


AMEE Consensus Statement: Planetary health and education for sustainable healthcare

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








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ABSTRACT

The purpose of this Consensus Statement is to provide a global, collaborative, representative and inclusive vision for educating an interprofessional healthcare workforce that can deliver sustainable healthcare and promote planetary health. It is intended to inform national and global accreditation standards, planning and action at the institutional level as well as highlight the role of individuals in transforming health professions education. Many countries have agreed to 'rapid, far-reaching and unprecedented changes' to reduce greenhouse gas emissions by 45% within 10 years and achieve carbon neutrality by 2050, including in healthcare. Currently, however, health professions graduates are not prepared for their roles in achieving these changes. Thus, to reduce emissions and meet the 2030 *Sustainable Development Goals* (SDGs), health professions education must equip undergraduates, and those already qualified, with the knowledge, skills, values, competence and confidence they need to sustainably promote the health, human rights and well-being of current and future generations, while protecting the health of the planet.



The current imperative for action on environmental issues such as climate change requires health professionals to mobilize politically as they have before, becoming strong advocates for major environmental, social and economic change. A truly ethical relationship with people and the planet that we inhabit so precariously, and to guarantee a future for the generations which follow, demands nothing less of all health professionals.


This Consensus Statement outlines the changes required in health professions education, approaches to achieve these changes and a timeline for action linked to the internationally agreed SDGs. It represents the collective vision of health professionals, educators and students from various health professions, geographic locations and cultures. 'Consensus' implies broad agreement amongst all individuals engaged in discussion on a specific issue, which in this instance, is agreement by all signatories of this Statement developed under the auspices of the Association for Medical Education in Europe (AMEE).

To ensure a shared understanding and to accurately convey information, we outline key terms in a glossary which accompanies this Consensus Statement ([Supplementary Appendix 1](#)). We acknowledge, however, that terms evolve and that different terms resonate variably depending on factors such as setting and audience. We define *education for sustainable healthcare* as the *process of equipping current and future health professionals with the knowledge, values, confidence and capacity to provide environmentally sustainable services through health professions education*. We define a *health professional* as a person who

KEYWORDS

Ecological crisis; human rights; planetary health; health professions education; sustainable healthcare

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has gained a professional qualification for work in the health system, whether in healthcare delivery, public health or a management or supporting role and education as 'the system comprising structures, curricula, faculty and activities contributing to a learning process'. This Statement is relevant to the full continuum of training – from undergraduate to postgraduate and continuing professional development.

Introduction

For millions of years, the Earth has sustained a diversity of life on land and sea. Since the industrial revolution, human development has harnessed the power of fossil fuels and other natural resources and rapidly reshaped environments to meet our needs. The scale of urbanization, industrial agriculture and anthropogenic carbon emissions has, however, led to a range of global environmental changes, including deforestation, biodiversity loss, ocean acidification and air, water and soil pollution and climate change (Frumkin and Haines 2019; Barna et al. 2020) – collectively referred to in this Statement as *ecological crisis*.

Industrialization was generally enabled by Western nations exploiting the Global South, in the form of colonization, mass enslavement and even genocide (Lewis and Maslin 2015). Present-day ecological crises that undermine the health of people across the globe are rooted in the practices of colonialism and capitalism, in particular the sixteenth century colonization of the Americas, where the trans-Atlantic enslavement of people and the homogenization of agriculture gave birth to plantation economies and global trade (Sealey-Huggins 2017). Over the past four centuries, the beliefs justifying the superiority of some humans over others also justified the exploitation of the planet's natural systems. This violence lies at the foundations of contemporary global society and at the root of health inequality. As such, the global ecological crisis we face has its roots in, and perpetuates, deep ecological and social injustice. Furthermore, the ecological crisis will disproportionately impact vulnerable groups such as those in the Global South, Indigenous Peoples and people of color (Thomas et al. 2019). Thus, the ecological crisis is deeply intertwined with issues of inequity and human rights.

Humanity now faces an ecological crisis that threatens the ecosystems on which we rely. The human population is expected to increase to 8.6 billion people by 2030 and nearly 10 billion by 2050 (United Nations 2017), with concomitant social and economic development increasing demand on natural resources. We have been 'mortgaging the health of future generations' (Whitmee et al. 2015; p.1973), expending resources at a far greater rate than they can be replenished in nature, bringing us to a present which has been termed the Anthropocene (Lewis and Maslin 2015; Weidmann et al. 2020).

To limit global warming to 1.5°C, as *per* the Paris Agreement (United Nations General Assembly 2015), greenhouse gas emissions must be reduced by 45% (from 2010 levels) by 2030 and to net zero by 2050 (Intergovernmental Panel on Climate Change 2018). A 0.5°C of warming (i.e., from 1.5°C to 2.0°C) is expected to result in increased risks to health, food security, water supply, human security and livelihoods. Climate change can increase the frequency of flooding, heat waves and natural disasters, all of which cause injury and disease and may directly impact healthcare facilities. For Höhne and colleagues (2020), a wasted decade has

Practice points

- Health professionals must be prepared to deliver system-wide changes to mitigate and adapt to the ecological crisis.
- Education for sustainable healthcare (ESH) includes mainstreaming planetary health as a transversal curricular theme.
- Faculty development, eco-ethical leadership and transdisciplinary and interdisciplinary planetary health action are urgently needed.
- ESH guidance plus ESH learning and assessment resources are already available.
- ESH accreditation standards, indicators and progress monitoring are required.

shortened the timeframe to act: '*In 2010, the world thought that it had 30 years to halve global emissions of greenhouse gases. Today, we know that this must happen in ten years to minimize the effects of climate change*' (p. 25).

Health systems are responsible for about 4.4% of the world's greenhouse gas emissions (Health Care Without Harm 2019). Healthcare is also responsible for a broader environmental impact of between 1% and 5% of the total global impact and more than 5% for some national impacts (Lenzen et al. 2020). Healthcare thus contributes to ill-health through emissions, which cause climate change and other environmental impacts including air pollution (e.g. through waste incineration) and water pollution (e.g. through pharmaceutical waste) (Eckelman and Sherman 2018; Health Care Without Harm 2019; Lenzen et al. 2020). The health professions therefore have a moral obligation to take action to reduce the environmental impacts of healthcare provision. As well as working to mitigate further environmental degradation, health professionals will need to develop climate resilient healthcare facilities (WHO 2020) – equipped to anticipate, respond to and adapt to climate impacts already underway such as altered patterns of disease, threats to infrastructure due to changing weather patterns and psychological impacts. These will require ambitious and clear plans, with flexibility to monitor progress and adapt as circumstances change.

Planetary health solutions

There are many cultural models for living in harmony with the Earth, whilst also meeting humanity's needs. Indigenous People across the world have long acted as custodians of the environment, recognizing the interconnectedness of all living things, including the impact of all elements of the planet on well-being, health and spirituality.

