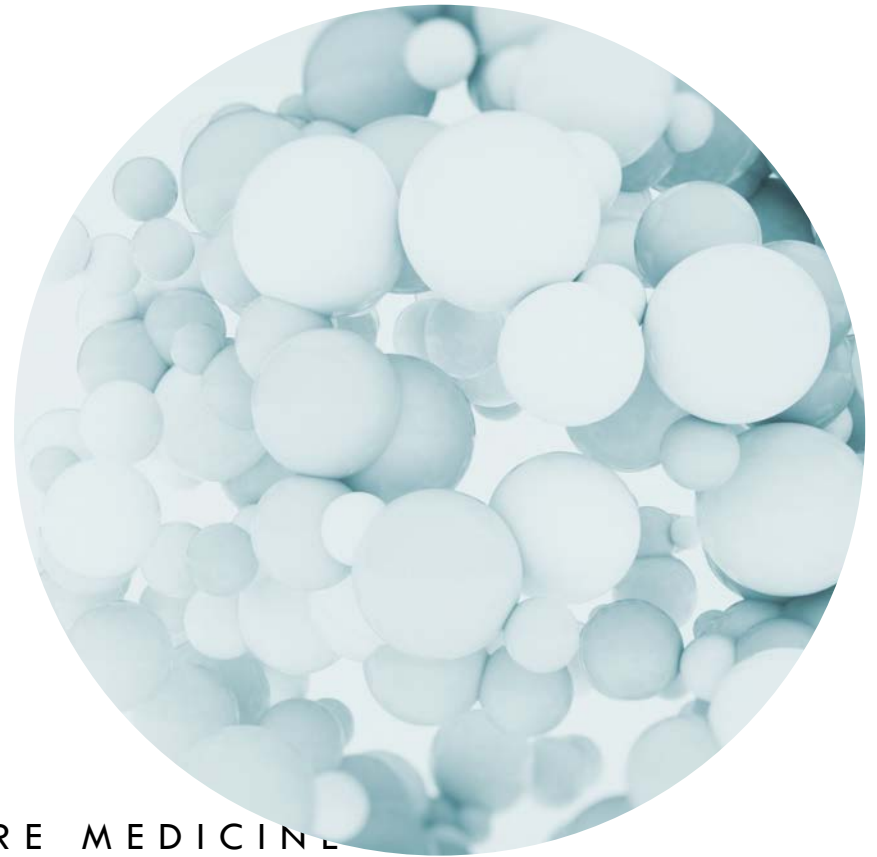


**INDIVIDUAL HEALTH VS.
PUBLIC HEALTH –**

**HOW DOES ANAESTHESIA
DEAL WITH THIS?**



DR. MED. SALOME MEYER MBA

FMH ANAESTHESIA UND INTENSIVE CARE MEDICINE

HEAD STRATEGY INITIATIVE SSAPM

DISCLOSURE / CONFLICT OF INTEREST

I have no conflicts of interest

OVERVIEW

- Climate change and health
- Paradigm shift
- What does it mean for us anaesthetists?

