



# Statement on Environmental Sustainability in Anaesthesia and Pain Medicine Practice

## 1. Purpose

The purpose of this statement is:

- 1.1 to affirm ANZCA's commitment to minimising the health impact of climate change and promoting environmental sustainability.
- 1.2 to serve as a resource for clinicians to promote environmentally sustainable practices in their workplace.
- 1.3 to assist healthcare facilities in embedding sustainable practices in the delivery of safe patient care.

## 2. Scope

This document is intended to apply to all clinicians practising anaesthesia, perioperative medicine and pain medicine, and all healthcare facilities in which anaesthesia, perioperative and pain medicine services are provided.

## 3. Background

The healthcare sector is highly interconnected with activities that emit pollution to air, water, and soils, resulting in a significant ecological footprint and contribution to anthropogenic climate change. Climate change has and will continue to impact on health outcomes.<sup>1,9,10</sup> The impact will be particularly significant for vulnerable population groups, including children and the elderly, those living in low-lying areas, the disadvantaged such as indigenous populations and people with pre-existing medical conditions. Furthermore, future generations are not responsible, yet will be most affected and are least able to affect change.

In Australia, over 7% of national carbon emissions is from the healthcare sector.<sup>2</sup> In the United Kingdom, ~5% of acute hospital carbon release has been estimated to be a direct result of anaesthesia.<sup>3</sup> All healthcare workers, including anaesthetists are in a position to significantly reduce greenhouse gas emission by making clinical and non-clinical decisions with regard to the environment.

As described in the background paper PS64BP, sustainability action now brings many co-benefits such as improved health and reduced health costs, subsequent reduced fossil fuel use, less air pollution, mitigation of rising temperatures, less waste, and increased green spaces. Better patient care can be achieved by redesigning infrastructure and introducing innovative models of care, using

new technologies, and judicious use of resources. Sustainable healthcare can reduce costs and waste and improve health.

## **4. Statement**

### **4.1 Inhalational Anaesthesia Agents**

The contribution of inhalational anaesthetic agents to climate change on the global scale is small, however anaesthetists are uniquely placed in that the choices we make at work can have an impact on our carbon footprint many times greater than that of our other day-to-day activities.

The effect of each agent is dependent on its absorption of infrared radiation that would otherwise leave the Earth's lower atmosphere, the amount used, and its atmospheric lifetime. As they are used in clinical practice, desflurane and nitrous oxide have a high intrinsic environmental impact, at least ten-fold greater than sevoflurane and isoflurane.

Clinicians can reduce their impact on the environment by:

- Using low-flow anaesthesia.
- Using agents that have a lower impact on the environment.
- Using techniques to minimise the requirement for inhalational agents, such as regional anaesthesia and total intravenous anaesthesia (TIVA). General anaesthesia with TIVA has a much lower carbon footprint than with volatile anaesthetics. Other environmental effects of TIVA/volatile production and use, such as water and land pollution and solid waste production, could also be considered (see PS64BP).

Such considerations must always be in the context of achieving optimal patient outcomes, in any individual case.

### **4.2 Infrastructure**

Planning of future infrastructure should involve an approach similar to the accounting framework term "triple bottom line", recognising that economic, social and environmental benefits are interdependent. Architectural elements such as natural light improve health, and good facility design improves workflow. New infrastructure should be built so that it is adaptable to the weather conditions and workplace efficiency reduces waste, energy demand and cost. Incorporating these elements has benefits for patients, staff health and well-being, and the environment.

Existing facilities can be redesigned or retrofitted with measures to reduce energy and water consumption. Use of water aerators, repairing leaking plumbing and use of motion-sensitive automatic surgical taps can reduce water use. Turning off equipment, such as desflurane heating coils, and lights when not in use, occupancy-sensing lighting and air conditioning, and use of LED lighting can reduce energy use.

The source of energy for healthcare facilities plays a major part in their carbon footprint. Low carbon energy sources such as combined heat and power plants can considerably reduce the greenhouse gas production from healthcare.

#### 4.3 Equipment and consumables

Operating theatre complexes use large amounts of energy, procure many consumables and produce excessive waste, often contributing to a quarter of all hospital waste<sup>4</sup>. As end users, clinicians should participate in hospital product evaluation committees and consider the environmental footprint of all equipment and consumables, particularly reusable and single use equipment by performing full life cycle assessments ('cradle to grave' analyses).

Clinicians and healthcare facilities can encourage manufacturers and suppliers to supply more environmentally friendly products, made from and packaged in recyclable and recycled materials.

Use of reusable surgical gowns, dedicated operating theatre footwear and freshly laundered lint free hats will reduce the amount of single use gowns, caps and overshoes that are discarded and add to waste. Theatre attire should meet standards set out in *PS28 Guidelines on Infection Control in Anaesthesia*.

