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# Preparing Australian medical students for climate change

## Background

Climate change is now recognised as a global public health problem and the future medical workforce will be working during a period when the health impacts of climate change are likely to be significant.

## Objective

This article discusses the ongoing training on the health impacts of climate change for the current and future medical workforce.

## Discussion

The role of medical practitioners in the coming decades will need to include assisting communities to adapt to changing climatic conditions, managing climate sensitive illnesses, and contributing to mitigation efforts to prevent climate change. Climate change and health should be built into the curricula of Australian medical schools spanning public health, clinical medicine, preventive health and global health. We propose a problem based learning approach to highlight clinical and public health implications, and present two hypothetical case studies suitable for teaching purposes.

■ **Climate change is now recognised as a global public health problem and will be an important component of ongoing training for the current medical workforce and, particularly, for the future medical workforce.<sup>1-3</sup> The role of medical practitioners in the coming decades is likely to include assisting communities to adapt to changing climatic conditions, managing climate sensitive illnesses and contributing to mitigation efforts to prevent climate change.<sup>4</sup> In this article, we argue that climate change and health should be built into the curricula of Australian medical schools and ongoing education for general practitioners and other specialists. We propose a problem based learning approach to highlight clinical and public health implications, and present two hypothetical case studies suitable for teaching purposes.**

## Health risks of climate change

The impacts of climate change on health are increasingly understood; indeed, they were the focus of World Health Day 2008.<sup>1</sup> A key message was that the health sector is one of the most affected by climate change. For example, in their assessment, The World Health Organization focused on five specific pathways through which climate change might impact on global health<sup>5</sup>:

- thermal stress
- weather disasters
- malaria
- diarrhoea, and
- malnutrition (related to reduced agricultural yields).

Notably it predicts that the impacts of climate change will be concentrated in poorer populations, where climate sensitive diseases are common, and in vulnerable populations, such as children under the age of 5 years.<sup>5</sup>

Although Australia is a developed nation, it is also vulnerable to climate change, especially in rural and remote locations.<sup>6,7</sup> More frequent droughts and long term drying are a particular challenge.<sup>8</sup> There are numerous flow on impacts of drought, including impacts

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on local economies and on physical and mental health. Individuals and communities experiencing underlying disadvantage will be the hardest hit,<sup>9</sup> with Aboriginal communities especially vulnerable.<sup>10</sup> In addition, heatwaves and fire risk will rise with warmer and drier conditions, the latter increasing fire related injuries and deaths, respiratory problems from dust and smoke, and multiple health risks to fire fighting workforces.<sup>11</sup>

Australia is also at risk of changes in the distribution of some mosquito borne diseases. Australia is currently receptive to dengue in the north of Western Australia, the Northern Territory and Queensland. Applying a global dengue model to Australia suggests this arbovirus has the potential to extend further south with climate change.<sup>12</sup> Although this prediction has been challenged (for inaccurate baseline distribution predictions for the vector *Aedes aegypti* and a failure to incorporate the past, more widespread distribution),<sup>13</sup> it would be prudent to still prepare for this and similar

risks. The epidemiology of Ross River virus may well also alter with climate change; but, due to its complex ecology more research is needed to determine which changes may occur.<sup>14</sup>

Around the world, rising sea levels will also affect coastal communities, displacing local populations<sup>15</sup> and perhaps leading to an influx of environmental refugees from Australia's neighbours in the Asia Pacific region.<sup>16</sup>

## Role of the medical workforce

Medical practitioners will need supplementary training in identifying and managing climate change related health risks, particularly in primary care and emergency response settings, and this should therefore be incorporated into undergraduate medical curricula, general practice registrar training and other postgraduate education programs. This will enable doctors to be appropriately equipped for the impact of climate change on their

Table 1. Potential roles of future medical workforce in context of climate change

### **Adaptation – provide health care for climate sensitive illnesses**

Direct impacts (eg. heat waves, infectious diseases, injuries related to extreme weather events)

Indirect impacts (eg. loss of livelihood, loss of social infrastructure, displacement)

### **Contribute to building community resilience**

Health system preparedness (eg. for heat waves or extreme weather events)

Community advice for supporting those who may be at particular risk (eg. old age, inadequate access to support or resources, existing medical conditions)

### **Promote community understanding**

Evidence based public health information about climate change (spokesperson, local media contributions)

Participate in community based and other activities that model climate change appropriate health behaviours (eg. walking school bus)

### **Mitigation – champion environmentally sustainable health care**

Green hospitals<sup>19</sup>/green clinics<sup>20</sup> (eg. renewable energy, energy/water efficiency, green purchasing policies)

Make it easier to walk or cycle to medical facilities (eg. secure bike parking, on site shower facilities)

### **Advocate for sustainable government policies**

Lobby local governments to improve public transport (reduces air pollution and greenhouse gas emissions)

Participate in advocacy groups (eg. Doctors for the Environment Australia<sup>18</sup>)

Inform policy makers about the health impacts and costs of climate change

Articulate a public health perspective on climate change in the mainstream media

### **Undertake research relating to health and climate change**

Measurement of specific health effects of climate change

Preparing health services to respond to climate sensitive illnesses

Effective education – promote healthy behaviours with environmental co-benefits

Effective promotion of active transport (eg. walking and cycling) to build health and reduce adverse environmental impacts

Effective communication of information about the health and environmental benefits of a high fruit and vegetable/low ruminant diet (ie. improves diet, reduces greenhouse gas emissions and water consumption)

practice, and will be important in achieving preparedness. Climate change adaptation, education and mitigation activities will be core activities, as outlined in *Table 1*.