Western medical practice, often focused on the biomedical model, has neglected this traditional Indigenous wisdom, wisdom which can enhance our ability to promote planetary health and ability to deliver education for sustainable healthcare. Planetary health pertains to the interdependent vitality of human and earth systems, both biological and socially constructed. Education for sustainable healthcare necessarily incorporates planetary health principles. Indigenous populations have long held conceptions of planetary health (*Indigenous traditional knowledge*) and the interconnectedness of all beings on the planet (Redvers et al. 2020). Planetary health is inclusive of all species and environments and emphasizes equally ‘all that is known about the world around us and how to apply that knowledge in relation to those beings that share the world’ (Bennett et al. 2014, p. 301).

Whilst each country has a unique context with regard to Indigenous Peoples and colonialist history, an increased focus on the interdependence of all life on Earth has application to health professionals across the world. This focus ensures a health workforce that is informed about the interdependence of ecosystems and health, prepared to tackle social and ecological injustice and inequities and possesses the skills, values and capabilities to respond.

Recognizing that development must protect and promote human rights and be equitable and environmentally sustainable, the United Nation’s 2030 Sustainable Development Goals (SDGs) provide a framework for action at all levels – global, national, institutional and individual. As the ‘Accelerating Education for the SDGs’ Report describes, universities play a vital role in helping society to meet the 2030 targets (Sustainable Development Solutions Network 2020; UN 2020). Universities can facilitate ‘Education for the SDGs’ by equipping students with the knowledge, skills and motivation necessary to tackle complex problems that we face as a society, such as the ecological crisis. They can also motivate learners to become active agents in working towards a sustainable future (Box 1).

To ensure a sustainable existence, we must address inequalities, respect human rights and become stewards of our planet’s limited resources. Raworth’s (2017) ‘Doughnut model’ is useful for depicting the social and ecological

boundaries that encompass human well-being which need to be preserved to promote ‘a safe and just space for humanity’ (Figure 1). This requires us to challenge existing power structures that often perpetuate overuse of resources and exacerbate inequalities. For health professionals specifically, the values enshrined in the human rights discourse have the potential to lead the way within the social foundation necessary for the health of our planet.

Role of health professionals

There is a growing recognition among health professionals that the current ecological crisis poses a major threat to human health and well-being. Many health professional bodies have responded by declaring a climate crisis or emergency (e.g. WONCA World Organization of Family Doctors and International Council of Nurses) and calling for environmental sustainability and resource stewardship in healthcare (e.g. the World Medical Association, Environmental Physiotherapy Association and the Australian Medical Association). Many health professionals and their organizations are calling for action, including developing the evidence base on the interactions between environmental change and health, reducing negative environmental and health impacts of health systems, educating professionals, educating the public, lobbying policymakers and preparing health systems to manage the direct impacts of the ecological crisis (e.g. the WHO 2020 Guidance for Climate Resilient and Environmentally Sustainable Health Care Facilities document).

Health professionals can drive social and policy change (Haines and Ebi 2019) as they are generally highly trusted (*Gallup poll 2019*) and have influence at all levels of society. With trust comes responsibility to influence wisely and lead effectively, which requires collaborative engagement beyond individual actions, thus ‘*Health professionals will be called on to engage as humble, informed, and trusted partners in the collective, boundary-crossing effort of transforming practices and structures to better sustain the health and*

Box 1. Targets and indicators for the three SDGs that include an education target, ratified by the UN General Assembly, July 2017.

Goal 4. Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all

Target 4.7

By 2030, ensure that all learners acquire the knowledge and skills needed to promote sustainable development, including, among others, through education for sustainable development and sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture’s contribution to sustainable development

Indicator 4.7.1

Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in:

- (a) national education policies
- (b) curricula
- (c) teacher education
- (d) student assessment

Goal 12. Ensure sustainable consumption and production patterns

Target 12.8

By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature

Indicator 12.8.1

Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in:

- (a) curricula
- (b) national education policies
- (c) student assessment
- (d) teacher education

Goal 13. Take urgent action to combat climate change and its impacts

Target 13.3

Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning

Indicator 13.3.1

Extent to which (i) global citizenship education and (ii) education for sustainable development are mainstreamed in:

- (a) national education policies
- (b) curricula
- (c) teacher education
- (d) student assessment

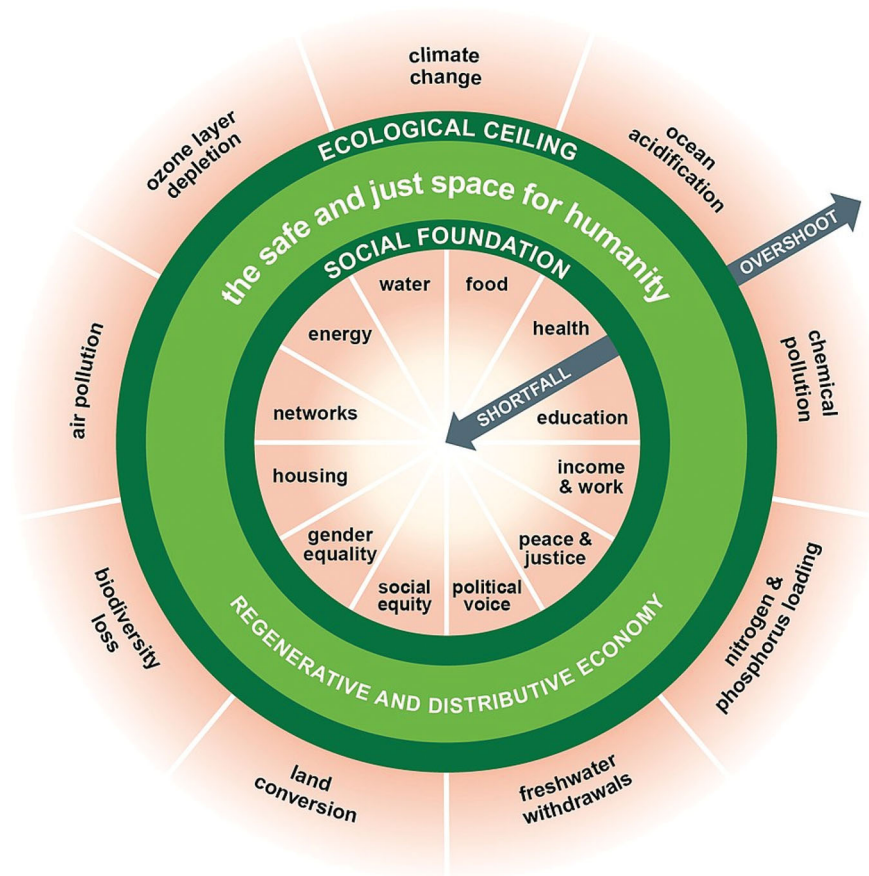


Figure 1. Raworth's (2017) Doughnut model of a regenerative and distributive economy within social and planetary boundaries (with permission).

well-being of all life, including our own' (Parkes et al. 2020; p. 4).