Using reusable anaesthesia equipment such as drug trays, face masks, breathing circuits and laryngoscope blades may reduce waste and save money. The net environmental effect of reusable versus single use equipment is a complex calculation and depends upon the local energy source.

Management of stock volumes to allow for less wastage of expired and outdated stock (drugs and consumables) should occur. Unused stock and equipment should be collected and donated to developing nations after careful consideration of its eventual use, and the needs of the receiving communities. This reduces waste and provides much needed equipment for patient care in other communities.

Practices such as the drawing up of drugs and opening consumables for emergency use can be costly and wasteful. It also increases the risk of error and contamination. Other measures for rapid access to medications, such as pre-filled syringes may provide both financial and environmental benefits, as well as enhance safety. Reformulating pre-fabricated kits so they contain only the required products can also reduce unnecessary disposal of unused items.

#### 4.4 Rational use of diagnostic tests and prescriptions

Rational use of diagnostic tests and prescriptions can reduce our environmental footprint through increasing workplace efficiency. Efficiency in healthcare means reducing waste while maintaining safety. This increases the overall value of the service we provide our patients. This may ultimately be reflected in improved health outcomes for patients, both directly and indirectly, through a cleaner environment, and should also contribute to reduced health costs.<sup>5</sup>

Careful history, examination, review of notes and communication with general practitioners and other healthcare providers may avoid duplications of investigations. This saves both time and resources, for practitioners and patients alike, and it reduces the need to travel for unnecessary appointments and investigations.

For patients in rural and remote areas, evaluation, optimisation and ongoing management by a local general practitioner or healthcare provider may be more suitable than travelling to a major city. This would serve to minimise the need for transportation and its associated emissions. Consultation with a specialist anaesthetist or specialist pain medicine physician

using information and communication technology, such as teleconferencing should also be considered.

Prescribing practices have a safety and environmental impact. Medications are not free of side effects and complications. Rational use of therapeutic interventions using x-ray or CT guidance will also reduce the radiation exposure to the environment, staff and patients. Considered prescribing of medications, and monitoring of prescriptions can contribute towards reducing the demand for production.

#### 4.5 Waste Management

Operating rooms generate 20-30% of total hospital waste; 20-25% of total operating room waste comes from anaesthesia services specifically.<sup>6-8</sup> This includes general waste, recyclable waste and contaminated waste. Reducing waste is an important and key component in improving environmental sustainability. Clinicians should discard waste in such a way as to reduce environmental and financial costs. This includes the judicious segregation of contaminated waste and sharps from general and recyclable waste and appropriate disposal.

Recycling programs in healthcare facilities should be standard practice. Recycling programs can reduce operating theatre waste to landfill by up to 60%. Manufacturing goods using recycled products uses less fossil fuels. Most waste can be recycled if not contaminated by body fluids. Items which can be recycled include paper/cardboard, blue surgical/equipment wrapping, plastics, glass (including drug vials as drugs remain present in only small amounts and glass-making temperatures are sufficient to render drugs inert), batteries, fluorescent light bulbs and electronics (under e-recycling programs).

Compostable/biological waste streams allow for reduced landfill (or incineration), reduced carbon release, and better resource utilisation. Paper, compostable plastics and hospital food waste are all amenable to compost and vermiculture disposal.

Ensuring only needles and easily broken (non-tempered) glass medication vials are discarded in sharps bins reduces the frequency with which these receptacles are processed, providing both financial and environmental savings. Tempered (hardened) glass can be discarded with general waste or be recycled as glass if such recycling exists.

The method of disposal of medications can reduce environmental contamination and diversion. Discarding unused but drawn up drugs into a stream of waste that is incinerated, such as clinical waste or sharps waste, reduces landfill and water contamination.

#### 4.6 Travel

Considerable direct and indirect health benefits arise from less travel. Fewer 'carbon miles' due to reduced air and road travel will reduce the global burden of climate change. Greater active and public transport will have health co-benefits through greater exercise, less obesity and diabetes; of benefit to clinicians and patients. Clinicians can be mindful of the benefits of teleconferencing on the environment and health.

#### 4.7 Advocacy

Anaesthetists, perioperative and pain medicine physicians are well positioned to encourage system-wide solutions. As problem-solvers and leaders, they may encourage their

organisations to make better decisions with respect to the environment, the climate, and public health.

#### 4.8 Research

Supporting and funding audit and research in the environmental impact of clinical anaesthesia, perioperative medicine and pain medicine will continue to assist in improving and rethinking methods of environmental sustainability.