CLIMATE CHANGE AND HEALTH

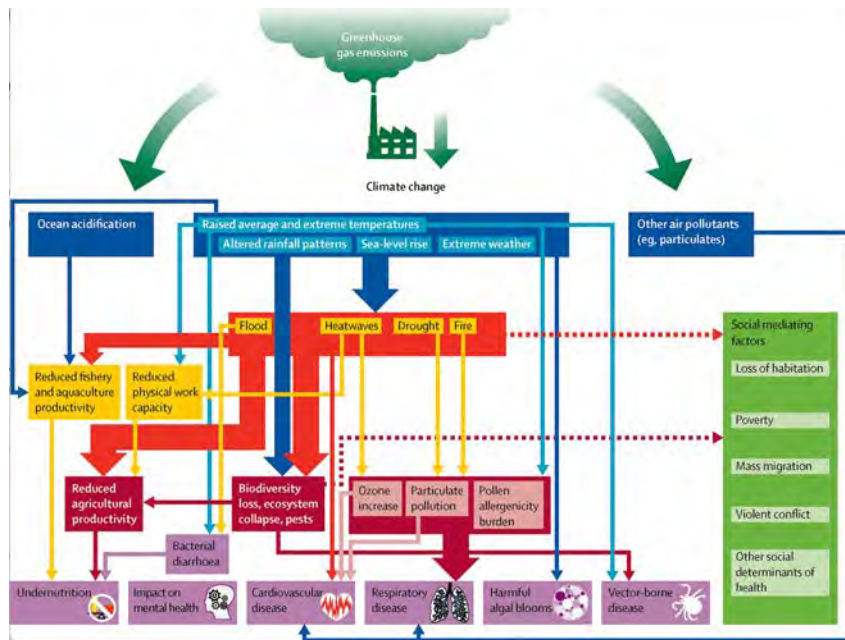
“Climate change is the single biggest health threat facing humanity, and health professionals worldwide are already responding to the health harms caused by this unfolding crisis.”

The climate crisis threatens to undo the last fifty years of progress in development, global health, and poverty reduction, and to further widen existing health inequalities between and within populations

WHO: www.who.int/news-room/fact-sheets/detail/climate-change-and-health

The 2018 report of the *Lancet* Countdown on health and climate change: shaping the health of nations for centuries to come, DECEMBER 08, 2018

EFFECTS OF CLIMATE CHANGE

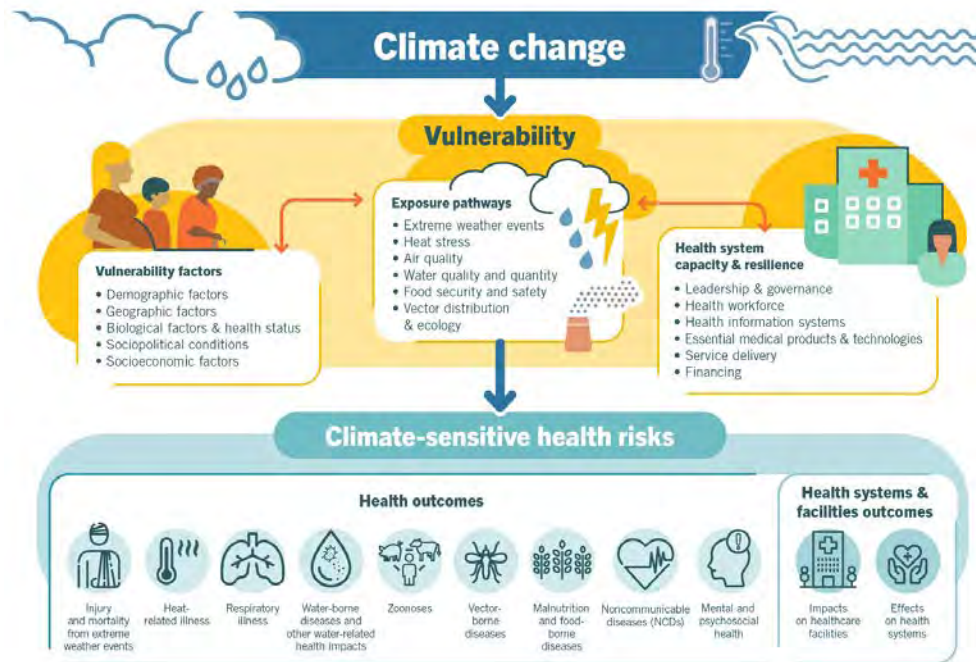


Climate change affects the social and environmental determinants of health – clean air, safe drinking water, sufficient food and secure shelter