Education has been identified as having an essential role in attaining the SDGs and stabilizing the Earth's climate by 2050 (Otto et al. 2020). Consequently, we must rapidly mobilize health professions educators to deliver education for sustainable healthcare. Setting targets, developing indicators, and measuring and monitoring progress can help achieve change across the sector (Box 1).

This Consensus Statement explores how the health professions can and must prepare the health workforce, including healthcare leaders, to deliver on this agenda. In a recent survey of the inclusion of climate change and air pollution in the medical curricula in more than 100 countries, only 15% of medical schools had included climate change and even fewer had incorporated air pollution (El Omrani et al. 2020). These omissions further highlight the urgency as education is considered one of the important tipping points for action (Otto et al 2020; McLean et al. 2020).

Vision for education for sustainable healthcare

The "responsibility for planetary health requires us to relinquish conventional professional, societal, and cultural partitions and to develop contextual coalitions based both on science and broader cultural narratives" (Prescott and Logan 2019; p. 3).

The overarching education for sustainable healthcare vision is one in which positive changes to education, healthcare, public health and planetary health are achieved through collective, collaborative, non-hierarchical and inclusive

commitment and action. Our vision for education for sustainable healthcare emphasizes ecological accountability through environmental stewardship – (caretaking) of the living planet – by health professionals and health and education institutions. It respects Indigenous knowledge in terms of the link between people and the planet. Education for sustainable healthcare needs to ensure a health workforce that is informed about the interdependence of the ecosystems and health, possesses the skills, values and capabilities to drive change and is mobilized and motivated to foster change.

In this Consensus Statement, we affirm the duty of all health professionals to protect and promote the health of both the planet and all of its inhabitants in the context of humanity's complete dependence on the ecosystems within which we live (Prescott et al. 2018). We support learning that equips health professionals to meet this duty. We acknowledge that Indigenous People across the world have long acted as custodians of the environment, recognizing the interconnectedness of all living things, including the impact of all elements of the planet on spirituality, well-being and health. In line with this approach, health professions educators need to highlight the complex challenges related to the ecological crisis and how human lives and well-being are directly dependent upon the natural world.

Education for sustainable healthcare practices are synergistic with promoting planetary health (Prescott et al. 2018). Shared, evidence-informed practices can advance health and environmental sustainability, reduce health inequalities, minimize the environmental footprint of health

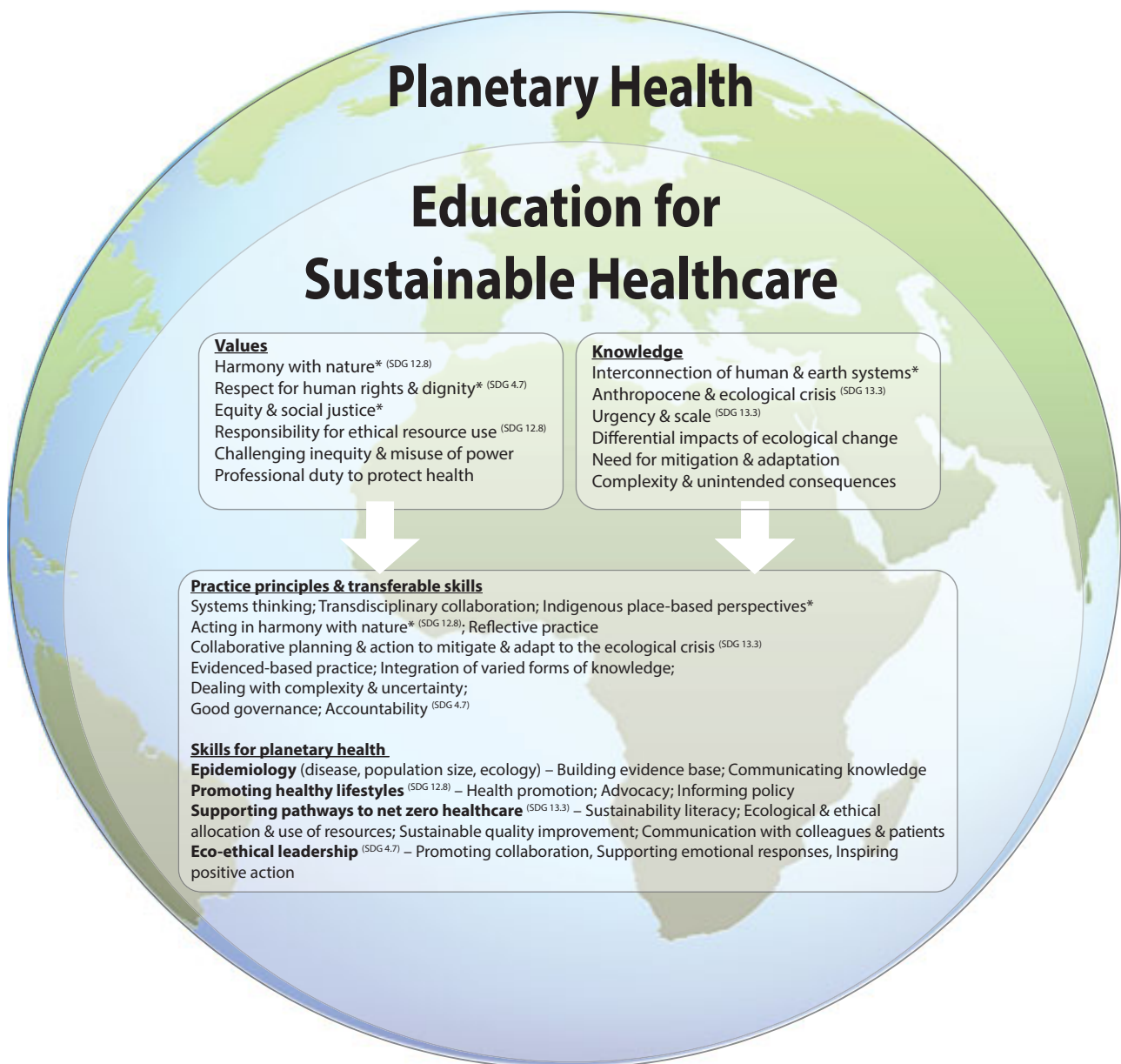
systems and strengthen populations' resilience to environmental change, thereby contributing to overall wellness for our communities while ensuring the continued existence of all living organisms. For practitioners to be cognizant of and responsive to planetary health requires not only relevant knowledge and skills, but also values. Education for sustainable healthcare engenders these values, such as prioritization of health equity, human rights and respect for life and ecosystems. Figure 2 depicts the vision for education for sustainable healthcare in which knowledge and values guide practice, informed by Indigenous perspectives and part of a wider planetary health paradigm.

