Rethinking health professions' education leadership: Developing 'eco-ethical' leaders for a more sustainable world and future

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Practice points

- Leadership on 'wicked' issues such as the climate emergency health and the need for environmentally sustainable healthcare is urgently needed
- An 'eco-ethical' leadership and followership approach is highly relevant for health professional educators and learners
- Eco-ethical leadership is an integrated approach centred around sustainability, values, collaboration, justice, advocacy and, if need be, activism
- It will need to be put into practice at intrapersonal, interpersonal, team, organisation and system levels

Keywords

Leadership, followership, environment, planetary health, ethical leadership, eco-ethical leadership, health professions education

Abstract

In this commentary, we discuss health professions' education (HPE) leadership in relation to planetary health emergencies, suggesting that an 'eco-ethical leadership' approach is highly relevant. Building on both traditional and more contemporary leadership approaches and the need for HPE to be socially and environmentally accountable, we define the key features of eco-ethical leadership and its underpinning beliefs and values, then expand on these features in terms of leadership at intrapersonal, interpersonal, team, organisational and system levels. Eco-ethical leadership is needed to tackle a range of 'wicked' problems – a changing climate, environmental pollution, deforestation, all of which threaten global biodiversity and human civilisation. Such leadership requires passionate individuals to role model the behaviours and actions that are required to bring people along with them, not least the learners, many of whom are already concerned about their future. Eco-ethical leadership (and followership) offers an integrated approach for HPE, centred around sustainability, values, collaboration, justice, advocacy and, if need be, activism. The environment cannot not wait. Eco-ethical leaders already exist but their numbers are small. They are required in key positions in academia and healthcare to drive the agenda in partnership with learners, many of whom are already environmental advocates and activists.

In this commentary, to fast-track action at a time of climate and biodiversity crisis, we wish to begin a conversation around what health professions' (HP) educators could do in terms of leadership and followership in relation to planetary health, which incorporates the interrelatedness of human well-being and stable ecosystems, now and in the future (Whitmee et al. 2015). We acknowledge that some health professionals do not feel that such topics and advocacy or activism should be included in already over-crowded curricula (Goldfarb 2019), but, increasingly, groups and individuals (including students) who becoming increasingly concerned that appropriate leadership in this space is lacking in both healthcare and in HPE.

For example, whilst concern over the anthropogenic impact on the Earth's natural resources and the consequences of global environmental changes (GECs) on human health and well-being has gained momentum (Rockström et al. 2009; Horton et al. 2014; Myers 2017; Fumkin & Haines 2019; Haines and Ebi 2019; Gupta et al. 2019), a recent *Lancet* editorial entitled 'Looking for leaders' lamented this fact: *'Little conventional leadership is taking the steps necessary to address these issues'* (Lancet 2019; p.399). It is against this backdrop that this commentary is written.

Planetary health

The United Nations (UN) 2030 Sustainable Development Goals (SDGs) reflect the need for environmental sustainability in human progress to protect the planet and ensure that all people can enjoy a healthy future (UN 2015). In acknowledging the intimate relationship between the health of our planet and our own health and well-being, the concept of planetary health has emerged. Horton and colleagues' (2014) *Lancet* manifesto, recognising the threats to the sustainability of our civilisation, called for a social movement to support collective public health action at all levels, from personal to planetary. They called this 'planetary health'. Whitmee and colleagues' (2015) definition is probably the most widely accepted: *"….. the achievement of the highest attainable standard of health, wellbeing, and equity worldwide through judicious attention to the human systems – political, economic, and social – that shape the future of humanity and the Earth's natural systems that define the safe environmental limits within which humanity can flourish. Put simply, planetary health is the health of human civilization and the state of the natural systems on which it depends."* (p. 1978).