### Incorporating climate change and health into medical training

In light of the health impacts of climate change, practising and graduating doctors will need to be able to diagnose and manage an increasing range of climate related illnesses and health risks. While some of these roles fall outside medical practitioners' current responsibilities, climate change will require medical practitioners to take on broader responsibilities including leadership and advocacy on the issue of climate change mitigation, as well as for environmentally sustainable health service and community planning.

How is climate change best included within existing medical training? This will depend on the structure of the university medical course or GP or other specialist training, teaching methods, and the extent to which teaching about the natural environmental determinants of health is already integrated within the curricula. Two broad, nonmutually exclusive approaches are suggested:

- introduce specific units on climate change, and/or
- build climate change awareness and implications into other areas of learning.

There are different ways to put these approaches into practice; we indicate below how climate change might be incorporated into problem based learning (PBL) or case based learning (CBL) approaches. Whatever the approach adopted, teaching the health impacts of climate change will be a multidisciplinary task spanning public health, clinical medicine, preventive health and global health. We propose some learning outcomes that can be used as a guide regardless of teaching methods (*Table 2*).

### Learning about the health impacts of climate change

Problem based learning methods have been successfully utilised in many of the undergraduate medical curricula in Australia and may have a role in teaching this field. They are underpinned by a constructivist approach, which places students in an active role in which they develop critical thinking abilities.<sup>17</sup> Often, students collaborate and develop teamwork skills as they face common challenges as co-investigators. Two example PBL hypothetical case studies suitable for teaching purposes are presented in *Case study 1* and *2*. Case based learning for medical practice could be considered in a similar way with consideration given to both patient centred care and a broader perspective on health.

Scenarios such as these can be used to prompt qualified practitioners and students to consider the causative environmental factors leading to illness and emerging opportunities for health promotion. In *Case study 1*, a middle aged man presents with an upper respiratory tract infection and, at the same time, exhibits a range of health risks related to his lifestyle. It highlights an opportunity for the GP taking a patient centred approach to involve the man in exploring ways of improving his health while simultaneously achieving

**Table 2. Key learning outcomes for climate change and health**

- Understand the scientific basis of climate change
- Understand the existing and potential health impacts of climate change in Australia and internationally
- Understand the disease implications of migration to Australia (especially of climate change refugees) in terms of new, eradicated or currently rare diseases' ability to survive in Australia under conditions of continuing climate change
- Be aware of diagnosis and management of illnesses that are sensitive to changing climate
- Be aware of characteristics that may make certain individuals or communities especially vulnerable to adverse climate change health impacts
- Appreciate the links between preventive health interventions and environmental sustainability
- Understand the need for development and implementation of effective environmental health policies in the context of climate change
- Be aware of the opportunities for increased health promotion that climate change may offer

environmental co-benefits by encouraging lifestyle changes that would reduce greenhouse gas emissions. Such preventive health advice in line with principles of environmental sustainability may provide powerful incentives to be used within a motivational interviewing technique, especially in those patients who are concerned about the environment and wishing to reduce their own carbon footprint. In *Case study 2*, students are asked to look beyond the detection and management of dengue fever and to consider the implications climate change can have on the vector life cycle (eg. via the direct effects of higher temperature and also less obvious impacts, such as increased numbers of water tanks). Students are also led to a consideration of the public health implications of disease management.

### Case study 1 – obesity/cardiovascular risk

Con is an office worker, 45 years of age, who presents to your large inner city general practice with an upper respiratory tract infection (URTI). He mentions specific symptoms of cough, runny nose and feeling generally unwell. He reports being tired and stressed and has taken 2 days off work, for which he requests a medical certificate. A reminder pops up that his cholesterol levels need to be rechecked. On examination, he certainly seems to have a viral URTI but you also find that he weighs 98 kg with a BMI of 30.8 and blood pressure of 160/95. He works a 50 hour week in the city, driving 45 minutes each way. His diet is low in fruit and vegetables and he eats red meat four times per week.

Apart from following up his BP and high lipids, how would you engage Con in a discussion about his lifestyle? What questions might you ask him to ascertain what might be feasible in his particular circumstances? Can you envisage any environmental co-benefits of any proposed lifestyle changes?

## Case study 2 – dengue fever

Thuy is 32 years of age and works in tourism in Cairns. Having returned to Brisbane to visit her parents 5 days ago, she presents to your practice complaining of fever, back pain, diarrhoea and retro-orbital pain. On examination she has a macular rash. Full blood count shows leucopenia and thrombocytopenia, thick and thin films for malaria are negative, and stools for ova, cysts and parasites, and microscopy, culture and sensitivity are negative. Dengue IgM is positive.

What are the risk factors for dengue fever and what public health/preventive strategies could be implemented? Through what mechanisms might climate change affect the distribution of dengue fever in Australia?

## Conclusion

The future medical workforce will be working during a period when the health impacts of climate change are likely to be significant; climate change will be important regardless of particular career paths. Clinical practice will be enhanced by understanding of these population health issues and will empower doctors to have an important role as advocates for the health of their community.

Climate change is already an area of interest to many Australian medical students and doctors. For example, the Australian Medical Student Association Global Health Conference 2008 featured several sessions on climate change; and medical students and doctors are also active in advocacy groups, such as Doctors for the Environment Australia.<sup>18</sup> By building on this interest we can prepare for medical practice in a world in which the climate may be radically different.

Conflict of interest: Evelyn Hamel Green, Grant Blashki, David Harley and Gill Hall are members of Doctors for the Environment.

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