This vision and Consensus Statement are guided by Indigenous traditional wisdom and connection to nature, informed by evidence on the safe operating space for humanity and Raworth's doughnut (Figure 1) and shaped

to align with the internationally agreed SDGs (Box 1). This developing education for sustainable healthcare vision is part of a growing positive response to the ecological crisis that we are currently experiencing. It outlines some important directions for healthcare institutions. We have an increasing need for professionals, citizens and leaders— healers, if you will—who are able to adapt and move quickly to educate both existing and emerging practitioners to address our collective future and the well-being of our shared home.

Enacting the vision

Our vision for education for sustainable healthcare demands a shift from rhetoric to action. Action requires understanding, acceptance and strategies for leading a



*Indigenous Peoples have incorporated this knowledge & these values for centuries; these points are informed by Indigenous perspectives, which can guide our understanding & our practice
 SDG 4.7 – Ensure that all learners acquire the knowledge and skills to promote sustainable development, including through education for sustainable lifestyles, human rights, gender equality, promotion of a culture of peace and non-violence, global citizenship and appreciation of cultural diversity and of culture's contribution to sustainable development.
 SDG 12.8 - Ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature.
 SDG 13.3 - Improve education, awareness-raising and human and institutional capacity on climate change mitigation, adaptation, impact reduction and early warning.

Figure 2. The relationship between planetary health, Indigenous perspectives and the knowledge, values and practices which are incorporated into education for sustainable healthcare.

major culture change – from the glorification of consumption and economic growth to working towards health and sustainability for all. Education for sustainable healthcare leaders require understanding of organizational behavior and politics in the real world. Education for sustainable healthcare encompasses *environmental accountability* as defined by Pearson et al. (2015), the obligation to ensure that education and research contribute to active development, promotion and protection of environmentally and ecologically sustainable solutions (Boelen et al. 2016). It also aligns with *social accountability*, the responsibility of health education institutions to focus their considerable resources and capacity on the priority health concerns of the societies which they serve (Woollard 2006; Woollard and Boelen 2012; Boelen et al. 2016).

Health professions educators must aspire to *facilitate learning in a very different way* and to incorporate environmental and ecological sustainability into curricula (Walpole et al. 2017). Educators must also nurture transdisciplinary problem-solving to bring disciplines together to design curricula to promote the best possible outcomes for patients, communities and the planet (Schwerdtle et al. 2020). Nurturing knowledge, skill development and values can move learners and educators beyond despair to engagement (Walpole et al. 2016). Today's health professionals must be equipped to respond to local and global environmental changes as urgent threats and address wide-ranging health, healthcare and sustainability challenges (Sterling 2015; UNESCO 2014a). In such an emergency, eco-ethical leadership is required (McKimm and McLean 2020; McKimm et al. 2020).

Leadership in a complex world

Health professionals work in multiple, overlapping, dynamic biological, social and ecological VUCA (*Volatile, Uncertain, Complex and Ambiguous*) systems (Mack et al. 2015), within a nested hierarchy of domains, ranging from the personal to the family, community and national and international levels. In many Indigenous communities, the responsibility to act as stewards for the planet is central (Greenleaf 2008) to pass it on in the best shape to generations who follow (McKimm and O'Sullivan 2016). This responsibility is not new, but the current ecological crisis makes it urgent.

To achieve the education for sustainable healthcare vision, an '*eco-ethical*' leadership approach, integrated around environmental and ecological *sustainability, values, collaboration, justice, advocacy and activism*, designed to address issues in complex systems must be applied by health professions educators and incorporated in learning (McKimm and McLean 2020). Eco-ethical leadership facilitates meaningful and sustainable change through understanding how people and systems work and interact to create change. Addressing sustainability issues can cause strong or overwhelming reactions in staff or students, which need to be recognized and directed to appropriate sources of support (Tun 2019). Eco-ethical leadership enables translation of policy and strategy into meaningful action and working with paradox, uncertainty and ambiguity whilst retaining moral purpose (Obolensky 2017).

Eco-ethical leadership must embrace an *inclusive* approach that welcomes diverse cultural views. From an Indigenous perspective, education for sustainable healthcare can be seen as being rooted in the land as a *medicine place*, i.e. a place that brings healing and greater overall well-being (Redvers 2018). Health professions education informed by Indigenous knowledge systems recognizes the interconnectivity of all life on the planet. This calls for *inclusive leadership* skills which cross existing boundaries and domains to foster innovation, effective engagement practices and inclusiveness, while utilizing the strengths of collective intelligence (Kuenkel 2016).

Engaging faculty

To enact this vision, faculty engagement is essential. Faculty must recognize that addressing environmental and ecological issues is a matter of utmost urgency and should be a core priority for the health service as well as the duty of all health professionals. Sustainability literacy is essential if faculty are to educate for sustainable healthcare, yet environmental concepts may not be familiar to all health professions educators (Walpole and Mortimer 2017). Faculty development can help prepare and support faculty in assuming their new roles as sustainability educators. Key concepts in sustainability include causes of the ecological crisis, the health impacts and the ethical dimensions, sustainable healthcare delivery and clinical practice (Tun et al. 2020).

Health professional students may already be familiar with environmental issues through knowledge acquired in their secondary school curriculum or the school Climate Change Strikes. Thus, they are ideally placed to partner with academics not only by helping to integrate sustainability concepts into curricula but also by contributing to faculty development. To this end, student organizations have created resources that can be used for curriculum planning and faculty development, such as the International Federation of Medical Students' Associations' *climate change short course* and the Canadian Federation of Medical Students' *planetary health competencies*. In addition, Tun and colleagues' (2020) *Medical Teacher* Special Issue article provides case studies of student contributions to faculty development in planetary health and sustainable healthcare.

Institutional support is also essential. This can include offering continuing professional development and awards for innovation to incentivize progress. Those who develop best practice activities can be involved in training others. Institutions need to 'walk the sustainability talk' and, where possible, promote practices such as virtual and distance learning to reduce the environmental footprint of travel.

Developing a curriculum that incorporates planetary health and sustainable healthcare on campus, in the community and in healthcare settings can enhance faculty satisfaction and self-efficacy (Brand et al. 2020; Tun et al. 2020). Faculty development fosters in-depth learning and a sense of meaningful interaction with others, both of which may improve personal and professional well-being in the face of our climate emergency.

Next, the Consensus Statement explores how health professions education can be adapted to address the urgency of the ecological crisis we are currently facing. It outlines key knowledge, skills and values that health professionals will need to be able practice sustainable

healthcare and suggests pedagogies and assessment strategies. We acknowledge, however, that the knowledge, skills and values required to practice sustainable healthcare will vary across the world and by profession.

