zealand Reference Centre; Austral Asian Medical Index; CINAHL; Clinical Reference Systems; Health Source: Nursing/Academic Edition; Informit e-library; MasterFILE Premier; Medline (Silver Platter: erlWebSPIRS, 2000–2004); Pre-CINAHL; Pubmed; the Psychology and Behavioural Science Collection; Rural and Remote Health Database and, the Sociological Collection. In addition, the Rural Health Research Register was examined for clinical research publications.

The literature search parameters covered the following keywords, with each being searched separately under the words 'rural', 'remote' and 'regional' in Australia:

- injury and farm injury
- accident
- mental health
- depression
- suicide
- cardiovascular
- heart
- clinical research
- clinical trials
- randomised control trials
- randomised control trials and injury/mental health/cardiovascular.

A classification system was devised to record the details of each publication. Categories were: journal, title and year of publication; institutional affiliation/s of author/s; aim or purpose of the study; rural health priority area; site/s of data collection; sample group and size; and research design and methods. The research aim or purpose was subcategorised into explanatory, evaluative, descriptive or exploratory.<sup>16</sup> The research design was subcategorised into: experimental, quasi-experimental and non-experimental.<sup>17</sup>

While research funding targeting Aboriginal and Torres Strait Islander peoples was included in the first component of this project, this group has not been included in the second component. As the focus of the second element of the study was on health issues that have been identified as high priorities for people living in rural, regional and remote locations (cardiovascular health, injury and mental health),<sup>10</sup> it was inappropriate to include Aboriginal and Torres Strait Islander people under the same priority headings. While recent work has acknowledged cardiovascular disease as a leading cause of mortality in Aboriginal Australians,<sup>18</sup> the priority health issues facing this cohort vary and need to be considered separately. The paucity of randomised control trials addressing Australian Aboriginal health needs has been reviewed.<sup>3</sup>

## RESULTS

Given the methodological limitations described above, the following results are best considered to be indicative rather than definitive. The results are presented according to: the number and the funding level of the grants for research on rural, regional and remote health, and the proportion of funding allocated to rural, regional and remote health and Aboriginal and Torres Strait Islander health; and publication output in three priority health areas.

### Number and funding level of grants

NICS has funded one project specifically focusing on ATSI health: a randomised trial for improving diabetes self care in the Torres Strait. While other NICS projects have involved rural clinicians and rural populations, they have not been included here because they have not addressed rural health issues in particular. NICS has, however, commissioned a literature review and conducted a workshop on the use of evidence by rural and remote practitioners.<sup>9,13</sup>

Table 1 shows that a total of 5995 grants were awarded by the NHMRC for the period 2000–2004. Of these, 126 (2.1%) could be clearly identifiable as being allocated to rural, regional and remote health research, and Aboriginal and Torres Strait Islander research.

**Table 1 Total of NHMRC grants and proportion of grants allocated to rural, regional and remote health (including ATSI), 2000–2004**