The relative inaction of many governments, despite being signatories to the 2015 Paris Agreement to reduce greenhouse gas emissions, as well as ignoring evidence and warnings on environmental degradation from the scientific community and global leading bodies (e.g. Intergovernmental Panel on Climate Change), has stimulated individuals (such as the Indigenous climate activist, Artemisa Xakriabá and Greta Thunberg) and groups such as Extinction Rebellion, which includes a doctors' group, to become public activists (Horton 2019; Mahase 2019). Concerns about the impact of the climate emergency on human health, potentially reversing the health gains of the past fifty years (Costello et al. 2009) have also led to the *Lancet* Countdown annually tracking key indicators (Watts et al. 2018; 2019), as well as many HP bodies declaring climate change a health emergency and publishing position statements on sustainable health care and resource stewardship (see 'Useful information' section).

Medical and health professions' education

For decades, medical educators and health researchers have played a significant role in foregrounding public health issues in research (Pascal et al. 2019), global health issues in HP education (Bhutta et al. 2010) and advancing the medical school social accountability agenda (Boelen & Heck 1995; Pearson, Walpole & Barna 2015;). More recently, recognising that healthcare itself is a contributor to GECs through its large environmental footprint in terms of greenhouse gas emissions, natural resources usage and waste (Eckleman & Sherman 2016; Pencheon 2018; Malik et al. 2018; Pichler et al. 2019), the social accountability agenda has been expanded to *'include the concept of Environmental Accountability, i.e. … the obligation of medical schools to ensure they actively develop, promote, and protect environmentally sustainable solutions to address the health concerns of the community, region, and the nation they serve"* (Boelen and Heck 1995, p3). While a recent AMEE Guide discussed

environmental accountability as a 'Future Challenge' ((Boelen et al. 2016; Box 1), the 'future' about which they wrote has arrived.

1. **Box 1. Key features of an environmentally accountable medical school (Boelen et al. 2016)**
   Environmentally responsible: Aware of GECs facing society and recognises their impact on future students, staff and populations served by the school. Responsibility includes tracking the school's carbon footprint and other resource usage such as water.
2. *Environmentally responsive*: Aware of requirements to reduce the school's impact on local and global environment, having policies and priorities for saving water, raw materials and energy, e.g. through amending building and travel policies, reducing, recycling, encouraging sustainability initiatives and individual champions.
3. *Environmentally accountable:* Has clear, effective policies to reduce the school's environmental impact and through education, research and service to ensure health systems are sustainable for future generations. Includes linking awareness and responsiveness to challenges with clear, evidence-based action plans, working with local communities so the school and the communities it serves can reduce their environmental impact and minimise damage where impact is unavoidable. Has measurable outcomes.

In the last few years, HP students (e.g. International Federation of Medical Students' Associations 2019), educators (e.g. Pearson et al 2015; Walpole et al. 2016; 2017; 2019; Wellbery et al. 2018) and health professionals (e.g. Mortimer 2010; Shelton et al. 2019) have become more active and vocal about these issues and what should be done in terms of strategies, curriculum components, learning opportunities and community engagement. Most regulators, however, are still not explicit about requirements around education and health professionals' responsibilities for planetary health, thus a key driver for change is missing. Mainstream HP education has also been slow to ensure students and qualified staff are fully prepared (in terms of up to date knowledge, tools and techniques) to take a leadership role in ensuring an environmentally sustainable health care agenda and the advancement of planetary health. Opportunities exist but are often not exploited. For example, while many doctors in training are encouraged to undertake Quality Improvement (QI) initiatives around tackling waste and reducing the environmental impact of healthcare organisations, these initiatives tend to remain as individual institutional 'projects' which end when the doctor in training moves on. The opportunity for such projects to become mainstream activities that contribute to reducing healthcare's environmental impact is therefore lost.

Because doctors and other health professionals generally have a high social standing, with power and a voice in society, it is vital that they are equipped to take leadership roles at local and wider levels and that environmental activism and actions are not just reliant on a few individuals (Dobson et al. 2012; Wellbery 2018; American Association of Medical Colleges 2019). Desperate times call for different leadership. In this commentary, we suggest that this requires leadership with a mindset that recognises the responsibility of HP leaders to take and encourage action on what can only be described as pressing environmental issues.