⇒ exacerbates existing health inequalities between and within populations

The 2018 report of the *Lancet* Countdown on health and climate change: shaping the health of nations for centuries to come; VOL 392, P2479-2514, DECEMBER 08, 2018
WHO: www.who.int/news-room/fact-sheets/detail/climate-change-and-health

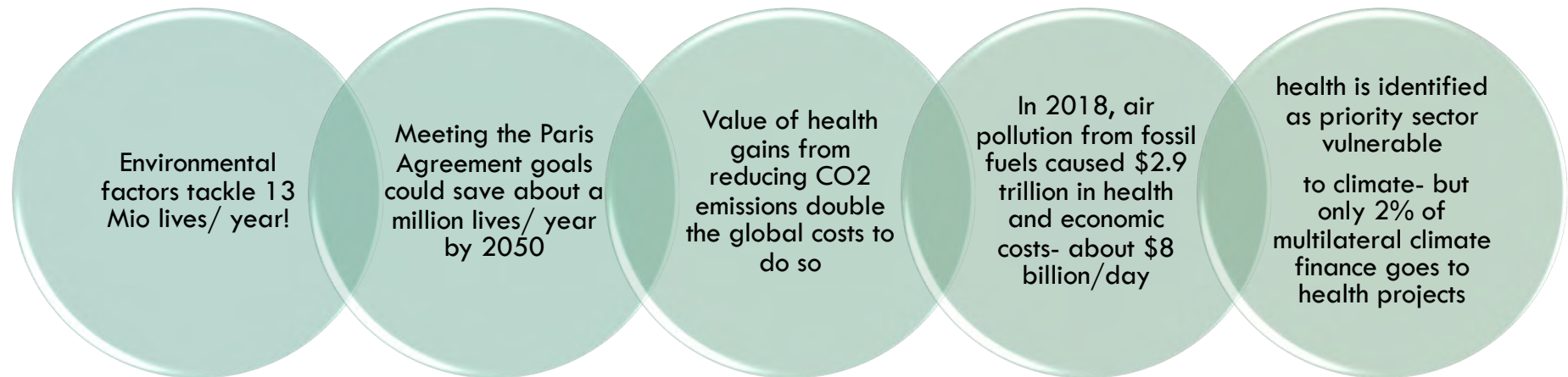
CLIMATE SENSITIVE HEALTH RISKS



Climate change impacts health both directly and indirectly, and is strongly mediated by environmental, social and public health determinants

The 2018 report of the *Lancet* Countdown on health and climate change: shaping the health of nations for centuries to come; VOL 392, P2479-2514, DECEMBER 08, 2018
 WHO: www.who.int/news-room/fact-sheets/detail/climate-change-and-health

FAST FACTS



CONTRIBUTION OF THE HEALTH CARE SYSTEM

- 5,2 % of the German greenhouse gas emission
- If the global health care system was a country... 5th largest emitter
- First do no harm???

SAMW POSITION PAPER



1. The health system actors are guided by the Triple Aim framework.
2. The cantons combine to form a small number of health regions.
3. Efforts to promote health literacy begin in childhood.
4. Switzerland knows how many health professionals are required and adjusts the number of training places accordingly.
5. The data required for quality assurance and health services research is available.
6. Interventions no longer needed are removed from the list of reimbursable services.
7. New reimbursement models reduce perverse incentives.
8. The federal government sets a ceiling on increases in health expenditures.

SHIFT FOCUS FROM INDIVIDUAL TO PUBLIC HEALTH

Tripple Aim Framework:

- ⇒ integrating medical and economic goals
- ⇒ formulate goals for the health system from – at the same time – the perspectives of public health, individual medicine and sustainability

1. improving the health of populations;
 - ❖ Not every intervention indicated from the perspective of individual medicine makes sense from a public health perspective.
2. improving the patient experience of care (including quality and satisfaction)
 - ❖ patient's concerns are placed at the centre of healthcare
 - ❖ goal of medical interventions is not necessarily restitutio ad integrum but recovery of the capacity to lead a life which is meaningful from the perspective of the individual concerned.
3. reducing the per capita cost of health care
 - ❖ not enough people recognise that resources are limited and act accordingly

