College of Anaesthesiologists, AMM

Malaysian Society of Anaesthesiologists

CoA-MSA CONSENSUS STATEMENT ON GREEN ANAESTHESIA – A STARTER TOOLKIT

For the College of Anaesthesiologists (CoA) and Malaysian Society of Anaesthesiologists (MSA)
Climate-Conscious, Evidence-Based, Health-Centred Anaesthetic Practice

INTRODUCTION

Climate change is the greatest global health threat of the 21st century, and healthcare significantly contributes to environmental degradation.

Anaesthesia has a disproportionately high environmental impact due to:

Toolkit purpose:

1. Provide practical, evidence-based guidance for sustainable anaesthesia in Malaysia
2. Balance environmental responsibility with patient safety and clinical efficacy

ROLE OF ANAESTHESIOLOGIST

Anaesthesiologists are central figures in perioperative care and uniquely placed to champion sustainability.

Can influence **Scope 1** (direct emissions), **Scope 2** (energy-related emissions), **Scope 3** (supply chain emissions), and **improve wellbeing and self-care of anaesthesia providers** through daily clinical decisions.

The World Federation of Societies of Anaesthesiologists has underscored this responsibility through **three core directives:**

1. Ensuring patient safety while implementing green practices
2. Fostering global unity across income settings
3. Advocating for healthcare-wide mandates to curb contributions to global warming.

OBJECTIVES OF THE TOOLKIT

Awareness:
Highlight anaesthesia's environmental impact in Malaysia.

Actionable Guidance:
Offer practical, locally relevant carbon-reduction strategies.

Support Initiatives:
Help departments align with national climate goals.

Foster Collaboration:
Promote teamwork among anaesthesiologists, surgeons, nurses, and administrators.

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KEY RECOMMENDATIONS & STRATEGIES

Scope 1: Direct Emission

1 Practice Low-flow anaesthesia
(≤1 L/min)

Lower flow reduces volatile agent consumption, costs, and emissions.[1,2] It is safe with modern CO_2 absorbers and reduces unnecessary environmental release.

2 Limit use of Desflurane
(specific cases only)

Global Warming Potential (GWP) data: Desflurane (2540), long atmospheric lifetime. We recommend the use of Desflurane only for specific indications. Examples include but not limited to the patients with morbid obesity, elderly patients, patients undergoing long surgeries and neuro-surgeries.[3-6]

3 Limit use of Nitrous Oxide(N_2O)
(labour analgesia only)

N_2O: Ozone depleter [7,8], small volume but high impact

4 Total Intravenous Anaesthesia (TIVA) / Regional Anaesthesia preferred

TIVA/Propofol: Life cycle assessment shows lower footprint, —even accounting for the manufacturing and disposal of syringes and IV sets.[9-11]

5 Use Depth of Anaesthesia (DoA) monitoring

DoA monitoring reduces agent use, and may lead to reduction of Green House Gas (GHG) emissions. [11]

6 Use leak-free closed-circuit with scavenging

Leak prevention essential for occupational safety. A leak-free anaesthesia machine is essential for the effective practice of low-flow anaesthesia.[12-14]

Scope 2: Indirect Emission From The Energy Used

1 Minimise energy consumption

Power off out of hours

Heat, Ventilation and Air-Conditioning (HVAC) Systems:
Ensure systems are powered down when not in use.

Anaesthesia Machines:
Power down post-procedure, which can save approximately 50 kWh per day per machine.

Utilise centralised monitoring to minimise the need for redundant devices:
- Introduce 'shutdown' and 'power on' checklists.
- Install occupancy sensors and automate 'set-back' modes HVAC systems.

Anaesthetic Gas Scavenging System (AGSS):
Switch off when theatres are not in use or volatile anaesthetics are not being utilized.

Ventilators/ ICU Monitors:
Activate eco-mode during standby, which reduces energy consumption by 30%.

Use cordless electrical equipment with rechargeable batteries

Implement energy-saving measures

Examples included but not limited to:
- Use of LED lightbulbs
- Install motion-activated lights.

Optimise temperature and humidity

- Maintain operating theatre (OT) temperature: 18-22°C with hypothermia prevention; Burns Unit: 24-30°C.
- Keep OT doors closed to reduce temperature loss. Maintain OT relative humidity between 30% and 60% for patient comfort and infection control.

