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**Marlies Ostermann**

King's College London  
Guy's & St Thomas' Hospital  
Department of Critical Care  
London, UK

marlies.ostermann@gstt.nhs.uk

# Call for a Green ICU

Intensive care units are carbon hotspots that contribute three times the GHG emissions as acute care units per bed day. Clinical staff must be aware of GHG production's impact and potential mitigations. This article summarises key points and initiatives to make this happen.

Healthcare contributes approximately 5% of worldwide greenhouse gas (GHG) production (Lenzen et al. 2020). Some regional variation exists. For instance, in the United States, the carbon footprint of the healthcare system is approximately 10% of the national GHG emissions compared to 7% in Australia (Eckelman et al. 2020; Malik et al. 2018). Within healthcare systems, hospitals and pharmaceutical sectors combined have the largest carbon footprint (approximately 60%), and within hospitals, intensive care units (ICUs) are carbon hotspots contributing three times the GHG emissions as acute care units per bed day (Prasad et al. 2022). The reasons are high staff activity, high use of technical and non-technical resources, and high energy demands. Further, approximately 10% of healthcare is considered harmful, and 30% is low-value care (Barratt et al. 2022), and yet they contribute to GHG emissions.

It is vital for clinical staff to be aware of the impact of GHG production and potential mitigations. Very timely, the journal *Intensive Care Medicine* launched a new series, "My Green ICU", led by Professor T Bein and Professor F McGain (Bein and McGain 2023). In their introductory editorial, they highlighted several important points and initiatives:

## 1. Green Teams

The development of integrated, multifaceted, collegial 'Green teams' in ICU has proven to be very successful and integral to sustainability (Trent et al. 2023; Huffling and Schenk 2014). Such initiatives often started with one or two individuals who addressed a particular issue (e.g. use of gloves, cessation of intravenous antibiotics) and then expanded to larger teams and sometimes up to hospital administrators

and beyond (bottom-up approach). Where implemented, they have been shown to be vital to harnessing employee expertise, motivating, educating and finding new and better ways to a more sustainable practice (Trent et al. 2023).

## 2. Reduction of Energy Use

In general, a significant long-term reduction of the intensive care carbon footprint will be achieved by preventing serious illnesses and reducing people's need for ICU admission. Thus, preventive medicine per se is an important strategy towards sustainability. In addition, ICUs should be

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provided with regular information on their energy expenditure, from heating, lighting and ventilation to air-conditioning (Bein and McGain 2023). This offers opportunities to identify both initiatives to save energy and water and strategies to reduce waste. Patient care may improve, too. For instance, there is a correlation between noise levels and sleep disturbance and ICU delirium.

## 3. Life Cycle Assessments

Life cycle assessments (LCAs) are scientific methods to analyse the environmental and financial footprints of products and processes (Bein and McGain 2023). LCAs already exist for specific ICU devices, e.g. face masks and breathing circuits, and

also for ICU medications but should be routinely undertaken. As an example, changes in supply stocking resulted in an 80% reduction in the amount of unused equipment waste in a 16-bed ICU in Canada (Yu and Baharmand 2021).

## 4. ICU Recycling

Quantification of total ICU waste has not been systematically investigated, but data from specific areas exist. For instance, half of the drugs drawn up for emergencies end up being discarded unused (Atcheson et al. 2016). Further, it is estimated that approximately 50% of waste could be recyclable (McGain et al. 2009). The introduction of recycling stations and improved waste practices in a 14-bed ICU in Australia resulted in 5 tonnes of comingled resources to be diverted from landfill (Department of Health and Human Services, Melbourne, Victoria 2016)

## 5. Less is More

A 'less is more' philosophy has been advocated in recent years, including calls for daily consideration of measures to de-escalate therapies, prescription of sensible therapeutic goals, and avoidance of inappropriate tests and therapies (Department of Health and Human Services, Melbourne Victoria 2016; Singer 2022; Darmon et al. 2019; Zampieri and Einav 2019). To achieve this, regular audits of clinical practice are needed to evaluate compliance with the latest evidence and standards. Further, more research and scientific evidence are required to identify "less of what", for instance, to support a transition from over-testing and over-treating to effective and appropriate testing and treating, in line with more sustainable clinical practice (Darmon et al. 2019).

## 6. Avoidance of Futility

Critical care interventions that prolong life without achieving effective patient-centred care are considered futile and expensive. Avoidance of futile treatment is beneficial, saves money that can be used to support other patients, and is climate protective (Bein and McGain 2023).

The “My Green ICU” series in Intensive

Care Medicine serves to encourage all healthcare staff, particularly those who work in the ICU, to join the race to zero carbon emissions and to promote planetary health as a framework for sustainable health systems (Bein and McGain 2023).

## Conflict of Interest

None. ■

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