

# Climate change: is Australian rural and remote medical education and training ready for the age of consequences?

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... the era of procrastination, of half-measures, of soothing and baffling expedients, of delays, is coming to a close. In its place we are entering a period of consequences. — —Winston Churchill

## Aims

On the threshold of a new era of consequences, it seems the evidence of climate change is not speaking to medical education and training, and vice versa. What competencies will Australia's rural and remote general practitioners need in a climate-changing world? How should Australian rural and remote medical education and training adapt to meet the challenges of climate change? How is Australia placed relative to the world in meeting such challenges and what does this suggest about our global responsibilities?

This paper aims to explore what Australia should do locally, nationally, and internationally to help ensure rural and remote general practitioners are prepared for a climate-changing world.

## Methods

### Method overview

The paper draws on the results of

1. A study of the climate change literature as it relates to health: abstracts for 458 papers and 146 reviews were scanned in the database PUBMED using the terms "climate change" and "health" for the period 2003-2008 to locate papers useful to identifying the clinical and non clinical knowledge and skills relevant to rural and remote regions.
2. A case study of Australian competencies for rural and remote general practice and related quality assurance systems, using documents obtained from the Australian College of Rural and Remote Medicine (ACRRM) and the Royal Australian College of General Practitioners (RACGP), and related national and international quality assurance documents, as well as Australian government department website searches useful to identifying Australian policy and research plans for climate change
3. An international study of key publicly available models of rural and remote competencies around the world: this study involved searches of the websites of relevant professional and government agencies and medical schools, as well as written requests for direction to publicly available documents. This part of the study also involved a literature search on best practice in developing competencies using Australian and international databases for the time period 2000 to 2008 (APAIS-Health, Australian Medical Index, Pubmed, as well as ERIC and ProQuest). The search terms included variations of the words "identifying competencies", "writing competencies", "evaluating competencies", "developing competencies" and "medical competencies". Almost 400 papers were identified and used to develop the author's foundational understandings of what is best practice in developing rural and remote competencies and related quality assurance issues.

Rural and remote competencies have been defined in this paper as any explicit statement of the knowledge, skills and attributes required for rural medical education and training.

### Limitations and challenges of this study

The literature on climate change is vast, including for rural and remote regions. However, this literature is substantially driven by European and American perspectives and offers very little by way of integrated analysis of the total set of knowledge and skills that will be required by health practitioners in a climate-changing world.

However indisputable the prospect of climate change now is, knowledge about the effects of climate change on the health of people in many regions remains hazy. The body of knowledge about health effects of climate change in Australia is still small and focused on discrete diseases and conditions such as Ross River virus<sup>(1, 2)</sup> and Murray Valley encephalitis.<sup>(3)</sup> There are very few studies offering holistic discussion of the health needs of rural and remote dwelling populations in Australia, including indigenous peoples.<sup>(4-7)</sup>

While medical practitioners here and overseas have been active in making public statements on climate change,<sup>(8)</sup> and in supporting initiatives such as the 'GreenClinic' intervention<sup>(9)</sup> for environmentally sustainable practices, we know little about the implications of climate change for medical competencies and related systems of medical education and training. With few exceptions, most notably those led by Australian GP researcher Blashki,<sup>(10, 11)</sup> the medical education literature does not yet reflect on the implications of the climate change literature for medical education and training. Not only that, but the education literature generally, including the vast competencies literature for many professions beyond health, has not begun to explore what climate change means for the new knowledge and skills required in the future. Searches of PUBMED and, across the disciplines, of SCOPUS, using the terms "climate change" and "competencies" revealed no relevant studies beyond the broadest possible exhortations to develop workforce capacity to cope with climate change.

Further, the information about rural and remote competencies and related best practice is scattered over diverse scholarly and applied sources, including agency websites, curriculum documents, and the multidisciplinary literature relevant to such questions. Research on developing rural and remote competencies (as opposed to competencies *per se*) is largely absent—never mind research on designing competencies for specific threats to rural and remote communities like climate change.

None of this is an argument for evading the task of examining what climate change means for rural and remote medical education and training in Australia or anywhere else. It is an admission that efforts such as this—aiming to open discussion about future integrated development of medical education and training for a climate-changing world—must rely on piecemeal assembly and extrapolation of incomplete and fragmented evidence. However certain the prospect of climate change, there is not yet a well-developed body of evidence about how health factors will interact with changing local ecologies, agricultural, economic, and demographic forces to shape what medical practitioners need to know and do, and how we should prepare them for rural practice. In this paper there is space only to highlight the key issues and questions, possibilities for development, and immediate actions needed to build the required evidence base.