Sustainability literacy, skills and values

Drawing on the education for sustainable healthcare vision, this section describes what health professionals need to learn, be able to do and what values they should espouse. While we need to collaborate across health disciplines in line with clinical practice (Schwerdtle et al. 2020), we acknowledge that one size does not fit all and each institution needs to tailor the integration depending on its local needs – ‘think globally, act locally’. The learning outcomes in Table 1 have been adapted from the *Centre for Sustainable Healthcare* to include skills and values. Higher order activities, such as ‘apply’ and ‘evaluate’ are essential to ensure learners are prepared to make a difference in the real world (Adams 2015). While it is important for health professionals to acquire and apply knowledge and learn skills and appropriate professional behaviors, it is equally important that educators consider the role of values and emotions. Values-based education helps prepare health professionals to work towards the SDGs. The affective (emotion-based) components of learning and responses to learning (including eco-anxiety) must be supported (Burford et al. 2016; Huss et al. 2020). As the field is constantly evolving, professionals need to actively engage in continuing professional development to ensure life-long learning (Field 2010). Equity and human rights must be central to this framework. There must be an awareness of how the ecological crisis disproportionately affects certain populations, including Indigenous groups, communities of color, the elderly and the young, rural communities, people living with long-term conditions and disabilities and with low incomes.

In Table 1, we offer suggestions and examples of curriculum planning and delivery of education interventions that can be adapted for local contexts. Sustainability should be integrated across all years of the curriculum rather than being a series of stand-alone or add-on elements. A first step to integration is to identify core education for sustainable healthcare learning outcomes and map these to local curricula, professional competencies or other relevant frameworks (NurSus Interim Report 2015; Lopez-Medina et al. 2019, Tun 2019; Table 1). Introducing practical learning experiences in sustainable healthcare early in training emphasizes these concepts and principles as core components of professional identity (Prescott et al. 2018). Given the complexity of the ecological crisis, a transdisciplinary approach to learning is essential (Schwerdtle et al. 2020). This transdisciplinary focus bridges traditional divides between disciplines to ensure collective vision, problem-solving and action.

We thus advocate experiential, transdisciplinary learning that engages individuals in activities that require critical thinking, communication, leadership and change management (Table 2). At its best, education for sustainable healthcare will draw on personal experiences, stimulate discovery, encourage problem-solving and be relevant to learners’ future health professional roles. Learning activities assist with progressing from understanding how the ecological crisis impacts health to creatively addressing problems, including local and global interventions that not only involve adaptation and development of resilience, but also reduce the environmental impact of healthcare through resource stewardship and education of patients on topics such as the co-benefits of exercise and plant-based diets.

Assessment

Assessment can motivate students to learn (Miller 1990). Thus, to ensure that health professionals gain the essential

Table 1. Learning outcomes and objectives for environmentally sustainable healthcare and associated domains of learning, adapted from the *Centre for Sustainable Healthcare* (Thompson et al. 2014) and the 2020 Sustainable Development Solutions Network Guide.

Learning outcomes	Learning domain	Examples of specific learning objectives
Describe how the environment and human health interact at different levels.	<i>Knowledge</i>	<ul style="list-style-type: none"> • Discuss how local and global ecological crises impacts on individual patients and communities. • Describe the interaction between local and global ecological crises and the social determinants of health. • Discuss how the promotion of environmental sustainability generally and in healthcare can support progress on social determinants of health, health equity and respect for cultural diversity, including Indigenous traditional knowledge.
Demonstrate the knowledge and capabilities needed to improve the environmental sustainability of health systems, using systems thinking (see Glossary in Supplementary Appendix 1)	<i>Knowledge, Application</i>	<ul style="list-style-type: none"> • Evaluate the environmental impacts of a patient pathway and identify ways to enhance environmental sustainability. • Describe how changes in disease burden due to environmental change may be identified, characterised and quantified and how such information can inform planning and practice to address health needs. • Apply key policies and frameworks related to sustainable development including the SDGs to evaluate a population health challenge. • Apply critical thinking, problem-solving and systems thinking to sustainable healthcare challenges. • Communicate clearly with health professional colleagues when responding to an ecological challenge or opportunity in healthcare.
Discuss how the duty of health professionals to protect and promote health is impacted by the interdependence of health and ecosystems and implications for health professionals’ personal and professional lives.	<i>Knowledge, Values, Mindset and Agency</i>	<ul style="list-style-type: none"> • Discuss the role of health professionals in mitigation, adaptation, advocacy and activism in terms of sustainable development, planetary health and environmental stewardship. • Demonstrate the ability to advocate for planetary health and the SDGs. • Demonstrate how to motivate behaviour change to promote environmental sustainability at an individual, professional and community level. • Discuss examples of eco-ethical leadership. • Identify how Indigenous traditional knowledge and voice can inform healthcare practice and promotion of planetary health and sustainable development in your local context. • Apply an ethical, compassionate, non-hierarchical and holistic approach to addressing the ecological and social determinants of health.

Table 2. Examples of learning activities, opportunities and possible assessment approaches that promote transdisciplinary, action-based learning and the involvement of multiple stakeholders (SDSN 2020).

