Promoting practice change towards environmentally sustainable healthcare - More than meets the eye

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The healthcare industry contributes between 4 and 5% of global greenhouse gas emissions.[1] Extreme temperatures and other effects of climate change cause excess morbidity and mortality.[2] In Canada alone, data suggests that negative environmental impacts account for an annual loss of over 23,000 disability-adjusted life years.[3] In 2021, the Intergovernmental Panel on Climate Change (IPCC) issued an urgent warning, 'Code Red for Humanity', noting that we are edging ever closer to the global temperature rise threshold of 1.5°Celsius as set out by the Paris Agreement.[4] It is predicted that beyond this limit, the ramifications on intensity and frequency of extreme events, on resources, ecosystems, biodiversity, food security and carbon removal will outstrip humanity's capacity for adaptation.[5] Immediate action to halt further temperature increase is urgently required.

Within the healthcare industry, operating rooms (OR) are 3-6 times more energy-intensive than the hospital as a whole.[6] As such, it is rational to focus strategies to curb carbon dioxide equivalent (CO_2e) emission on ORs, as this should result in a comparatively high-yield. The concept of environmental sustainability in healthcare appears to have resonated with anesthesiologists, likely because many in the community recognize the detrimental effect of the inhalational agents used in our clinical practice.

In this issue of the *Journal*, Zaw et al. report a qualitative study on the perceptions and barriers to the adoption of more environmentally sustainable practices amongst anesthesiologists at a teaching hospital in Singapore.[7] In this interview-based study using the Behavior Change Wheel (BCW) as a theoretical framework, the authors categorized their data under three headings derived from the BCW: capability (ability to perform the required task); opportunity (external factors making behavior possible), and motivation (cognitive process that energize and direct behavior). They also noted the significance of 'culture', which, whilst not fully captured by the

BCW, appeared to be a ‘key player’ in encouraging sustainable practices. We were heartened to read this study as publication of such in anesthesia journals is rare. Despite the urgent need for climate action, there is paucity of research in the area, and a particular lack of qualitative studies to assess behavioral change using implementation science tools. In this editorial, we consider the importance of qualitative research in anesthesia, and review its particular relevance to sustainable healthcare and the challenges in implementing behavioral changes in complex organizations.

Qualitative research methods may be less familiar to anesthesiologists than the quantitative techniques that form the basis for ‘medical’ models of evidence-based medicine. However, qualitative research has a unique role in scholarship, centered around developing an in-depth understanding of the experiences, ideas and actions of others. Often, qualitative research in healthcare focuses on patient experiences, but it also has an important role in deciphering the practices of healthcare providers, as in the study by Zaw et al.[7] A key element of qualitative research is the ability to ‘get beneath the surface’ of phenomena by asking ‘why’ and ‘how’ something occurs. Sustainable healthcare is an ideal topic for this type of inquiry as there is urgency to change practice, but little experience of how, and an evidence base that is far from complete.

The most common methods for gathering qualitative data include interviews, focus groups and observations, usually conducted according to a topic guide developed to address the research question. The methods for analyzing qualitative data are usually based on working with unstructured text (e.g., written sources, field notes or transcribed speech). Related content is assigned to ‘themes’ that relate the data to the research question. This analytical process may be deductive, based on themes specified a-priori, or inductive, where themes are developed from the

data through a process that involves coding (labeling) the data and then combining the codes into themes.[8] Themes generated by an inductive approach are sometimes described as 'emergent' themes, because they are said to 'emerge' from the data through this iterative process.

Zaw et al.[7] identified 'culture' as an emergent theme beyond the categories of the BCW. Whilst issues related to cultural norms can fall within the 'opportunity' component of the BCW, there are other frameworks, such as the Consolidated Framework for Implementation Research that more explicitly address the construct of 'culture'. The norms, values, and the basic assumptions (i.e. culture) of a given organization are constructed by interactions of individuals and groups within that organization, each with their own beliefs, values and skills.