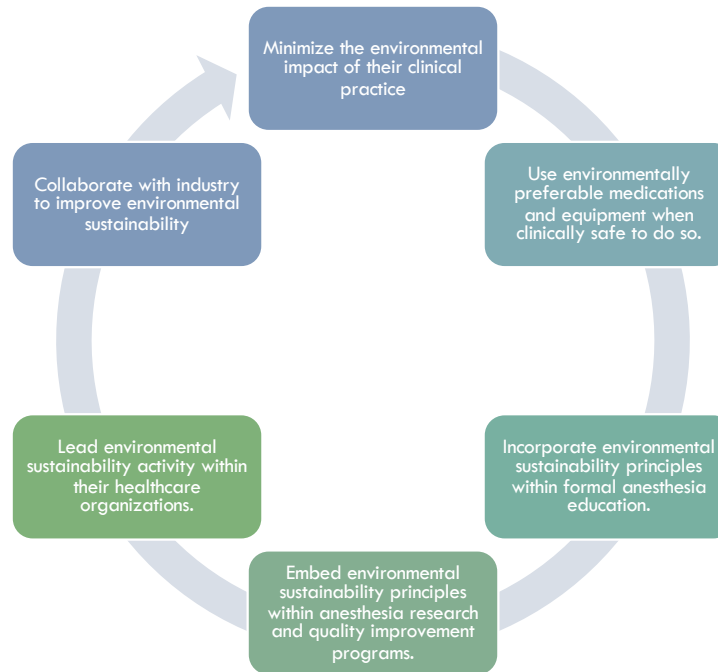
www.ihl.org/Engage/Initiatives/TripleAim/Pages/default.aspx Whittington J.W. et al. Pursuing the Triple Aim: The first 7 years. *Milbank Quarterly* 2015; 93: 263–300.

WHAT ABOUT ANESTHESIA?

- ❖ To protect public health, anaesthesia providers need to reduce the contribution their practice makes to global warming
- ❖ There is global agreement on fundamental principles to change towards environmentally sustainable anaesthesia
- ❖ A shift from individual to public health is mandatory

Anaesthesia Volume 77, Issue 2 p. 201-212: Principles of environmentally-sustainable anaesthesia: a global consensus statement from the World Federation of Societies of Anaesthesiologists S. M. White et al.
01 November 2021

FUNDAMENTAL PRINCIPLES TO GUIDE ANAESTHESIA PROVIDERS IN THE MOVE TO ENVIRONMENTALLY SUSTAINABLE PRACTICE



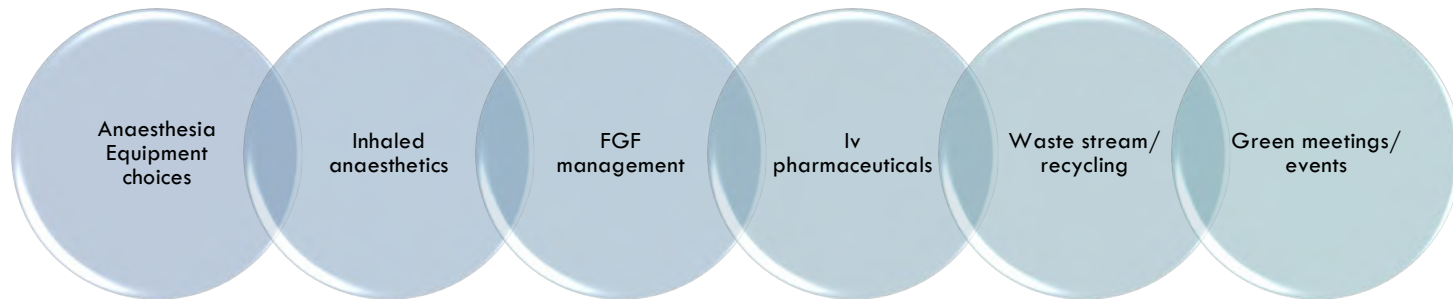
Anesthesia; Principles of environmentally-sustainable anaesthesia: a global consensus statement from the World Federation of Societies of Anaesthesiologists S. M. White et al. 01 November 2021