Eco-ethical leadership

Our concept of 'eco-ethical' leadership for HP educators draws from a number of contemporary leadership theories and approaches, taking the view that 'leadership' involves management and followership, as well as 'leadership' *per se* (McKimm and O'Sullivan

2016). Changing behaviour, organisations and cultures is challenging and needs a long-range perspective, requiring individuals to become active and proactive agents for environmental change and sustainability. Reflecting contemporary thinking on leadership, we are purposely not defining a leadership approach in terms of a set of measurable competencies, but more from a philosophical, and, specifically, an ontological leadership perspective (Souba 2011). Thus, we have focussed on describing the underpinning values and beliefs which drive the lived experience of 'being' an authentic leader, rather than defining the leadership 'things' that leaders might do. From this perspective, self-reflection and self-awareness are vital important precursors to developing authentic leadership and appropriate leadership intentions. In a similar approach, Block (2014) takes a phenomenological perspective, suggesting that leadership is a *"supercomplex' phenomenon, in which authentic leaders and followers utilise reflection and self-awareness in the moment to generate intentions 'that can be ethically focused, politically mitigated and directed appropriately"*. (p. 233). In light of these perspectives, we therefore also highlight the personal leadership knowledge, skills and behaviours which will enable leaders to become more accountable, advocate for sustainability, social change and justice and perhaps be activists themselves (Larson and Murtadha 2001; Hargreaves and Fink 2004; Keunkil 2016; Frankson et al. 2016).

Whilst 'eco-leadership' usually relates to leadership in organisations that takes an holistic, systemic and ethical stance (but not necessarily an environmental one) (Western 2010), in this commentary we are using the term 'eco' to refer to the various environments in which we live and work as an inter-related set of complex systems, taking particular account of the natural environment. Hutchins and Storm (2019) suggest that leaders need to shift consciousness from traditional reductive machine logic to a living systems logic, which sees organisations as messy, interconnected living systems made up of messy interconnected human relationships. They call this 'regenerative' leadership, reflecting the cyclical nature of nature and eco-systems. For those working in health and education, emphasising the cyclical nature of processes seems relevant.

Ethical (moral or value-led) leadership involve leaders who 'do the right thing' (Mabey 2017), thinking about what is 'right' and what is 'wrong', taking responsibility for their actions from a moral imperative and displaying humility and compassion (West and Chowla 2017). In terms of planetary health, reflecting the experiences, wisdom and needs of all communities (including marginalised, First Nation and displaced peoples), human health and well-being and the environment are central to all activities. This requires an integrated and interdisciplinary approach (Eisenbeiss 2012). From a servant leadership perspective (Greenleaf 2008), we have a responsibility to act as stewards for the planet, handing it on in the best shape we can to the generations that come after us. This Islamic declaration on climate change suggests that we have abrogated this responsibility: *….though selected to be a caretaker or steward (khalifah) on the earth … [as being] the cause of such corruption and devastation on it that we are in danger ending life as we know it on our planet'* (Islamic Foundation for Ecology and Environmental Sciences (IFEES) 2015).

A mindset shift

Effective leadership involves drawing on a range of approaches, styles and concepts (some of which we describe below, such as adaptive, servant and collaborative leadership) appropriate for different situations or times. All leadership approaches are underpinned by a set of beliefs, values and principles about how the 'world works', how people behave and what the role, activities and duties of a leader should be. Some of these are explicitly articulated and easy to see, others are implicit, but are highly influential in terms of how leaders sees themselves,

how they view their followers and how followers see (and choose to follow) their leaders. 'Leaders' can operate at all levels and, whilst individuals may act or be seen as both a leader and a follower (depending on the context or situation), because the features of eco-ethical leadership are grounded in the personal values and beliefs core to a person's identity, they will be enacted in whatever activities the individual is involved, both professionally and personally.

In Box 2, we set out the key features that distinguish an 'eco-ethical' leadership approach from other leadership approaches, explicitly articulating the underpinning values and beliefs of such leadership.

Box 2. Key features of an 'eco-ethical' leadership approach for health professions' education.