Learning activity	Examples	Opportunities	Possible formative and summative assessments <i>Rubrics for all assessments can be developed based on intended learning outcomes and enhance validity of assessment.</i>
Activities with a clinical focus			
Environmental history in communication skills training	In a role play, take a history from a patient who has been affected by bushfire smoke or has diarrhea as a result of limited or no access to clean water.	<ul style="list-style-type: none"> Promote attention to ecological and social determinants of health. Practise sensitive enquiry about risk factors. Integrate sustainability with history taking skills. Address SDG 3 (promotion of health and well-being for all). 	Formative – observed role play Summative – OSCE history station; MCOs & SAQs regarding environmental risk factors
Lifecycle analysis of common medical resources	Investigate using peer reviewed literature and/or grey literature (e.g. product information, health system data) the social, environmental and financial costs of equipment and medications commonly used in healthcare. Discuss the implications of these costs for healthcare planning and healthcare practice.	<ul style="list-style-type: none"> Create awareness of the ecological footprint of medical equipment from manufacture to disposal. Raise discussion about ethical issues related to consumption, e.g. mining for metals/elements and dismantling of medical devices often happens in low and low-middle income countries. Address SDGs 12 (sustainable consumption and production), 14 (life below water) and 15 (land and biodiversity protection). 	Formative – observation of group activity, oral assignment, discussion in clinical practice Summative – written or oral assignment, MCOs or SAQs about measurement methods or relative costs.
Concept mapping exercise, individual or group, may be transdisciplinary	Research the environmental impacts of care provided within one healthcare speciality. Use graphical tools to demonstrate where environmental change may alter disease burden and healthcare seeking and where healthcare may impact on ecosystems. Consider how causes and effects interact and varied drivers of costs such as greenhouse gas emissions and negative impacts on patients' employment or social support.	<ul style="list-style-type: none"> Promote understanding of ecological and social determinants of health Apply systems thinking. Creative activity engages learners and facilitates active learning. Address SDGs 3, 12, 13 (climate action), 14 and 15. 	Formative – assessment of process, reflections, or the concept map produced. Summative – assessment of the concept map produced using a rubric based on key learning outcomes.
Practicing communicating with patients about environmental sustainability and health promotion in communication skills training	In a role play, discuss with a patient a more environmentally sustainable intervention that can provide equivalent (or greater) health benefits than the alternative, e.g.: <ul style="list-style-type: none"> Options with lower environmental impact, e.g. dry powder inhalers over metered dose inhalers (asthma pumps) Lifestyle changes and the co-benefits, i.e. reducing environmental footprint and improve health, e.g. reducing meat intake and increasing grain and vegetable intake; walking or cycling rather than driving. 	<ul style="list-style-type: none"> Facilitate learning about health co-benefits* of sustainable lifestyles, e.g. sustainable diets, increased exercise. Facilitate learning about environmental impacts of healthcare interventions. Develop motivational interviewing skills. Address SDGs 3 and 12. 	Formative – Direct observation of role play. Summative – OSCE communication skills station; MCOs & SAQs about relevant evidence, e.g. health co-benefits, carbon impacts of healthcare interventions, and/or related ethical issues.
Healthcare pathway analysis activity	Explore one patient pathway (e.g. that taken by a patient presenting to primary care with abdominal pain and referred to secondary care), and consider how to apply principles of sustainable healthcare, including: <ul style="list-style-type: none"> Avoiding investigations that do not add value, (e.g. imaging not recommended for low back pain unless neurological damage is suspected) Avoiding interventions where a conservative approach is beneficial or equivalent and lower financial or social cost (e.g. watch and wait approach for hernias can be preferable) Choosing lower carbon options which are equivalent in health benefits, e.g. anaesthetic gases with less global warming potential 	<ul style="list-style-type: none"> Calculate (or apply calculations of) the financial, social and environmental costs of healthcare provision Understand the integration (or lack of integration) of different healthcare services. Consider patient's experiences of accessing healthcare and take this into account when evaluating a healthcare pathway. Identify strategies to achieve both sustainability gains and improvements in healthcare. Address SDGs 12, 13, 14 and 15. 	Formative – Observed group work, group presentation, individual reflective practice assignment Summative – group presentation, written assignment (group or individual)
Quality improvement projects in primary or secondary or higher levels of care	Apply the SusQI (Sustainability in Quality Improvement) framework (Mortimer et al. 2018) to plan and deliver a project, e.g. about medicines waste.	<ul style="list-style-type: none"> SusQI framework can be applied in different contexts to focus on local needs and resources. Clearly link environmental topics to clinical practice. Integrate environmental, social, cultural, financial and ethical perspectives. May address any or all SDGs. 	Formative – supervisor's report, learner's reflective report. Summative – report, poster, oral or other presentation.

(continued)

Table 2. Continued.

Learning activity	Examples	Opportunities	Possible formative and summative assessments <i>Rubrics for all assessments can be developed based on intended learning outcomes and enhance validity of assessment.</i>
Activities which may have a clinical, public health or wider sustainability focus			
Literature-based individual or group research project and presentation	Research and communicate best evidence on a planetary health topic. The SDGs offer a useful framework which could inform the choice of topic or approach to addressing it. Learners may choose to produce a video to communicate on their topic or use another format.	<ul style="list-style-type: none"> • Practise and demonstrate effective communication with colleagues or the public about planetary health. • Learners may choose a topic of personal interest. • If video presentation is used, learners may develop digital technology skills. • May address any or all of the SDGs. 	Formative or summative – Assessment of the presentation may be carried out using a rubric based on key learning outcomes.
Written assignment, informed by a literature review	Design an assignment question or select from a list of questions addressing any planetary health topic. Construct a written argument in response to the question.	<ul style="list-style-type: none"> • Develop skills for evidence based practice, including critical appraisal and synthesizing complex and / or diverse information. • Demonstrate effective written communication about a planetary health topic. • In-depth learning on a chosen planetary health topic. 	Formative or summative – A rubric for marking assignments may include understanding of topic, development of argument and written communication. This assessment may, however, be time-consuming with large cohorts.
Research assignment involving local or global communities, preferably transdisciplinary	A scenario or challenge that allows learners to explore the relationship between one or more ecological crises, social determinants of health and inequality, e.g. exploring how marginalized Indigenous communities experience these issues, or investigating gender inequality. Participatory research (<i>with not about</i> communities) would be an ideal way to achieve deeper learning if time and structures to support ethical research are in place.	<ul style="list-style-type: none"> • Develop qualitative research skills. • Participatory research may promote empathy and advocacy. • Learners may focus on an area of personal interest. • Learners may form lasting connections with students from other disciplines; they may mutually support each other to implement positive change. • Mirrors teamwork in clinical practice. • Learner may explore several SDGs, e.g. 1 (alleviation of poverty), 5 (gender equality) and 13 (climate action). 	Formative – observation of team working, learners provide feedback on other presentations, written reflections on learning. Summative – research project write-up as conference presentation or journal article.
Debate, preferably transdisciplinary	Prepare an argument and debate a motion, which could be about: <ul style="list-style-type: none"> • - professional duty – the role of health professionals in advancing sustainable development through resource stewardship, • - an ecological justice issue such as the impact of rising sea levels on Small Island Nations • - responding to a sustainability challenge, e.g. the link between pandemics and environmental factors. • - an ethical issue, e.g. single-use items in health care, or the global burden of disease caused by the health sector emissions. 	<ul style="list-style-type: none"> • Practice developing an evidence-based viewpoint. • Engaging format to encourage engagement. • Promotes communicating effectively with colleagues from different health professions and addressing resistance or conflict. • Allows engagement with emotionally challenging, ethical and/or political issues. • Learners may form lasting connections with students from other disciplines; they may mutually support each other to implement positive change. • May address various SDGs depending on debate topic. 	Formative – observation of team working in preparation or during debate. Summative – observation of debate presentations and contributions using assessment rubric, essay around the debate question, MCQs or SAQs on the debate topics.
Small group public health learning scenario, preferably interprofessional or transdisciplinary	Use systems thinking to design a public health strategy for a scenario (individual patient or community) addressing an ecological event or crisis and its impacts on health and/or healthcare facilities, e.g.: <ul style="list-style-type: none"> • Respiratory disease linked to local air pollution • Forced migration due to sea level rise • Bush fire causing destruction of a local health post • Climate-induced drought and food insecurity • Ecological crisis causing eco-anxiety*, grief, depression and suicide, particularly among youth 	<ul style="list-style-type: none"> • Stimulates discussion about health professionals' roles in, e.g. reducing healthcare's environmental footprint and advocacy. • Scenarios can be designed based on local ecological and public health challenges to promote engagement. • Systems thinking explores interactions between different parts of a system and potential unintended consequences of a given response. Learners can then apply it to other settings and challenges. • Opportunity to promote transdisciplinary collaboration. 	Formative – observation of discussion or presentation by small group. Summative – using rubric to assess small group work or a group presentation of discussion and solutions identified, written report of learning.
Reflective assignment	Explore personal, professional and/or ethical challenges, e.g. single-use plastic equipment in terms of sustainable lifestyles and global citizenship or in relation to healthcare practice. Read relevant articles, consider how the issues are faced in your day to day life and may affect current or future choices. Write an essay or collection of short reflections on this process.	<ul style="list-style-type: none"> • Facilitate engagement with personal values, feelings and attitudes, which may lead to mindset and behavioural changes. • Identify and explore tensions which may enhance ability to understand diverse perspectives • Practice written communication regarding challenging and sensitive issues • May address any or all SDGs. 	Formative – portfolio entries Summative – portfolio entries or essay to meet particular domain requirements, e.g. professional, advocacy.