**This document is accompanied by a background paper (PS64BP) which provides more detailed information regarding the rationale and interpretation of the Guideline.**

#### Related ANZCA documents

The following Professional Documents should be interpreted in light of this document:

PS07 Guidelines on Pre-Anaesthesia Consultation and Patient Preparation

PS28 Guidelines on Infection Control in Anaesthesia

PS51 Guidelines for the Safe Management and Use of Medications in Anaesthesia

#### References

1. Watts N, Adger WN, Agnolucci P, Blackstock J, Byass P, Cai W, et al. Health and climate change: policy responses to protect public health. *Lancet*. 2015 Nov 7;386(10006):1861-914.
2. Malik A, Lenzen M, McAlister S, McGain F. The carbon footprint of Australian health care. *Lancet Planet Health*. 2018 Jan;2(1):e27-e35.
3. Sustainable Development Unit. Carbon Footprint from Anaesthetic gas use. [internet]. Cambridge, UK: Sustainable Development Unit; Dec 2013 [cited 1 Mar 2019]. Available from: <https://www.sduhealth.org.uk/areas-of-focus/carbon-hotspots/anaesthetic-gases.aspx>
4. McGain F, Story D, Kayak E, Kashima Y, McAlister S. Workplace sustainability: the "cradle to grave" view of what we do. *Anesth Analg*. 2012 May 1;114(5):1134-9.
5. Maughan D, Ansell J. Protecting resources, promoting value – A doctor's guide to cutting waste in clinical care. London, UK: Academy of Medical Royal Colleges; 2014 Nov 6.
6. Ard JL, Jr., Tobin K, Huncke T, Kline R, Ryan SM, Bell C. A Survey of the American Society of Anesthesiologists Regarding Environmental Attitudes, Knowledge, and Organization. *A A Case Rep*. 2016 Apr 1;6(7):208-16.
7. Axelrod D, Bell C, Feldman J, Hopf H, Huncke TK, Paulsen W, et al. Greening the Operating Room and Perioperative Arena: Environmental Sustainability for Anesthesia Practice. [Internet]. American Society of Anesthesiologists; [Updated 2017 Jan; cited 2019 Mar 4]. Available from: <https://www.asahq.org/about-asa/governance-and-committees/asa-committees/committee-on-equipment-and-facilities/environmental-sustainability>.
8. Pungsornruk K, Forbes MP, Hellier C, Bryant M. A renewed call for environmentally responsible anaesthesia. *Anaesth Intensive care*. 2015 Nov;43(6):800-1.
9. Australian Government Bureau of Meteorology and Commonwealth Scientific and Industrial Research Organisation (CSIRO). State of the Climate 2018 [Internet]. CSIRO; 2018 [cited 2019 May 26]. Available from: <https://www.csiro.au/en/Showcase/state-of-the-climate>

10. National Institute of Water and Atmospheric Research (NIWA). What is climate change and why is it happening? [Internet]. NIWA [cited 2019 May 26]. Available from: <https://www.niwa.co.nz/natural-hazards/hazards/climate-change>

### Further reading

Choosing Wisely Australia <http://www.choosingwisely.org.au/home>

Choosing Wisely New Zealand <http://choosingwisely.org.nz/>

*Professional documents of the Australian and New Zealand College of Anaesthetists (ANZCA) are intended to apply wherever anaesthesia is administered and perioperative medicine practised within Australia and New Zealand. It is the responsibility of each practitioner to have express regard to the particular circumstances of each case, and the application of these ANZCA documents in each case. It is recognised that there may be exceptional situations (for example, some emergencies) in which the interests of patients override the requirement for compliance with some or all of these ANZCA documents. Each document is prepared in the context of the entire body of the college's professional documents, and should be interpreted in this way.*

*ANZCA professional documents are reviewed from time to time, and it is the responsibility of each practitioner to ensure that he or she has obtained the current version which is available from the college website ([www.anzca.edu.au](http://www.anzca.edu.au)). The professional documents have been prepared having regard to the information available at the time of their preparation, and practitioners should therefore take into account any information that may have been published or has become available subsequently.*

*Whilst ANZCA endeavours to ensure that its professional documents are as current as possible at the time of their preparation, it takes no responsibility for matters arising from changed circumstances or information or material which may have become available subsequently.*

Promulgated: February 2018

Reviewed: 2019

Date of current document: July 2019

© Copyright 2020 – Australian and New Zealand College of Anaesthetists. All rights reserved.

*This work is copyright. Apart from any use as permitted under the Copyright Act 1968, no part may be reproduced by any process without prior written permission from ANZCA. Requests and inquiries concerning reproduction and rights should be addressed to the Chief Executive Officer, Australian and New Zealand College of Anaesthetists, 630 St Kilda Road, Melbourne, Victoria 3004, Australia. Email: [ceo@anzca.edu.au](mailto:ceo@anzca.edu.au)*

ANZCA website: [www.anzca.edu.au](http://www.anzca.edu.au)

FPM website: [www.anzca.edu.au/fpm](http://www.anzca.edu.au/fpm)