U N D E R L Y I N G S T A T E M E N T S

- patient safety should not be compromised by sustainable anaesthetic practices;
- high-, middle- and low-income countries should support each other appropriately in delivering sustainable healthcare (including anaesthesia)
- healthcare systems should be mandated to reduce their contribution to global warming

WHAT DOES THAT MEAN FOR AN ANESTHETISTS' DAILY LIFE?

- Avoid unnecessary interventions- challenge the indications where appropriate!
- Incorporate the aforementioned principles into your daily practice by looking closely at the following areas:



Greening the Operating Room and Perioperative Arena: Environmental Sustainability for Anesthesia Practice ASA Position Paper 2014

ANESTHESIA EQUIPMENT CHOICES



- Hospitals in the U.S. produce approximately 5.9 million tons of medical waste annually – with about one-third of this originating in operating rooms. Much of this is from surgical care; however, anesthesia contributes substantially as well
- disposable equipment appears to be a very wasteful option
 - **Life Cycle Assessment: Cradle to Grave Analysis**
 - Disposable vs. reusable:
 - Traditionally, the choice focused on cost, patient safety, efficacy and ease of use
 - disposable and reusable selections have potential to harm the environment, and both present tradeoffs

ENVIRONMENTAL IMPACT OF INHALED ANESTHETICS



Table 1. Environmental Gas Emissions of Common United Kingdom Anaesthetic Systems