Eco-ethical leaders hold, display (through day-to-day behaviours and actions) and can articulate the following values and beliefs:

1. That we have a moral duty to act in terms of taking responsibility for stewardship of the planet and its resources.
2. Are accountable for their actions, recognising when advocacy or activism is needed.
3. Role-model environmentally sustainable practice, both personally and professionally
4. Show a commitment to environmental, organisational and community sustainability and regeneration.
5. Have cognitive complexity in that they can see the world from a dynamic systems' perspective.
6. Are of the opinion that collective intelligence is the most powerful way to engender meaningful change though listening, trust, networking, sharing information and power, communicating and working collaboratively across and within disciplines and professions.
7. Demonstrate socio-cultural and ecological values that embody inclusivity and social and ecological justice.
8. Have an authentic, person-centred, empathetic and compassionate approach to change, recognising that making changes is difficult, that people need to support one another and celebrate what might seem small changes.

What might this involve for HP leaders?

In this section, we do not elaborate on specific educational strategies (for examples, see Teherani et al. 2017; Schwerdtle et al. 2019; Tun 2019) and a forthcoming *Medical Teacher* special issue on sustainable health care education. Instead, we expand on the key features of eco-ethical leadership, described in Box 2, in terms of knowledge, skills and behaviours that might be required at the levels of the system, organisation, team and the individual (Swanwick and McKimm 2017). What eco-ethical leadership might mean in terms of the behaviours or actions of such a leader will vary depending on the context in which leadership is being enacted, the extent or ways in which these features are integrated into an individual's *persona* or identity, the power and authority available to them, and the nature of the followership. For example, in the first feature in Box 2, individuals will have to reflect on what 'moral duty' and 'stewardship' might mean to them. For a senior leader in a university, this might mean developing and promoting policies that aim to reduce waste, recycle and repurpose, and appointing a senior champion to implement and measure the impact of these policies, whereas for an educator, this might mean role modelling best practices to learners and developing sustainable educational resources (this would also link to #3).

At the systems levelHP educators work in multiple, overlapping, dynamic systems, including healthcare, social care and education, which today operate in a VUCA environment: Volatile, Uncertain, Complex and Ambiguous (Mack et al. 2015). Within these overarching large systems, are nested others (e.g. organisations, departments, curricula), all of which have their own system dynamics. Surrounding these systems are wider environmental and social systems. Eco-ethical leaders thus need to be adaptive (Obolensky 2017), being able to translate policy and strategy into meaningful action, accept and work with paradox, uncertainty and ambiguity whilst retaining a moral purpose. They also need to develop 'cognitive complexity' to understand how systems work and interact (Guarana & Hernandez 2015). Effective leaders are often good 'boundary-spanners', being able to work across system boundaries and in the 'spaces between' (through gate-keeping and knowledge-broking) to influence others and effect change (Paraponaris et al. 2015). Kuenkel's (2016) collective leadership 'compass' comprises six complementary domains - wholeness; future possibilities; engagement; innovation; humanity and collective intelligence – which are central to the eco-ethical leadership approach we have defined and clearly resonate with what should be HP educators' core values and activities.

In organisations
Whilst organisations and their components can be viewed as systems, organisations have certain key features including a defined purpose and objectives, co-ordinated effort, division of labour and a hierarchy of authority. Eco-ethical leadership will therefore involve understanding and working with existing formal and informal processes (e.g. strategic and policy planning) and structures (e.g. committees) to embed environmental assessment and quality improvement, accountability and resource stewardship. What we are really trying to do is change the culture rather than the structures and processes, but the two are interlinked and eco-ethical leaders need to understand how to work with both aspects to change the culture from one of consumerism to one which values resources (Friel 2020). Culture change is hard, takes a long time and is not easily measured, so 'political' lobbying might be required, using personal and group power to champion these issues and change behaviour through role-modelling, persistence and perseverance.