### Findings

The findings offer exploration of possible answers to three questions:

- *Competencies needed in a climate-changing world:* what does the climate change literature suggest about the health needs of rural and remote communities and the competencies Australian general practitioners will need?
- *Developing the Australian system:* what are the strengths and weaknesses of the Australian general practice education and training system for meeting these needs?
- *Making a difference globally:* how well is Australian general practice education and training placed relative to the rest of the world in adapting to climate change and what can we do to make a difference globally?

### Competencies needed in a climate-changing world

A recent publication by McCracken of the Climate Institute in Washington summarises the large body of evidence produced by the Intergovernmental Panel on Climate Change and concludes that the health effects can be understood in terms of direct and indirect effects: direct effects from adverse weather events and indirect effects to do with, for example air and water quality and vector and rodent-borne diseases.<sup>(12)</sup>

In the future catastrophic climatic events such as tropical cyclones, storm surges, tornados, drought and wildfires will bring a host of health effects from injuries to nutritional deficiencies to mental health conditions as more people, particularly indigenous peoples, experience food security issues and displacement.<sup>(6, 13-15)</sup> Warmer conditions brought about by climate change may produce increases in

- asthma arising from allergens linked to pollens and weeds<sup>(15, 16)</sup>
- insect-borne disease vectors such as tick-borne encephalitis<sup>(15, 17-19)</sup>
- waterborne diseases such as cholera and other conditions linked to contamination of water and food supplies<sup>(15, 20)</sup>
- cataracts and skin cancers as well as other conditions linked to extreme temperatures and sun exposure.<sup>(15, 21)</sup>

Climate change will be characterised by complex interactions between people, place, and climate leading to great regional variation. It will exacerbate existing socio-economic disadvantage in areas that already experience unequal health outcomes.<sup>(15, 22-24)</sup> Australia's *Human Health and Climate Change—National Adaptation Research Plan* led by pre-eminent researcher Tony McMichael offers a review of the emerging body of research on health effects in Australia, suggesting that Australia will not be exempt from these kinds of health challenges. For example, in relation to vector-borne disease, Australia may see changes in the distribution and incidence of Ross River Virus and Dengue. Infectious diseases not currently presenting significant threats such as malaria may present as an increased threat in a climate-changing Australia. Australia may face particularly pressing issues of mental health, especially drought-stricken areas, and related challenges of community adaptation and resilience, including for indigenous communities. The Australian plan also notes that some of the critical areas where this country does have an emerging body of evidence (heat waves and heat) take an urban focus. Further, it suggests that health services may need to be reshaped in a climate-changing Australia—in ways we do not yet understand.<sup>(25)</sup>

Thus, the climate change literature raises some important questions about whether in a climate-changing world, rural and remote family practitioners will need:

- New *clinical competencies* related to the presence of particular conditions just noted and new interactions between these and rapidly changing local ecologies: that is, new skills in diagnosing,

investigating, and treating diseases with diverse causal relationships. For example, changing ecologies will likely lead to alterations in traditional vector-borne disease dynamics, redefining animal hosts, disease vectors and outcomes in ways that may be very specific to particular regions and unpredictable over time <sup>(18, 26)</sup>

- New kinds of non clinical competencies such as
  - Knowledge and skills in collecting and providing systematic data on new categories of health status that can inform public health responses, including for tracking systems that can help determine disease trends and vulnerable people and places and evaluate local responses to these; these will most likely depart from narrow bio-medical data to collect more integrated holistic information about people relevant to, for example, epidemic early warning systems for waterborne diseases
  - Knowledge and skills in explaining and empowering people about steps they can take to prevent and manage conditions associated with climate change, including, for example, developing sustainable diets suitable for climate-changing world, in ways that take into account specific food security issues for particular groups such as indigenous people
  - Knowledge and skills in mental health assessment, intervention and follow-up as the burden of mental health sees an *escalated* shift to general practitioners and particular vulnerable groups within rural communities such as children in farming families experiencing long-term stresses of climate change
  - Knowledge and skills in working with community partners as part of an integrated community response to identifying health threats and at-risk populations, developing and implementing adaptive measures, and responding to emergences. <sup>(12, 14-17, 21, 23, 24, 27-30)</sup>