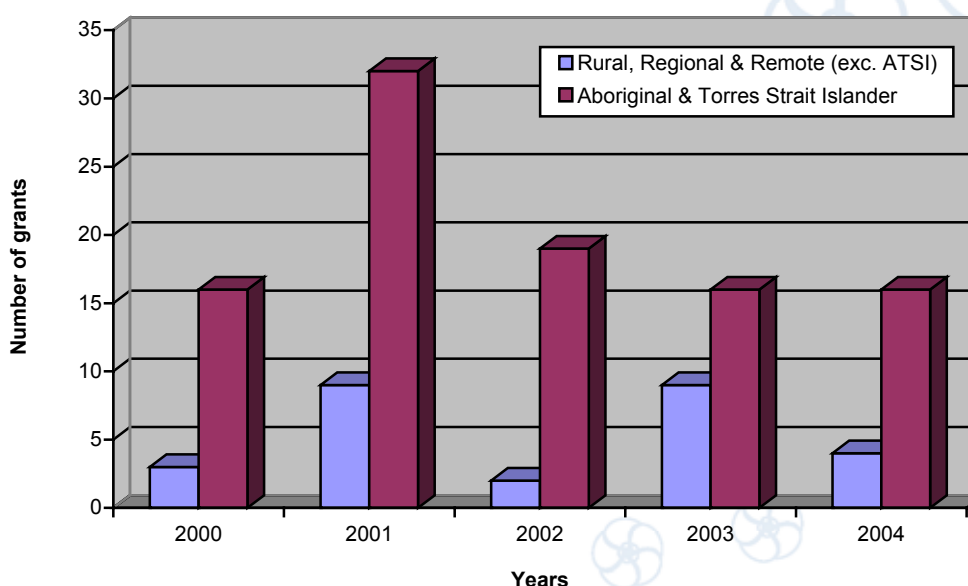
Year	NHMRC grants meeting inclusion criteria		NHMRC grants allocated specifically to rural, regional or remote health research			
	Number	\$	Number	% of total*	\$	% of total*
2000	1826	150 732 330	19	1	1 089 318	0.7
2001	1927	170 848 617	41	2	2 396 057	1
2002	680	318 233 902	21	3	3 102 079	1
2003	786	348 220 457	25	3	4 015 458	1
2004	776	345 989 083	20	2.5	10 455 322	3
Total	5995	1 334 023 989	126	2.1 (av.)	21 058 234	1.57 (av.)

\* Figures have been rounded

Table 1 also shows that the total level of funding awarded to all NHMRC grants from 2000–2004 exceeded \$1.3 billion. Of this, funding for rural, regional and remote and Aboriginal and Torres Strait Islander research totalled just over \$21 million. Over the five year period, rural, regional and remote and ATSI research has received around 1.6% of the funding. In 2004, 3% was received.

More detailed analysis of the number and funding level of the grants shows some interesting trends. Figure 1 and Table 2 reveal that, of the 126 grants over the five years, 99 (79%) were allocated to ATSI research projects, and 27 (21%) for non-ATSI rural, regional and remote projects.

**Figure 1** Number of grants awarded by NHMRC 2000–2004 separately reported for rural, regional and remote and ATSI



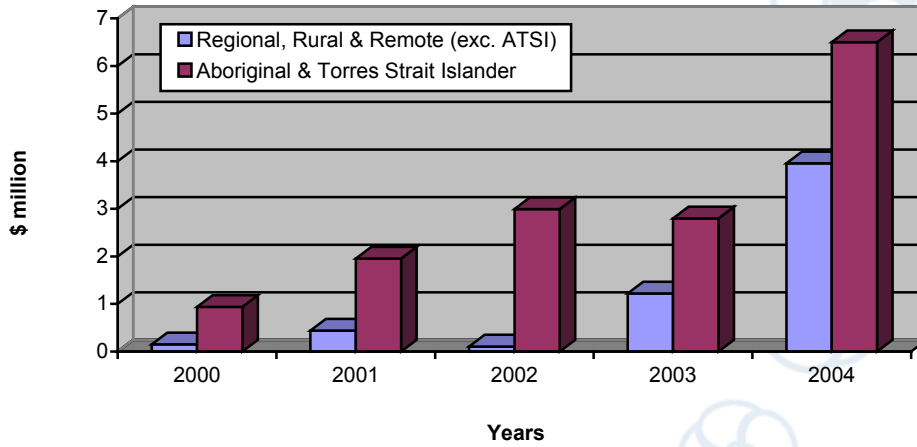
**Table 2** Number and \$ value of grants awarded by NHMRC 2000–2004 separately reported for rural, regional and remote and ATSI

Year	NHMRC grants allocated to rural, regional and remote (excluding ATSI)		NHMRC grants allocated to ATSI	
	Number	\$	Number	\$
2000	3	151 293	16	938 025
2001	9	440 385	32	1 955 672
2002	2	106 298	19	2 995 781
2003	9	1 221 798	16	2 793 660
2004	4	3 956 444	16	6 498 878
<b>Total</b>	<b>27</b>	<b>5 876 218</b>	<b>99</b>	<b>15 182 016</b>

Table 2 and Figure 2 show that, of the \$21 million awarded by NHMRC from 2000–2004 for rural, regional and remote and ATSI research, just over \$15 million (around 71%) was apportioned to ATSI research. There has been a steady growth in funding for ATSI research, with \$6.498 million allocated in 2004. The point of this analysis is not to reveal the differential

levels of research funding for rural, regional and remote and ATSI, but to highlight the gross inequities that they both face.