Working with others
Leading significant change is not easy. Eco-ethical leaders (and their followers) will need 'the courage of the heart', which Kouzes and Posner (2003) call 'exemplary leadership' which involves modelling the way, inspiring a shared vision, challenging the process and enabling others to act. Working collectively is essential in these difficult spaces because the more ideas and power we share, and the more wisdom we tap into, the more we have to use. Other personal attributes required include:

- Knowledge of the key issues and their impact to communicate ideas effectively;
- Political 'savvy' (what Hanson and Middleton (2000) term 'green Machiavellianism');
- Social and cultural intelligence;
- Resilience and grit (Duckworth 2016);
- A strong belief and passion in the value of environmental justice;
- The self-confidence to stand up for these broader, 'long-game' principles when resources are limited and other short-term pressures are biting;

- A willingness to collaborate and work with others and to develop like-minded followers (faculty and students) into future leaders (Flood et al. 2013; Grey 2013).

Being one of the first followers (or 'early adopters') can be very difficult. The importance of the first followers cannot be underestimated, however, as it is through harnessing the followership that a critical mass and tipping point is reached and meaningful change can happen.

Examples of eco-ethical leadership in practice

In this paper, we are not advocating one particular set of leadership activities. Indeed, a combination of activities by multiple stakeholders will be needed to stimulate and maintain change in such complexity. Box 3 highlights some examples in the sustainable healthcare education space, where groups of like-minded 'eco-ethical' leaders (including students) have collaborated, often across wide geographic areas and disciplines to drive an urgent agenda.

Box 3. Examples of collective vision and leadership advancing the sustainable health care education agenda

1. AMEE ASPIRE (International recognition of excellence in education): Social accountability criteria now include environmental accountability https://aspire-to-excellence.org/Areas+of+Excellence/
2. Centre for Sustainable Healthcare's Education and Training: A multi-disciplinary approach to sustainable healthcare practice, offering training and serving as a resource repository: https://sustainablehealthcare.org.uk/
3. General Medical Council (UK) Accreditation Standards: Sustainability has now been included in the Graduate Outcome Statements. By the summer of 2020, all UK medical schools should have integrated sustainability into their curricula.
4. Medical Deans of Australia and New Zealand (MDANZ) Working Group on Climate Change and Health: Recommended modifications to the 2012 Australian Medical Council Accreditation Standards have been endorsed by MDANZ, circulated to all medical deans (Madden, McLean and Horton 2018).
4. International Federation of Medical Students (IFMSA): Draft WHO global strategy on health, environment and climate change: https://ifmsa.org/wp-content/uploads/2018/10/IFMSA-Statement-5c_health_environment_climate_change.pdf; https://www.cfms.org/what-we-do/global-health/heart.html
5. Canadian Medical Students Association: Planetary health competencies: https://www.sciencedirect.com/science/article/pii/S2542519619302426
6. Frankson et al. (2016): Core competency domains for the One Health approach.
7. Parker et al. (2019): Scoping review of environmental competencies for healthcare educators and trainees.

Conclusions

Desperate times call for a new approach to leadership and followership. In this commentary, we have described the key features of the 'eco-ethical' leadership approach which will be required to tackle the range of 'wicked' issues facing humankind – a changing climate, environmental pollution, deforestation, all threatening global biodiversity as well as threatening human civilisation. This leadership requires passionate individuals who are able to role model the behaviours and actions that are required to bring people along with them, It will also need some current leaders to shift their stance on environmental issues, and to proactively listen to people and groups who they may see should be more passive followers. It is important that followers are listened to, that they feel acknowledged and heard and that

they are encouraged to be active in this sphere, not least learners, many of whom are already concerned about their future. As there is no Planet B, addressing the many global environmental challenges requires collective action at the intrapersonal, interpersonal and organisational and system levels. Eco-ethical leadership offers health professions' educators an integrated approach to leadership and followership, centred around sustainability, values, collaboration, justice, advocacy and activism. The environment cannot wait. Eco-ethical leaders already exist but their numbers are small. They are required in key positions in academia and health care practice to drive the agenda in partnership with their learners and patients, many of whom may already be environmental advocates and activists.