Such clinical and non clinical skills will be based on new kinds of transdisciplinary knowledges about interactions between, for example, bio-medicine and epidemiology, economics, ecology, culture, human behaviour and psychology, transport and infrastructure, and so on. <sup>(10, 23, 28)</sup> These transdisciplinary knowledges and skills can be defined as new ways of knowing about and delivering medicine that evolve from synergies between one or more of such diverse disciplines or sectors. The details of these transdisciplinary competencies remain uncertain precisely because the health phenomena associated with them have not been so well studied. As McMichael and Woodruff have suggested, the climate-change evidence suggests the shape of big events, rather than the nature of interactions and more complex effects when systems become 'uncoupled and dysfunctional'. <sup>(15, 31)</sup>

Thus rural practitioners of the future will need to be more adaptive, even more in command of contextualised knowledge and skills already important to how rural and remote education and training is conceptualised and delivered. <sup>(32-34)</sup> The conceptualisation of rural and remote medical practice as 'a horizontal discipline' that must include many other medical and non medical knowledge and craft groups is likely to increasingly include new kinds of transdisciplinary knowledges and skills.

Available studies support the broad conclusion that the task now is to engage with those within and beyond the health sector to develop transdisciplinary knowledge and skills in responding to the secondary impacts of climate change and the ways these will vary across regions for specific vulnerable groups such as indigenous people and those tied to natural resources industries. Thus there have been calls within and beyond the rural and remote health sector for Australia to develop more sophisticated regional understandings of the effects of climate change on health. <sup>(5, 25)</sup>

## Developing the Australian system—our strengths and weaknesses

There are three levels at which the Australian system might be developed to better respond to climate change: micro or individual levels, meso or regional and state levels, macro or national levels.

In relation to the micro-level of what individual practitioners know and can do, Australia is the only country with a detailed, nationally accredited curriculum document defining the knowledge and skills needed for rural and remote medical practice. The Royal Australian College of General Practice (RACGP) has developed broad curriculum statements of rural and remote practice.<sup>(35-39)</sup> However, it is fair to say that a far more detailed model of this practice is provided by the Australian College of Rural and Remote Practice in the form of its nationally accredited Primary Curriculum document.<sup>(40)</sup>

The ACRRM Primary Curriculum document was developed via an examination of what rural and remote doctors do in practice, as well as the Australian and international literature on rural and remote practice.<sup>(40)</sup> It offers principles, seven domains as the organising framework for the curriculum and assessment blueprint, learning outcomes describing core skills and offering a platform for assessment, as well as twenty-two curriculum statements specifying the content in different topic areas.

Consideration of the ACRRM curriculum document leaves little doubt that it offers an exhaustive model of curriculum for rural and remote practice. However, the document is silent on whether and how the climate change literature was considered. It encourages practitioners to develop many different kinds of literacies from information technology to cultural literacies but does not engage with what environmental literacy might mean for rural and remote practice in the future. In fact, the word 'climate' does not appear even once in either part one (40 pages) or part two (238 pages) of the ACRRM Primary Curriculum document.

Examination of the ACRRM curriculum document in the light of the climate change literature raises questions about the curriculum document like

1. Does the domain of 'Core Clinical Knowledge and Skills for Generalist Practice', as well as the domain of 'Extended Clinical Practice', place enough emphasis on ecologically intelligent clinical skills such as an awareness of how regional ecology may be shaping the nature and presentation of particular health conditions?
2. Does the domain of 'Emergency Care in Generalist Practice' appropriately emphasise what is known about the extent and nature of climate-driven disasters, particularly extreme climate events, in areas where these have not been observed before and the ways in which medical practitioners can contribute to environmentally intelligent disaster planning?
3. Does the domain of 'Population Health in Generalist Practice' appropriately emphasise the importance of practitioners being able to participate in the design of adaptive community infrastructure, including environmentally intelligent public health and other services, aimed at rapid responses as well as long-term coordination for a climate-changing world?
4. Does the domain of 'Aboriginal and Torres Strait Islander Health in Generalist Practice' appropriately emphasise the different ways in which climate change is known to impact on the health of indigenous people through powerful environmental forces that may bring about, for example, food shortages?
5. Does the domain of 'Professional, Legal and Ethical Practice in Generalist Practice' appropriately emphasise early warning information technology systems, including tracking methods, that will involve collection of holistic, environmentally intelligent information about people, places, and health conditions?