**Figure 2 Total funding awarded by NHMRC 2000–2004 separately reported for rural, regional and remote health and ATSI**



### Publication output in three priority health areas

Figure 3 summarises the number of Australian, peer-reviewed clinical research publications addressing three priority rural health areas. These figures exclude research on Aboriginal and Torres Strait Islanders. A total of 142 papers (on average, fewer than 30 per year) have been published over the five year period, with more than half of these focusing on mental health.

**Figure 3 Number of peer reviewed, clinical research publications in three rural health priority areas in Australia 2000–2004**

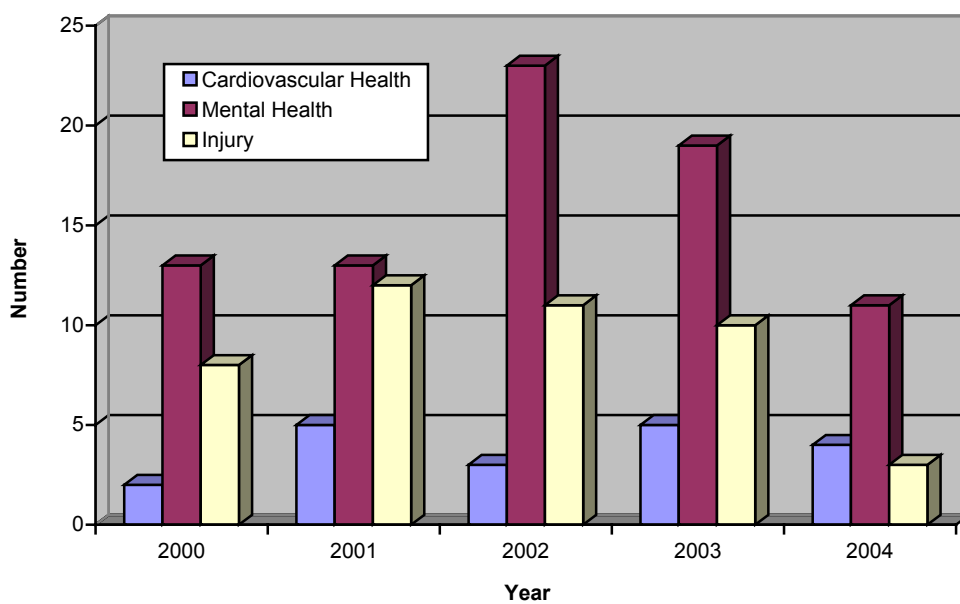


Table 3 presents the analysis of the research design and research purpose of each study described in the 142 papers. These results show that the great majority employ non-experimental designs including case studies or single observations of only one group. The research purposes are usually descriptive or evaluative, many of which describe or evaluate local, small scale projects. There is a notable absence of large scale, national, collaborative research projects combining explanatory purposes with strong research designs.

**Table 3 Research design and research purpose of peer-reviewed, clinical research publications in three rural health priority areas in Australia 2000–2004**

	Research design				Research purpose				
	Experimental	Quasi-experimental	Non-experimental	Total	Explanatory	Exploratory	Descriptive	Evaluative	Total
Cardiovascular health	0	6	13	19	2	2	9	6	19
Mental health	0	5	74	79	7	5	50	17	79
Injury	0	0	44	44	0	0	37	7	44
Total	0	11	131	142	9	7	96	30	142