2 Transition towards sustainable energy generation

Shifting to renewables significantly decreases life-cycle emissions of all hospital operations.

- Encourage solar, rooftop systems
- Sustainability planning with engineers

3 Prevention of energy loss

- Encourage window/ natural light sources to reduce electrical lighting.
- Optimisation of insulation/heat transfer for new facilities/major renovations of hospital facilities.

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KEY RECOMMENDATIONS & STRATEGIES

Scope 3: Indirect Emission from the Supply Chain

Application of 6R, EM concepts[13–16,17]

Reduce

- Minimise non-essential single-use items.
- Prepare medications only when needed to reduce waste.
- Use medication ampoules fully whenever possible.
- Shorten ICU and hospital stays to lessen resource use and environmental impact.

Reuse

Where appropriate, substitute single-use items with reusable alternatives, provided they meet all relevant safety and hygiene standards.

Recycle

- Segregate waste streams in operating theatres and ICUs.
- Collaborate with hospital administration and local authorities to improve recycling infrastructure and ensure compliance.

Rethink

- Prioritise procurement from suppliers with strong environmental commitments.
- Redesign supply kits to eliminate non-essential.

Repair

- Implement internal protocols for timely equipment maintenance and repair.
- Ensure supplier agreements include full post-sale support and guaranteed spare parts.

Research

- Conduct and support local audits and life cycle assessments of anaesthesia-related products and practices.
- Publish and share findings.

Education[16] & Culture Change

- Integrate sustainability into anaesthesia training and continuing education programs.
- Raise awareness among staff about the environmental impact of clinical choices and empower them to advocate for greener practices.
- Celebrate and share successes (e.g., Green Anaesthesia Day) to foster a culture of environmental responsibility.

Monitor and Audit

- Regularly track supply use, waste generation, and recycling rates in the OT and ICU.
- Benchmark against national and international standards and set measurable sustainability targets.
- Use audit data to drive continuous improvement and inform procurement and clinical practice changes.

Encourage sustainable waste management[18-21]

Optimise use of waste containers[22]

- Segregate waste into designated, color-coded waste collection containers.
- Dedicated rubbish containers.

Reduce leftover and unutilised disposable medical items

- Minimise partially used disposables.
- Limit unnecessary openings of single-use items.
- Optimise consumable supply usage.
- Prevent wastage of unopened medical disposables.

Ensure safe pharmaceutical waste disposal[23-26]

- Dedicated pharmaceutical disposal.
- Medication residue management.
- Safe handling of unused medication.

Promote paperless practices

- Minimize paper usage.
- Implement paperless documentation.
- Promote digital record-keeping.
- Decrease reliance on printed materials.

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Wellbeing & Self-care of Anaesthesia Care Provider

Create awareness of physical health risks due to heat

Anaesthesia providers are vulnerable to extreme weather, heat, air pollution, and resource strain.[27,28] Strengthening workforce resilience is essential to sustainable healthcare. This can be done by:

Integrate climate-related health risks into staff wellness programmes.

Monitor and identify high-heat areas in the hospital. Examples include but not limited to wards, on-call rooms, and older facilities with limited climate control.

Promote hydration and rest

- Encourage regular hydration. Aim for 150–250 mL fluid intake every 20–30 minutes in hot or humid environments.
- Implement peer support systems ('buddy checks') to identify early signs of heat strain, particularly among junior and auxiliary staff.
- Use designated cooling zones (e.g. air-conditioned rooms, shaded areas) equitably across all staff groups.

Empower mental health and heat resilience[27,28]

- Address climate-related stressors such as heat fatigue, haze, and disaster response within staff wellbeing programmes.
- Provide basic psychological first aid training for frontline staff and team leaders following climate-related events (e.g. floods, heat emergencies).
- Enable peer support and debriefing to help staff cope with climate-induced stress, including resource strain and community displacement.

Address occupational & systemic challenges[28]

- Advocate for system-level upgrades to create safer, greener, and more resilient workplaces.
- Encourage cardiovascular fitness and regular aerobic exercise to enhance physiological heat tolerance.

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