| System | CO ₂ (kg) | CH ₄ (kg) | N ₂ O (kg) | GHG (kg CO ₂ e) |
|------------------------------|----------------------|----------------------|-----------------------|----------------------------|
| Desflurane 6% (1 l/min FGF) | 1.1 | 0.002 | 0.001 | 1.1 |
| Desflurane 6% (2 l/min FGF) | 2.2 | 0.004 | 0.002 | 2.2 |
| Desflurane 6% (3 l/min FGF) | 3.3 | 0.006 | 0.003 | 3.3 |
| Desflurane 6% (4 l/min FGF) | 4.4 | 0.008 | 0.004 | 4.4 |
| Desflurane 6% (5 l/min FGF) | 5.5 | 0.010 | 0.005 | 5.5 |
| Desflurane 6% (6 l/min FGF) | 6.6 | 0.012 | 0.006 | 6.6 |
| Desflurane 6% (7 l/min FGF) | 7.7 | 0.014 | 0.007 | 7.7 |
| Desflurane 6% (8 l/min FGF) | 8.8 | 0.016 | 0.008 | 8.8 |
| Desflurane 6% (9 l/min FGF) | 9.9 | 0.018 | 0.009 | 9.9 |
| Desflurane 6% (10 l/min FGF) | 11.0 | 0.020 | 0.010 | 11.0 |
| Desflurane 6% (11 l/min FGF) | 12.1 | 0.022 | 0.011 | 12.1 |
| Desflurane 6% (12 l/min FGF) | 13.2 | 0.024 | 0.012 | 13.2 |
| Desflurane 6% (13 l/min FGF) | 14.3 | 0.026 | 0.013 | 14.3 |
| Desflurane 6% (14 l/min FGF) | 15.4 | 0.028 | 0.014 | 15.4 |
| Desflurane 6% (15 l/min FGF) | 16.5 | 0.030 | 0.015 | 16.5 |
| Desflurane 6% (16 l/min FGF) | 17.6 | 0.032 | 0.016 | 17.6 |
| Desflurane 6% (17 l/min FGF) | 18.7 | 0.034 | 0.017 | 18.7 |
| Desflurane 6% (18 l/min FGF) | 19.8 | 0.036 | 0.018 | 19.8 |
| Desflurane 6% (19 l/min FGF) | 20.9 | 0.038 | 0.019 | 20.9 |
| Desflurane 6% (20 l/min FGF) | 22.0 | 0.040 | 0.020 | 22.0 |
| Desflurane 6% (21 l/min FGF) | 23.1 | 0.042 | 0.021 | 23.1 |
| Desflurane 6% (22 l/min FGF) | 24.2 | 0.044 | 0.022 | 24.2 |
| Desflurane 6% (23 l/min FGF) | 25.3 | 0.046 | 0.023 | 25.3 |
| Desflurane 6% (24 l/min FGF) | 26.4 | 0.048 | 0.024 | 26.4 |
| Desflurane 6% (25 l/min FGF) | 27.5 | 0.050 | 0.025 | 27.5 |
| Desflurane 6% (26 l/min FGF) | 28.6 | 0.052 | 0.026 | 28.6 |
| Desflurane 6% (27 l/min FGF) | 29.7 | 0.054 | 0.027 | 29.7 |
| Desflurane 6% (28 l/min FGF) | 30.8 | 0.056 | 0.028 | 30.8 |
| Desflurane 6% (29 l/min FGF) | 31.9 | 0.058 | 0.029 | 31.9 |
| Desflurane 6% (30 l/min FGF) | 33.0 | 0.060 | 0.030 | 33.0 |
| Desflurane 6% (31 l/min FGF) | 34.1 | 0.062 | 0.031 | 34.1 |
| Desflurane 6% (32 l/min FGF) | 35.2 | 0.064 | 0.032 | 35.2 |
| Desflurane 6% (33 l/min FGF) | 36.3 | 0.066 | 0.033 | 36.3 |
| Desflurane 6% (34 l/min FGF) | 37.4 | 0.068 | 0.034 | 37.4 |
| Desflurane 6% (35 l/min FGF) | 38.5 | 0.070 | 0.035 | 38.5 |
| Desflurane 6% (36 l/min FGF) | 39.6 | 0.072 | 0.036 | 39.6 |
| Desflurane 6% (37 l/min FGF) | 40.7 | 0.074 | 0.037 | 40.7 |
| Desflurane 6% (38 l/min FGF) | 41.8 | 0.076 | 0.038 | 41.8 |
| Desflurane 6% (39 l/min FGF) | 42.9 | 0.078 | 0.039 | 42.9 |
| Desflurane 6% (40 l/min FGF) | 44.0 | 0.080 | 0.040 | 44.0 |
| Desflurane 6% (41 l/min FGF) | 45.1 | 0.082 | 0.041 | 45.1 |
| Desflurane 6% (42 l/min FGF) | 46.2 | 0.084 | 0.042 | 46.2 |
| Desflurane 6% (43 l/min FGF) | 47.3 | 0.086 | 0.043 | 47.3 |
| Desflurane 6% (44 l/min FGF) | 48.4 | 0.088 | 0.044 | 48.4 |
| Desflurane 6% (45 l/min FGF) | 49.5 | 0.090 | 0.045 | 49.5 |
| Desflurane 6% (46 l/min FGF) | 50.6 | 0.092 | 0.046 | 50.6 |
| Desflurane 6% (47 l/min FGF) | 51.7 | 0.094 | 0.047 | 51.7 |
| Desflurane 6% (48 l/min FGF) | 52.8 | 0.096 | 0.048 | 52.8 |
| Desflurane 6% (49 l/min FGF) | 53.9 | 0.098 | 0.049 | 53.9 |
| Desflurane 6% (50 l/min FGF) | 55.0 | 0.100 | 0.050 | 55.0 |

| | 0.5 l/min FGF | 1 l/min FGF | 2l/min FGF |
|-------------------|---------------|-------------|------------|
| Secoflurane 2% | 753 km | 1566 km | 3132 km |
| Isoflurane 1.2% | 667 km | 1334 km | 2668 km |
| Desflurane 6% | 3.924 km | 7649 km | 15698 km |
| Nitrous Oxide 66% | 279 km | 558 km | 1116 km |

