

Opinion Paper

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Embedding education into clinical laboratory professional training to foster sustainable development and greener practice

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Abstract: It has become apparent that the climate crisis is reaching critical levels and Governments and key organisations are recognising the need for change. A review of current literature reveals very little published research concerning the impact of clinical laboratory practice on the carbon footprint of healthcare. For a clinical laboratory to become more environmentally sound, key target areas of focus are required. With sustainability becoming a key consideration for course development, employing educational principles such as Education for Sustainable Development (ESD) in the form of Sustainability in Quality Improvement (SusQI), Quality Improvement objectives can be met, while benefitting the patient and the environmental impact of organisation.

Keywords: clinical laboratories; green labs; laboratory sustainability; quality; Quality Improvement; SusQI; sustainability.

Background

2022 marks both the 27th session of the Conference of the Parties of the UNFCCC (COP 27) and the 30th anniversary since the Convention on Climate Change UN Framework was signed. As these two events are marked, it is becoming increasingly apparent that the climate crisis is reaching a critical moment. Each year we are seeing an increase in record breaking weather phenomena and negative global health impacts with little progress [1]. Governments and key organisations are recognising the need for change and are

addressing this through legislation and policy changes but there is a requirement for professional understanding if more sustainable practices are to be implemented. The fundamental objective of healthcare is to save and improve lives. Through practice, delivery of service and professional education the aim is to heal the sick were possible and care for those in need. The growing evidence of the health impacts resulting from climate change and air pollution, including increased levels of cardiovascular disease [2] and lung cancer [3], not to mention the potential for increased spread of infectious diseases [4] highlights the imperative to take action. As a healthcare profession, there is a professional responsibility to improve current practices.

Several organisations have established experience in working to improve the environmental impact in research and academic laboratories. Laboratory Efficiency Assessment Framework (LEAF) [5] and MyGreenLab [6] particularly, have established assessment tools and certification. More recently however, these organisations have started to work with healthcare science professionals and their respective professional bodies to consider how current ‘green’ frameworks and initiatives can be applied to clinical practice.

A review of current literature reveals very little published research concerning the impact of clinical laboratory practice, on the environment. Several papers of note on this topic include the work by Lopez et al. Lopez explored the positive steps clinical laboratories could take to improve their detrimental environmental impact [7, 8]. Conclusions from these papers include working towards the ISO 14000 environmental standard [9] and the need to consider an overall reduction in sample throughput.

In a study by McAlister et al. the carbon footprint of five common hospital pathology tests including full blood examination; urea and electrolyte levels; coagulation profile; C-reactive protein concentration; and arterial blood gases, were reviewed [10]. This study concluded that substantial carbon footprint decreases could be made through sample collection and phlebotomy. Other studies support

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this by drawing attention to the unnecessary ordering of pathology tests; Although the exact figure is unclear, a meta-analysis study suggests this figure could be as high as 44% [11] combined with a potentially high rate of sample rejections from pre-analytical errors [12] – the carbon footprint of pathology has scope to be reduced.

A review by Molero also proceeded to discuss how sustainability could be achieved by ensuring efficient and responsible use of resources would reduce the environmental impact of clinical laboratories [13].

For a laboratory to become more environmentally sound, key target areas of focus are required. Clinical laboratories need to review how waste can be reduced, specifically plastics, how water can be conserved, and energy consumption decreased. These objectives, however, cannot be achieved in isolation and a collaborative effort is needed across the patient pathway and with suppliers, if the laboratories are to assist in the global strive for net zero.

Due to the impending changes to procurement, the supply and procurement chains are preceding clinical laboratories in their moves to reduce waste, recycle and decrease their carbon footprint. So how does the clinical laboratory profession play their part? The formation of the 'European Federation of Clinical Chemistry and Laboratory Medicine (EFLM) Task Force-Green and Sustainable Laboratories, has provided a platform to share green and sustainable current best practices and educate the clinical laboratory workforce. The 2022 EFLM strategic conference provided clinical laboratory professionals with the first substantial international opportunity for healthcare laboratory professionals to consider the climate crisis, international sustainability initiatives and green practices. The publication of the Guidelines [14] provided a tool and checklist for the clinical laboratories to adopt these more environmentally sound practices. The next objective of the taskforce looks towards education and training.