6. Does the domain of 'Rural and Remote Context in Generalist Practice' appropriately emphasise the ecological contexts of practice in a climate-changing world, such as the ways in which micro-climates will shape regional conditions of practice, including business models, and the role of general practice in building environmentally sustainable futures in those communities?

Anecdotal, it is known that rural and remote general practitioners are already in possession of knowledge and skills that make them one of the more environmentally literate members of their community. For example, they are positioned to know more about the interaction of drought and mental health conditions in their rural Australian communities than anyone else. In a climate-changing world it is likely that, over time, general practitioners will build knowledge and skills in diagnosing and treating conditions related to climate changes in their communities. However, to date little research has been done to find out the nature and extent of this eco-medical literacy. Efforts to study the health effects of climate change more generally have been fraught with difficulty.<sup>(15)</sup> This may be related to the lack of attention given to capturing (or even acknowledging the existence of) the practice-based knowledge of GPs and using it to develop hypotheses and methods for capturing complex causality. Whatever the case, it is certain that, at the individual level, Australian medical education and training in the future will need to place greater emphasis on building eco-medical literacy across the full range of clinical and non clinical skills.

At the meso or regional/state level, Australia's national rural curriculum documents sit in an accreditation system that includes other standards for GP education and training. These relate to what providers and training programs, trainers and training posts can do. At the macro or national level of accreditation, there are three key agencies in the Australian system apart from the Australian Medical Council (AMC): the RACGP, ACRRM, and General Practice Education and Training (GPET). This system sits in an even larger system of quality assurance for general practice which is comprised of many inter-locking agencies such as the Health Insurance Commission that perform functions important to the quality and safety of general practice.<sup>(41, 42)</sup> There is not the space here to detail how these meso and macro levels of quality assurance work: a report published by the RACGP offers the only publicly available account of the Australian quality framework for general practice.<sup>(42)</sup> However, a few general observations about its implications for climate-change preparedness can be made.

First, Australia appears to have an adaptive GP education and training system. The fact that both ACRRM and the RACGP have been able to relatively rapidly develop, implement and revise high quality standards, including global standards, at the different levels of accreditation suggests optimism for Australia's ability to incorporate new competencies for eco-medical literacy. However, while both the RACGP and ACRRM engage in much evaluation using participative approaches, little is known about how the Australian system of quality assurance for general practice is working as a whole. The complexity of the Australian system may be its Achilles heel in a climate-changing world. The lack of integrated evaluation and monitoring of the whole QA system at the national level is likely to make it difficult to know how well it is working overall to coordinate adaptive responses to climate change across regions.

Assessments of the risks and consequences of climate change on health<sup>(43)</sup> have been presented to the previous Australian government without reference to the risks to Australia if its health workforce is not properly supported to develop the appropriate competencies. However, the need for health workforce development is noted in the *Human Health and Climate Change—National Adaptation Research Plan* guiding research funding to be decided by the National Health and Medical Research Council in 2009.<sup>(25)</sup> This plan raises the important question of how continuing professional development will engage with the task of up-skilling health professionals for climate change. However, its silence on the subject of what aspects of the Australian medical education and training system need development reflects the lack of research in this and other climate change areas. It remains to be seen if the plan will lead to the kind of multidisciplinary 'whole-of-systems' research by experts in applied medical education that is needed. The

sort of variable-driven, scenario-based 'health risk' modelling favoured in traditional climate change research is not the kind of research that develops competencies: competencies research is often applied, iterative, qualitative, dominated by literature reviews and practitioner-based consensus-making methods such as the Delphi method.<sup>(44)</sup>

### Making a difference globally

There is evidence of increasing global cooperation in developing quality assurance systems for medical education and training. Guidelines developed by the World Health Organisation (WHO) and the World Federation of Medical Education (WFME) suggest best practice in education and training processes and, to some extent, in the development of curriculum standards: 'Accreditation of Basic Medical Programs',<sup>(45)</sup> 'Global Standards for Quality Improvement in Postgraduate Medical Education',<sup>(46)</sup> 'Continuing Professional Development (CPD) of Medical Doctors'.<sup>(47)</sup> These have been variously and quickly adopted in the Australian accreditation system, which already meets many of their basic and desirable features.