Useful information sources

Australian Medical Association (AMA). Environmental Sustainability in Health Care. https://ama.com.au/position-statement/environmental-sustainability-health-care-2019 (accessed 21 March 2019)

Centre for Sustainable Healthcare. 2018. 10 year impact review. https://sustainablehealthcare.org.uk/sites/default/files/final_report.pdf. (accessed 7 Nov 2019)

Extinction Rebellion: https://rebellion.earth/ (accessed 7 Nov 2019)

International Council of Nurses' Position Statement on Nurses, climate change and health https://www.icn.ch/sites/default/files/inline-files/ICN%20PS%20Nurses%252c%20climate%20change%20and%20health%20FINAL%20.pdf (accessed 7 Nov 2019)

Intergovernmental Panel on Climate Change https://www.ipcc.ch (accessed 5 Nov 2019)

Lancet Commission on Interplanetary Health https://www.thelancet.com/journals/lanplh/home (accessed 6 Nov 2019)

United Nations Climate Action https://www.un.org/en/climatechange/climate-action-areas.shtml (accessed 7 Nov 2019)

World Health Organisation (WHO https://www.who.int/health-topics/climate-change#tab=tab_1 (accessed 7 Nov 2019)

World Medical Association's Resolution on Climate Emergency (2019) https://www.wma.net/policies-post/wma-resolution-on-climate-emergency/ (accessed 7 Nov 2019)

References

Association of American Medical Colleges. 2019. Climate Change in the curriculum. [11 November 2019]. [https://www.aamc.org/news-insights/climate-change-curriculum]

Association of Medical Education in Europe. ASPIRE to Excellence awards https://www.aspire-to-excellence.org/Areas+of+Excellence/ (accessed 13 Nov 2019)

Bhutta ZA, Chen L, Cohen J, Crisp N, Evans T, Fineberg H, Frenk J, Garcia P, Horton R, Ke Y, et al. 2010. Education of health professionals for the 21st century: a global independent Commission. Lancet. 375(9721):1137-8.

Block BA. 2014. Leadership: A supercomplex phenomenon. Quest. 66(2):233-246, DOI: 10.1080/00336297.2013.879535

Boelen C, Heck JE, World Health Organization. 1995. Defining and measuring the social accountability of medical schools. Geneva: World Health Organization. Available at https://apps.who.int/iris/bitstream/handle/10665/59441/WHO_HRH_95.7.pdf?sequence=1&isAllowed=y (accessed 28 February 2020)

Boelen C, Pearson D, Kaufman A, Rouke J, Woollard R, Marsh D, Gibbs T. 2016. Producing a socially accountable medical school: AMEE Guide No 109. Med Teach. 38(11):1078-91.
Costello A, Abbas M, Allen A, Ball S, Bell S, Bellamy R, Friel S, Groce N, Johnson A, Kett M, et al. 2009. Managing the health effects of climate change. Lancet. 373(9676):1693-1733.
Dobson S, Voyer S, Regehr G. 2012. Perspective: agency and activism: rethinking health advocacy in the medical profession. Acad Med. 87(9):1161-1164.
Duckworth A. 2016. Grit: The power of passion and perseverance. New York (NY): Scribner.
Eckleman MJ, Sherman J. 2016. Environmental impacts of the U.S. health care system and effects on public health. PLOS One 11(6):e1057014. https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0157014
Eisenbeiss SA. 2012. Re-thinking ethical leadership: An interdisciplinary integrative approach. Leadersh Q. 23(5):791-808.
Flood MG, Martin B, Dreher T. 2013. Combining academia and activism: common obstacles and useful tools. Aust Univers Rev. 55(1):17-26.
Frankson R, Hueston W, Christian K et al. 2016. One Health core competency domains. Front Pub Health. 4:192. https://www.frontiersin.org/articles/10.3389/fpubh.2016.00192/full
Friel S. 2020. Climate change and the peoples' health: the need to exit the consumptagenic system. Lancet. https://www.thelancet.com/journals/lancet/article/PIIS0140-6736(20)30257-9/fulltext
Frumkin H, Haines A. 2019. Global environmental change and noncommunicable disease risks. Ann Rev Pub Health. 40:261-282.
Goldfarb S. 2019. Take two aspirin and call me by my pronouns, Wall St J, 27 August. https://www.wsj.com/articles/take-two-aspirin-and-call-me-by-my-pronouns-11568325291 (accessed 22 February 2020).
Greenleaf RK. 2008. Who is the servant-leader? Int J of Servant-Leadersh. 4(1):29-37.
Grey SJ. 2013. Activist academics: What futures? Policy Futures Educ. 11(6): https://journals.sagepub.com/doi/abs/10.2304/pfie.2013.11.6.701
Guarana CL, Hernandez M. 2015. Building sense out of situational complexity: The role of ambivalence in creating functional leadership processes. Organ Psychol Rev. 5(1):50-73.
Gupta J, Hurley F, Grobick A, Keating T, Stoett P, Baker E, Guhl A, Davies J, Ekins P. 2019. Communicating the health of the planet and its links to human health. Lancet Planet Health. 3(5):e204-206.
Haines A, Ebi K. The imperative for climate action to protect health. N Engl J Med. 380:263-73.
Hanson D, Middleton S. 2000. The challenges of eco-leadership. Greener Manage Int. 1(29):95-110.
Hargreaves A, Fink D. 2004. The seven principles of sustainable leadership. Educ Leadersh. 61(7):8-13.
Horton R. 2019. Extinction or rebellion. Lancet 394:1216.
Horton R, Beaglehole R, Bonita R, Raeburn J, McKee M, Wall S. 2014. From public to planetary health: a manifesto. Lancet. 383:847.
Hutchins G, Storm L. 2019. Regenerative leadership: the DNA of life-affirming 21st century organisations. Tunbridge Wells: Wordzworth Publishing.
Islamic FEES Ecoislam. 2015. Islamic declaration on global climate change. http://www.ifees.org.uk/declaration/ (accessed 6 November 2019).