The taskforce ambition is to cascade information and education materials, through its member bodies to internationally educate and develop its members and their colleagues. Going forward, professionals will require a means to use this education and apply it to practice. Educators can facilitate this application of theory to practice by using established models of sustainability education.

Education for sustainable development

Sustainability is becoming a key consideration for course development across Higher Education institutions. The

United Nations Educational, Scientific and Cultural Organisation (UNESCO), is a specialised agency of the UN aimed at promoting world peace and security through international cooperation in education, the sciences, and culture [15].

UNESCO has been driving Education for Sustainability (ESD) since the 2014 when the guidance was first published. In 2015 the Sustainability Development Goals (SDGs) were launched, and the United Nations Framework Convention on Climate Change Paris Agreement [16] adopted. Since 2015, ESD has evolved, it is finding its inclusion into quality frameworks for education and global healthcare continual professional development. ESD is about lifelong learning and plays an important role in quality education [17].

When teaching ESD, the educator needs to consider the learning content, the desired outcomes and method of delivery. The ultimate aim of ESD is to achieve society transformation by empowering the learner with key knowledge, skills, values and attitudes. By employing ESD principles, healthcare professionals can acquire skills of ESD which include:

1. Future thinking – using peer discussion to consider social, environmental and economic objectives and consequences of inaction.
2. Systems thinking – developing an understanding of carbon measuring, circular economy modelling, and the collaboration required for change and using case examples linked to students' current practice.
3. Critical reflection – using didactic learning, reflective practice, critical analysis of evidence-based research and team-based learning strategies.
4. Participatory learning – peer and experiential learning considering action research within the workplace.
5. Thinking creatively – problem-based learning linked to local Quality Improvement requirements using project-based learning to facilitate change.
6. Collaborative learning – contributions from local and guest experts, interprofessional working, and collaborative learning approaches.

As the healthcare laboratory professional starts to consider sustainability, an understanding is required for a recognised measurement of impact. The laboratory professional needs to develop an understanding of carbon measuring, circular economy modelling, and the measuring of social impact. Positive and negative social impacts of the current system need to be considered if a proposed change idea is to ensure maximum positive social outcomes.

It's initially hard to reconcile the circular economy model with the healthcare sector and pathology practice in particular. Single-use plastic items are widely in use for both health and safety and quality perspectives. Furthermore,

energy consumption is unavoidably high in the sector. ESD should enable the learner to make informed choices and take actions for both economic and environmental benefits.

For an education provider, it is recognised that ESD is an integral part of quality education. It is therefore necessary to embed ESD as a fundamental skill not only for future graduates but also for professionals currently in practice. ESD programs are designed to incorporate the “triple bottom line” approach. This enables the learner to find a balance for sustainable development utilising social/economic/environmental (SEE) considerations.

One such project which forms a sound model for ESD in healthcare professional development is Sustainability in Quality Improvement (SusQI). SusQI is the healthcare form of ESD developed by The Centre for Sustainable Healthcare (CSH). Quality improvement (QI) and sustainable healthcare have become integral to UK medical school's curricula, with UK practising medics expected to develop QI skills as part of the postgraduate training and professional development [18].

SusQI considers four principles of sustainable healthcare [19].

1. Prevention.
2. Patient self-care.
3. Lean delivery.
4. Low carbon alternatives.

CSH provides virtual training and support for healthcare professional sustainability advocates across the different professional groups and disciplines to incorporate these principles into ESD. The fundamentals of ESD and SusQI can therefore be used to form the backbone for professional sustainability education delivery both in a higher education or healthcare setting.

Utilising SusQI for laboratory professional ESD

Recognised methods for QI can be utilised to improve healthcare services, and by incorporating environmental and social benefit, often positive financial outcomes are realised. As a versatile toolkit, SusQI is already established in both nursing and medical education [20], this method is therefore easily adaptable for any healthcare professional group and the consideration of social and environmental challenges can be applied to any aspect of the patient pathway including laboratory diagnostics. In applying SusQI principles to healthcare laboratory scenarios and encouraging problem solving on how these can be addressed, sustainable

and green professional practice can become embedded within the laboratory, with the added benefit of interprofessional collaboration raising the visibility of the profession.

Utilising ‘green’ certification will undoubtedly improve the environmental impact of the laboratory [21], but Quality Improvement is a fundamental requirement of good laboratory practice and accreditation and by employing principles such as SusQI, QI objectives can be met while benefitting the patient and the overall carbon footprint of organisation.

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