Measuring culture and initiating changes in complex organizations and systems is challenging. In healthcare, autonomous individuals work in an environment with unpredictable fluidity and numerous intertwining components.[9] This non-linearity means that complex systems can defy orchestrated intervention, wherein seemingly obvious solutions can have minimal impact on system behavior (known as 'policy resistance'),[10] whilst small changes can have big unanticipated consequences.[11] Therefore, even though Zaw et al.[7] suggest a three-part approach comprising enhanced education, the provision of physical resources, and the development of organizational policies as the basis for change in behavior towards more environmentally sustainable anesthetic practice, [7] it is important to tailor these strategies to the local context and continually monitor them, adjusting/adapting as needed . Recently, the introduction of the empirically-driven and theory-supported framework on Successful Healthcare Improvement From Translating Evidence (SHIFT-Evidence) has provided a tool to guide practice change in a complex healthcare system.[11] Reed et al suggest a three-pillar approach to achieve successful evidence translation into practice: to 'act scientifically and pragmatically' while 'embracing

complexity' of the setting, and 'engaging and empowering' those responsible for and affected by the change.[11] Both strategic solutions and flexibility are required to incorporate various interdependent elements unique for that particular system to obtain functionality, and changes need to take into consideration the concerns and insight from frontline staff through engagement and communication, and align motivations and commitment to change.

To add to the complexity, several elements are necessary for individuals to be motivated and commit to change . As Glenngård and Anell note, individuals may commit to change because they 'want to' (affective commitment), 'have to' (continuance commitment), and/or 'ought to' (normative commitment).[10] (Appendix 1) The intrinsic 'want to' motive is linked to reward which has been found to result in the highest level of commitment to behavior change in healthcare. Rewards may include financial incentives and career advancement, but perhaps more importantly, recognition by peers and the public, and self-satisfaction arising from 'job well-done'. But how do we know if we are doing a good job from a sustainability perspective? And against what standards are we measured by peers and the public? This is, at least in part, determined by culture – and there is currently a lack of incentive, or agreed standards to adhere to for environmental stewardship in healthcare.

Unlike many other industries which have transparency and accountability regarding greenhouse gas emissions, healthcare lags behind in reporting waste production, CO_2e emissions and energy consumption. This is paradoxical as the significant environmental impacts of the healthcare industry has a negative impact on health.[2,3] Around the globe, the healthcare industry is under pressure to deliver patient-centered, cost-effective, high-quality care. We suggest that it is time to incorporate environmental sustainability into the equation, too. It should be noted that most environmentally sustainable initiatives are cost effective in the fullness of time.

To foster a culture of willingness from individuals , making sustainable practices second nature to future generations of medical practitioners could create a durable effect on practice patterns. In Canada, a recent survey demonstrated only a small proportion of Canadian anesthesia residency programs have a formal curriculum to teach residents about the environmental impact of practice.[14] In contrast, the General Medical Council in the United Kingdom (UK) introduced a national requirement to incorporate education for environmentally sustainable healthcare into all curricula for primary medical qualification in 2018. Three years later, the UK Royal College of Anaesthetists integrated environmental impacts of practice in the anesthesia training curriculum. Although these are welcome interventions, there remain obstacles to the delivery of sustainable healthcare education, including a consensus on what *exactly* learners need to be taught, and the training requirement/accreditation of appropriate educators and facilitators.[15] Integrating environmentally sustainable healthcare into educational curricula is still at its infancy; only time will tell if it actually translates to culture change. Unfortunately, it is time that we do not have. At a time of climate crisis, behavioral change needs to happen immediately.

Healthcare practitioners are unlikely to change their professional practices in a way that is not valued within their organizational culture - which should instill motivation for high-level commitment and create opportunity for such change. Qualitative research, when combined with implementation science tools, such as the study by Zaw et al.[7] enable effective exploration and assessment of the agents of behavioral changes, however, recognizing the complex dynamic interactions of different perspectives, individual experience and values, components, and politics of healthcare is essential to promote sustained and ever-improving changes.

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