*See Supplementary Appendix 1 (Glossary).

Abbreviations: ESH: education for sustainable healthcare; MCQs: multiple choice questions; OSCE: objective structured clinical examination; SAQs: short answer questions, SDGs: Sustainable Development Goals.

knowledge and develop the appropriate skills and values to advance sustainable healthcare, assessment must not only be constructively aligned with education for sustainable healthcare learning outcomes, but must be authentic (Gulikers et al. 2004), acceptable, fair and cost-effective (Norcini et al. 2018).

Assessment must test competence in understanding and applying broad and complex planetary health concepts at a global and a local level. Competence in the cognitive (i.e., knowledge) and psychomotor (i.e. manual skills) domains can generally be 'measured' using standardized assessment instruments such as multiple-choice questions or Objective Structured Clinical Examinations (OSCEs). Assessment of the complex concepts and the affective domain is more difficult and is generally considered more subjective (Smith et al. 2007). As the global community increasingly faces complex problems that impact on our health and well-being, e.g., ecosystem disruption, climate change, pollution and pandemics such as COVID-19, assessment of competency needs to accommodate creative solutions to these complex problems and differences in values or perspectives.

Thus, to educate fit-for-practice health professionals, assessment not only tests acquisition of knowledge but also its application. Learning is not only about knowing but also about ways of 'being'. If the aim of assessment is to drive the appropriate learning, then reliability is only critical in 'high stakes' scenarios where there are progression implications. Assessment can be more developmental than judgmental (i.e. *for*, rather than *of*, learning). To develop skills and values to mitigate and address planetary health challenges, we need more authentic approaches that allow multiple views of a learner's progress and also provide opportunities for individual creativity (Feltovich et al. 1993) while fostering the appropriate values (e.g. empathy and advocacy) and behavior (e.g. activism). Finally, assessment communicates what is valued by a profession (Boud 2000).

Professional bodies should include assessment of education for sustainable healthcare learning outcomes. Table 2 provides a range of assessment approaches with suggestions for ensuring students achieve the required competencies in education for sustainable healthcare.

Practical recommendations for implementing and evaluating education for sustainable healthcare

This section presents specific recommendations to enact the education for sustainable healthcare vision, including indicators to monitor progress and a road map for implementation, including specific, time-bound recommendations (UNESCO 2014b). Further resources to support implementation are available in Supplementary Appendix 2.

Proposed indicators for education for sustainable healthcare

Few targets and indicators for the inclusion of education for sustainable healthcare exist (Madden et al. 2020). Three SDGs include a target and a linked indicator relevant to education for sustainability (Box 1). An international medical student initiative has recently produced a set of

indicators to assess the progress of medical schools in incorporating planetary health (<https://phreportcard.org/our-metrics/>). Other examples of indicators address only one aspect (e.g., climate change) of many environmental changes that impact health and well-being. For example, in Australia, the *MJA Lancet Countdown* recently added a new indicator to monitor *The inclusion of health and climate change in medical curricula* (Beggs et al. 2019). Annual reporting will commence in 2021.

How can targets and indicators help? By measuring and monitoring what we do, we can identify whether strategies and interventions to create change are effective. Well-constructed indicators also provide a tool for communication about progress and can inform change. Indicators, where they exist, can also inform us whether institutions are meeting accreditation requirements for education for sustainable healthcare. Targets and indicators are best refined in consultation with the community of practice (Navi et al. 2017). There is thus a need for engagement of the health professional community to use existing indicators but also develop new robust indicators to measure and monitor progress.

Proposed targets for education for sustainable healthcare

Table 3 provides recommended targets for educators, health education institutions, health professions regulators and health professional organisations. For example, accreditation standards for the regulated health professions should reflect the environment and climate change as determinants of health and the responsibility of health professionals to practice environmentally sustainable healthcare. Health professional organizations, from trade unions to international organizations such as AMEE, can play a role. Organizations' scope, skills and mandate vary greatly and some or all of the recommendations may be applicable. When organizations develop and enact a plan to reduce the environmental impacts of healthcare, this models good practice and can be an aspect of eco-ethical leadership. 'Eco-ethical' leadership also involves embracing and welcoming diverse cultural views, advocacy and role modelling (McKimm and McLean 2020).

Concluding comments

Over the year-long development of this Consensus Statement, there has been wide and inclusive consultation across health professions, representing many countries, and reflecting the insights of Indigenous Peoples whose traditional knowledge and voices have largely been marginalized. This Consensus Statement reflects the current situation and is by no means exhaustive. Its primary purpose is to create an awareness of the important role of health professions educators and health professional institutions in advancing environmental accountability and to offer some direction for those who are new to this space. While this Consensus Statement focuses on education for sustainable healthcare, the broader lens of planetary health is particularly relevant to health professionals, to ensure an inclusive, respectful, collaborative, transdisciplinary response to address

Table 3. Proposed road map and recommended targets for education for sustainable healthcare (ESH).