International Federation of Medical Students' Associations 2020 Vision for Climate Health in Medical Curricula www.ifmsa.org (accessed 5 November 2019).
Kouzes JM, Posner BZ. 2003. The five practices of exemplary leadership. San Francisco: Jossey Bass.
Kuenkel P. 2016. The art of leading collectively. White River Junction (VT): Chelsea Green Publishing.
Larson CL, Murtadha K. 2002. Leadership for social justice. Yearb Nat Soc Study Educ. 101(1):134-161.
Looking for leaders. 2019. [editorial]. Lancet Planet Health. https://doi.org/10.1016/S2542-5196(19)30196-2 (accessed 13 November 2019).
Mabey C. 2017. Can ethical leadership be developed? In: Mabey C, Knights D, editors. Leadership Matters: Finding voice, connection and meaning in the 21st century. London: Routledge; p. 49-60.
Mack O, Khare A, Krämer A, Burgartz T, editors. 2015. Managing in a VUCA World. New York (NY): Springer.
Madden DL, McLean M, Horton G. 2018. Preparing medical graduates for the health effects of climate change: an Australasian collaboration. MJA. 208(7):291-292. https://www.mja.com.au/journal/2018/208/7/preparing-medical-graduates-health-effects-climate-change-australasian
Mahase E. 2019. Doctors for Extinction Rebellion: a new group fights for planetary and public health. BMJ. 365:12364.
Malik A, Lenzen M, McAlister S, McGain F. 2018. The carbon footprint of Australian health care. Lancet Planet Health. 2:e27-35.
McKimm J, O'Sullivan H. 2016. When I say…leadership. Med Educ. 50(9):896-897.
Mortimer F. 2010. The sustainable physician. Clin Med. 10(2):110-111.
Myers SS. 2017. Planetary health: protecting human health on a rapidly changing planet. Lancet. 390(10114):2860-8.
Obolensky N. 2017. Complex adaptive leadership: Embracing paradox and uncertainty. London: Routledge.
Paraponaris C, Sigal M, Haas A. 2015. Crowding at the frontier: boundary spanners, gatekeepers and knowledge brokers. J Knowl Manag. 19(5):1029-1047.
Parker G, Berta W, Shea C, Miller F. 2019. Environmental competencies for healthcare educators and trainees: A scoping review. Health Edu J. https://doi.org/10.1177/0017896919886599
Pascal M, Beaudeau P, Medina S, Hamilton NC. 2019. Global change: a public health researcher's ethical responsibility. Curr Environ Health Rep. 6:160-166.
Pearson D, Walpole S and Barna S. 2015. Challenges to professionalism: Social accountability and global environmental change. Med Teach. 37:825-80.
Pencheon D. 2018. Developing a sustainable health care system: the United Kingdom experience. MJA. 208(7):284-285.
Pichler P-P, Jaccard IS, Weisz U, Weisz H. 2019. International comparison of health care carbon footprints. Environ Res Lett. 14(6):064004. https://iopscience.iop.org/article/10.1088/1748-9326/ab19e1
Rockström J, Steffen W, Noone K, Persson Å, Chapin FS III, Lambin EF, Lenton TM, Scheffer M, Folke C, Schnellnhuber HJ, et al. 2009. A safe operating space for humanity. Nature. 461:462-475.
Schwerdtle PN, Maxwell J, Horton G, Bonnamy J. 2019. 12 tips for teaching environmental sustainability to health professionals. Med Teach. [accessed 13 November 2019]. https://doi.org/10.1080/0142159X.2018.1551994.