Relative to the rest of the world, Australia's system of rural and remote general practice education and training appears one of the most advanced. In many developing countries—India, Africa, South America and other developing regions—medical education and training programs take a strong regional focus, however, national accreditation systems are under development and many countries are struggling to implement the WFME standards. Some developed countries such as Canada<sup>(48, 49)</sup> and the United Kingdom<sup>(50)</sup> have undertaken the research and development work necessary to producing shorter statements defining the essential attributes for rural and remote practice. However, these do not approximate the level of detail and sophistication of the ACRRM primary curriculum document.<sup>(40)</sup> Consideration of the quality assurance systems for medical education in many developing countries suggests that those with climate change 'hotspots'<sup>(22)</sup> may well also lack the medical education and training infrastructure that can help their medical workforce adapt quickly and well to climate change.

It is hard to be certain about what an adaptive medical education and training system will look like in a climate-changing world. There is a body of literature on adaptive systems for climate change, and some analysis of adaptive responses to health care in a climate-changing world.<sup>(51)</sup> What is certain is that the challenge of upskilling rural and remote practitioners for climate change in any country will rely on having national and regional QA systems that allow quick uptake of relevant competencies through explicit curriculum documents and related accreditation processes for education and training standards.

What global responsibilities does Australia have to make a difference to how well other countries are able to adapt their systems to climate change? There is little room for national egotism in this task. Quality assurance systems are a product of history and culture. For many years the work of WHO in developing countries has suggested that health education and training templates, including of curriculum documents, are unlikely to work transplanted far from the needs that they were designed to serve.<sup>(52)</sup> At the same time, the present study involved contact with many medical educators in developing countries who were searching for models of rural and remote competencies they can adapt to their own purposes. They seemed to feel keenly the lack of opportunities to share global knowledge about these models. If the challenge of researching and developing competencies in eco-medical literacy is met in Australia, this would position us to be a more active and useful global citizen in a climate-changing world. Australia could work through bodies such as the WHO, WFME, and WONCA to help build a culturally sensitive, 'two-way street' approach to sharing international expertise in eco-medical literacy, rural and remote competencies, and related quality assurance.

## Conclusions

The story of Australia's preparation for a climate-changing world is a story that is largely silent on what workforce preparation for climate change is and how it might be implemented. However, it is certain that health workforce preparation for climate change must become part of what it means to be green. It is certain also that the climate change research and reform effort in Australia and internationally has proceeded largely without the benefit of studies of the eco-medical literacy of general practitioners who are likely to know more about the complex health effects of climate change than any other group. Australia has scarcely begun to conceptualise and map what workforce preparation for climate change is about.

This paper has suggested that eco-medical literacy might be defined as:

Clinical and non clinical knowledge, skills, and attitudes relevant to an understanding of how climate, place, and people interact to produce effects on health. Such literacy may involve transdisciplinary knowledge about interactions between, for example, bio-medicine and epidemiology, economics, ecology, culture, human behaviour and psychology, transport and infrastructure, and so on. This transdisciplinary knowledge and skills is likely to involve new ways of knowing about and delivering medicine that evolve from synergies between one or more of such diverse disciplines or sectors.

This paper has also suggested that Australian rural and remote general practice education and training is not ready for the age of consequences. In a climate-changing Australia, the development of medical education and training competencies needs to be more fully and rapidly informed by the 'on the ground' holistic knowledge of practicing doctors, especially in rural and remote regions. At the national level, medical education and training will need to rapidly and flexibly reflect integrated, cross-regional multidisciplinary evidence about climate change and health. If Australia can add eco-medical literacy to its armoury of expertise in designing and delivering GP education and training, it will be far better equipped to make a difference as a global citizen.

## Recommendations

1. That the National Rural Health Alliance (NRHA) refer this paper to ACRRM and the RACGP with the request that they work with the author and others to develop evidence for, and statements of, the competencies that will be needed in a climate-changing world, with a view to incorporating appropriate elements of these into future curriculum documents and related quality assurance mechanisms.
2. That the NRHA refer this paper to the Australian government to request funding for this urgent work preparing Australia's general practitioners for a climate-changing Australia, to be shared at the local, national, and global levels.

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