Focus area	Educator	College/school	Health professional accreditation body	National or international health professional organization
Eco-ethical leadership includes environmental accountability, modelling good practice and supporting eco-ethical leadership development	<ul style="list-style-type: none"> Identify whether your institution has a sustainability strategy and an ESH plan. Contact the director of your institution or another appropriate colleague to propose how you could contribute to existing plan or develop a plan for ESH. Contribute to development of a community of practice for ESH. Allow space for and/or open discussions with colleagues and students to discuss emotional responses to planetary health challenges. Propose that your institution signs up to the SDGs if it has not already. 	<p><i>Early 2021:</i> State a commitment to ESH, e.g. School of Nurses' commitment to Climate Challenge (supplementary Appendix 2)</p> <p><i>2021:</i> Develop a plan to integrate planetary health across curricula and your institution, in line with SDGs 4, 12 and 13.</p> <ul style="list-style-type: none"> Involve diverse experts and stakeholders, including Indigenous Peoples and other populations disproportionately affected by the ecological crisis, in the initiation, development and delivery of ESH. Facilitate the development of a community of practice to support ESH development. Provide space (including physical space & curriculum space) to support the development of emotional resilience. Work with local partners to promote environmental accountability (Box 1), progress towards the SDGs and planetary health. Use virtual/distance/remote learning to reduce travel where appropriate. 	<p><i>2021:</i> Publish a formal statement supporting action on planetary health by health professionals in training, health professionals and health professional organizations.</p> <p><i>2021:</i> Develop a sustainability plan for your own organization, including a strategy and timeline to reach net zero emissions.</p>	<p><i>2021:</i> Publish a formal statement calling for urgent integration of sustainability and/or planetary health into all health professional curricula across the spectrum of training, from undergraduate to continuing professional development.</p> <p><i>2021:</i> Measure the environmental footprint of your organization and develop and publish a plan to reach net zero.</p> <ul style="list-style-type: none"> As a health leader, advocate for policies and practices that support the SDGs and promote planetary health.
Contribute to faculty development	<ul style="list-style-type: none"> Read key references to advance own knowledge (supplementary Appendix 2) Initiate conversations about ESH with colleagues who you have not discussed sustainability with before – one within your field and one within another profession / department. 	<p><i>2021:</i> Provide initial faculty education.</p> <p><i>2022:</i> Provide guidance, training and resources so that all faculty members understand how sustainability relates to the overall course, including assessment.</p> <p><i>2024:</i> Link ESH to progress markers, awards, continuing professional development and career recognition by</p> <ul style="list-style-type: none"> Supporting faculty to develop sustainability literacy Engaging health professionals who develop and deliver sustainable healthcare in practice 	<p><i>2021:</i> Recognize sustainability as a core competency (e.g. GMC Outcomes for Graduates 2018).</p> <p><i>2022:</i> Recommend ESH be addressed within health professionals in training and health professionals and provide guidance on how to achieve this.</p>	<ul style="list-style-type: none"> Offer incentives to drive innovation, such as a planetary health essay prize for students and prizes for faculty who champion ESH. Provide resources to educate educators about planetary health. Provide a platform for educators to share and access ESH resources.
Identify where sustainability and planetary health can be incorporated into your curriculum	<ul style="list-style-type: none"> Identify one other country or regional contact who is already engaged in ESH and contact them to share resources. Plan to incorporate a planetary health perspective within a session or module which you deliver. 	<p><i>2021:</i> Seek student input to ESH development. <i>2021:</i> Briefly map sustainability / planetary health across the curriculum, including across assessment, and identify opportunities for integration.</p> <p><i>2022:</i> Develop a plan and strategy for integrating ESH by 2025.</p>	<p><i>2024 or earlier:</i> Integrate sustainability at the next publication of professional standards in multiple domains to include knowledge, skills and values.</p>	<ul style="list-style-type: none"> Host Special Interest Groups and events where educators can collaborate to develop new ESH resources Monitor progress locally, regionally and internationally and disseminate examples of best practice.
Trial new activities and assessment to drive learning	<ul style="list-style-type: none"> Design and trial one new sustainability learning opportunity, whether core or optional. Design and implement an appropriate formative or summative assessment 	<p><i>2021:</i> Incorporate ESH in at least one core curriculum element, e.g. ethics. Seek feedback from staff and students and disseminate progress and evaluation findings to faculty.</p> <p><i>2022:</i> Build on previous experience and address planetary health topics in a different module / year of the curriculum.</p>	<p><i>2021:</i> Call for ESH to be included in assessment for health professional training courses.</p> <p><i>2024 or earlier:</i> Address ESH within professional exams and other progression steps for health professionals.</p>	<p>Host Special Interest Groups and events where educators can network and discuss and develop assessment for ESH.</p>
Integrate sustainability and planetary health across curricula and educational practice	<ul style="list-style-type: none"> Work with your institution to integrate sustainability across curricula locally Collaborate nationally or internationally to develop effective ESH. 	<p><i>2023:</i> Incorporation of sustainability and planetary health across at least one clinical and one public health module in all health professional curricula.</p> <p><i>2025:</i> Incorporate sustainability as a cross-cutting curriculum theme across all health professions education.</p>	<p><i>2024 or earlier:</i> Develop indicators for use at national and international levels to measure progress by educational institutions on ESH (including but not limited to integrating planetary health across curricula and assessment).</p>	<p>Provide a platform for educators and students to share resources to support integration of planetary health into curricula, from assessment rubrics to approaches to tools for mapping planetary health across curricula to tips</p>

(continued)

Table 3. Continued.

Focus area	Educator	College/school	Health professional accreditation body	National or international health professional organization
	<ul style="list-style-type: none"> • Adapt ESH learning outcomes and approaches for your setting, learners and resources. • Constructively align assessment with learning outcomes. • Use a range of assessment approaches. Reliability in assessments can be achieved by including multiple views of a learner's progress. 	<ul style="list-style-type: none"> • Support extra-curricular activities, e.g. student-led initiatives, informal learning opportunities. • Adapt ESH objectives and approaches relevant to your setting, learners and resources • Provide authentic learning experiences, e.g. involve clinicians to demonstrate practical applications • Incorporate interprofessional learning to promote collective responses and mirror clinical teamwork. • Use a range of authentic assessment approaches • Constructively align assessment with learning outcomes 		
Ongoing collaboration, development and evaluation	<ul style="list-style-type: none"> • Work and learn collaboratively with colleagues from different disciplines. • Learn from best practice in other institutions and benefit from collaboration and resource sharing across institutions, disciplines and borders, including via online platforms, e.g. Centre for Sustainable Healthcare, Global Consortium on Climate and Health Education, Planetary Health Alliance & NurSUS. 	<p>Review these actions on an annual basis:</p> <ul style="list-style-type: none"> • Evaluate progress towards integration of planetary health across entire curriculum. • Canvas health professions educators and students for their views on institutional progress on ESH. • Encourage faculty to join networks of educators and contribute to movement-building and advocacy for policy action within and external to the educational sphere. 	Collaborate with health professional accreditation bodies internationally to support ESH.	2021: Provide a platform for educators from different institutions to discuss ESH progress, challenges, approaches and leadership.

the ecological crisis currently impacting on our health and well-being as well as that of our planet.

Our health and well-being are dependent on a healthy planet. The window of opportunity to protect our ecosystems is fast disappearing, so urgent, collective, transdisciplinary action is required. The 2020s can be the decade in which we step up action on pressing issues such as a changing climate. While COVID-19 stopped us in our tracks, it has also been a wake-up call. Our relationship with nature is broken and with an increasing but unequal affluence over the past 50 years and our unsustainable impact on the planet's ecosystems, not only our health but also survival is at stake. Given the dependence of human health on ecosystems, there is a need for eco-ethical leaders who can inspire current and future generations of healthcare professionals to become environmental stewards who strive towards a safe and just space for humanity and all of Earth's inhabitants.

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