## DISCUSSION

The results presented above indicate that funding awarded to rural health research by major public research funding schemes over the past five years is low. As a proportion of the total amount allocated by the NHMRC, rural health attracts about 2% of the grants and about 1.5% of the funding. These figures include funding for research on ATSI health. These figures are even more concerning when compared historically. Between 1994/1995 and 1998/1999, it was calculated that 1.4% of NHMRC funding is allocated specifically to rural health.<sup>11</sup> The increase since then appears to be marginal. When one considers the generally poorer health status of people in rural and remote settings, combined with the fact that about 30% of Australians live in non-metropolitan areas, the figures reveal major, structural inequities. It appears that there has been some progress on funding for ATSI health: in 1996, \$2.5 million was allocated by the NHMRC to Aboriginal health projects,<sup>3</sup> compared to over \$6 million in 2004. However, this in no way reflects an appropriate level of investment to rectify Indigenous people's appalling burden of disease and premature death. Research funding patterns are confirmed by the publications data. Despite some increase since the 1990s,<sup>13</sup> there are low levels of reporting of research findings in three priority areas in peer-reviewed journals.

Investments in rural health over the past decade (such as the establishment of university departments of rural health and rural clinical schools) and the higher profile of rural health issues (evident in the nomination of rural health as a second tier in the NHMRC's Strategic Framework for research priority areas, and funding for research into service delivery systems in rural and remote areas) should produce quantum gains in rural research funding and publication. This appears not to be the case.

There are a number of possible explanations. The first is that there is a time lag of several years between research capacity building and research performance. This being so, the benefits of appointing academic staff and clinical researchers in rural health over the past five should start to flow through in the remainder of this decade. A second possible explanation is that some rural health research is either unfunded or draws a substantial proportion of its funding from outside the major research funding schemes. There is some evidence to support this.<sup>11</sup> A third

reason is that the major research funding schemes do not favour rural health research. The Australian Research Council does not fund clinical research, and the NHMRC funding is largely directed towards biomedical and clinical research rather than inter-disciplinary primary health care. Rural health researchers have thus been forced to compete (largely unsuccessfully) for funding from these schemes.<sup>19</sup> There has been precious little research funding earmarked for clinical research addressing rural health priorities.

Clinical research also has its own distinctive challenges. A major review concluded that there is increasing pressure on clinicians to treat patients – rather than pursue clinical research which will advance evidence-based practice.<sup>20</sup> Other factors hampering the clinical research include a general lack of funding, institutional barriers in faced by new clinical researchers and those from allied health and nursing disciplines, and deficiencies in infrastructure for clinical research. Moreover, there is a lack of funding to support translational research or evaluation of the adaptation of clinical guidelines based on metropolitan research findings for rural and remote practice.<sup>9,21</sup>

## CONCLUSION

The principal conclusion of this study is that rural health research remains the poor cousin of mainstream health research. Little ground has been made up over the last five years. Furthermore, rural health research continues to be characterised by small-scale, local, non-cumulative, descriptive or evaluative studies.

The major shifts in research funding in Australia over the past five years have been in the direction of priority-driven, programmatic, longer term, larger scale, collaborative research. Programmatic research is typically large-scale research conducted by teams over the medium to long-term and is designed to impact on problems of priority interest. A research program comprises planned, purposeful, and substantively and/or theoretically linked studies with demonstrable public benefit. A research program is underpinned by a strong research culture. Programmatic research is the antithesis of localised, opportunistic, or highly personal research interests involving isolated projects undertaken either by a sole researcher or with one or two colleagues, typically with minimal funding. This type of research generally does not engage significant problems and has little impact and yet it remains the central research modality applied in rural and remote areas.

There is mounting evidence about the need for a cumulative, clinical knowledge base that specifically addresses rural health issues and is firmly grounded in the rural context.<sup>9,22,23,24</sup> Therefore, the key policy recommendations are:

- that a proportion of all health research funding from major funding sources be quarantined for clinical, programmatic rural health research; and that
- this proportion should increase incrementally so that it is commensurate with population distribution and the health needs of rural and remote communities.

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## PRESENTERS

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