Shelton CL, McBain SC, Mortimer F, White SM. 2019. A new role for anaesthetists in environmentally-sustainable healthcare. Anaesthesia. 74(9):1091-1094.
Souba W. Perspective: A new model of leadership performance in health care. Academic Medicine. 2011;86(10):1241-52.
Swanwick T, McKimm J, editors. 2017. ABC of clinical leadership. 2nd ed. Hoboken (NJ): John Wiley & Sons
Teherani A, Nishimura H, Apatira L, Newman T, Ryan S. 2017. Identification of core objectives for teaching sustainable healthcare education. Med Educ Online. 22(1):1386042. https://www.tandfonline.com/doi/full/10.1080/10872981.2017.1386042
Tun MS. 2019. Fulfilling a new obligation: Teaching and learning of sustainable healthcare in medical education curriculum. Med Teach. 41(10):1168-1177.
United Nations. 2015. Sustainable Development Goals (SDGs). https://www.un.org/sustainabledevelopment/sustainable-development-goals (accessed 7 November 2019).
Walpole SC, Barna S, Richardson J, Rother H-A. 2019. Sustainable healthcare education: integrating planetary health into clinical education. Lancet Planet Health. 3(1):e6-7.
Walpole SC, Pearson D, Coad J, Barna S. 2016. What do tomorrow's doctors need to learn about ecosystems? - A BEME systematic review: BEME Guide No. 36. Med Teach. 38(4):338-352.
Walpole SC, Vyas A, Maxwell J, Canny BJ, Woollard R, Wellbery C, Leedham-Green KE, Musaeus P, Tufail-Hanif U, Patrício KP, et al. 2017. Building an environmentally accountable medical curriculum through international collaboration. Med Teach. 39(10):1040–1050.
Watts N, Amann M, Arnell N, Ayeb-Karlsson S, Belesova K, Bery H, Bouley T, Boykoff M, Byass P, Cai W, et al. 2018. The 2018 Report of the *Lancet* Countdown on health and climate change: shaping the health of nations for centuries. Lancet. 392(10163):2479–2514.
Wellbery C, Sheffield P, Timmireddy K, Sarfaty M, Teherani A, Fallar R. 2018. It's time for medical schools to introduce climate change into their curricula. Acad Med. 93(12):1774-1777.
West MA, Chowla R. 2017. Compassionate leadership for compassionate health care. In: Gilbert P, editor. Compassion. London: Routledge; p. 237-257.
Western S. 2010. Eco-leadership: towards the development of a new paradigm. In: Redekop BW, editor. Leadership for environmental sustainability. London: Routledge; p. 50-68.
Whitmee S, Haines A, Beyrer C, Boltz F, Capon AG, de Souza Dias BF, Ezeh A, Frumkin H, Gong P, Head P, et al. 2015. Safeguarding human health in the Anthropocene epoch: report of The Rockefeller Foundation–*Lancet* Commission on planetary health. Lancet. 386(10007):1973-2028.