- Potent inhaled anesthetics are greenhouse gases (GHG).
- Anesthetic gas emission into the greater atmosphere is not regulated (considered to be medically/ “negligible” contribution to GHG and climate change)
- The degree to which each anesthetic agent will act as a GHG depends on both its unique infrared absorption spectrum and its atmospheric lifetime
- GWP is a measure of how much a given mass of greenhouse gas contributes to global warming over a specified period of time

Ozsel et al: The future is now: it’s time to rethink the application of GWP to anaesthesia. Can J Anaesth 2019

ENVIRONMENTAL IMPACT OF INHALED ANESTHETICS



Table 1: Environmental Gas Emissions of Common United Kingdom Anaesthetic Agents

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| Desflurane 2% | 0.4 | 0.001 | 0.4 | 0.4 |
| Desflurane 1.2% | 0.2 | 0.0005 | 0.2 | 0.2 |
| Sevoflurane 2% | 0.8 | 0.002 | 0.8 | 0.8 |
| Sevoflurane 1.2% | 0.4 | 0.001 | 0.4 | 0.4 |
| Sevoflurane 0.6% | 0.2 | 0.0005 | 0.2 | 0.2 |
| Isopropoflurane 1% | 0.6 | 0.001 | 0.6 | 0.6 |
| Isopropoflurane 0.5% | 0.3 | 0.0005 | 0.3 | 0.3 |
| Sum of all agents | 2.4 | 0.004 | 2.4 | 2.4 |

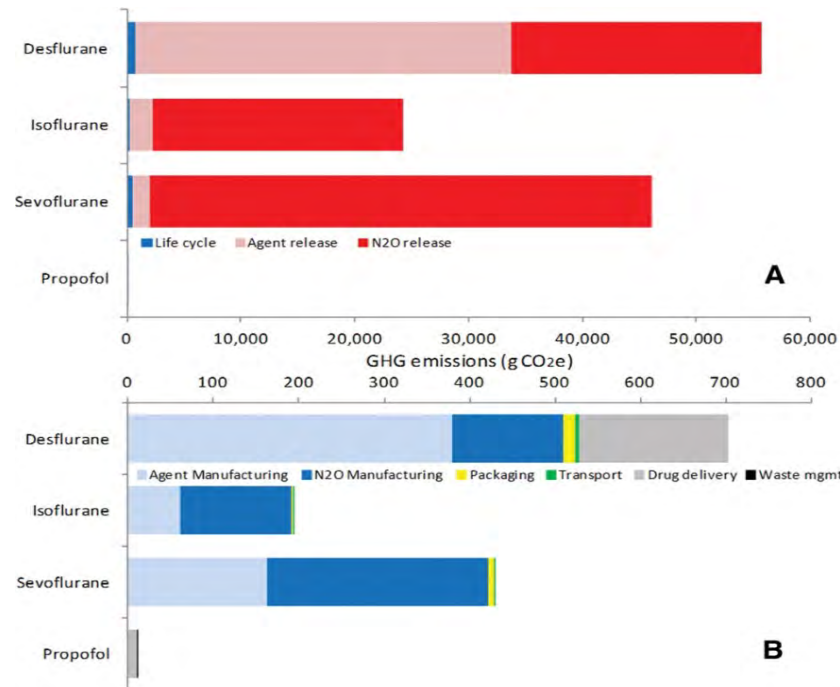
| | 0.5 l/min FGF | 1 l/min FGF | 2l/min FGF |
|------------------------------|---------------|------------------------|-----------------------|
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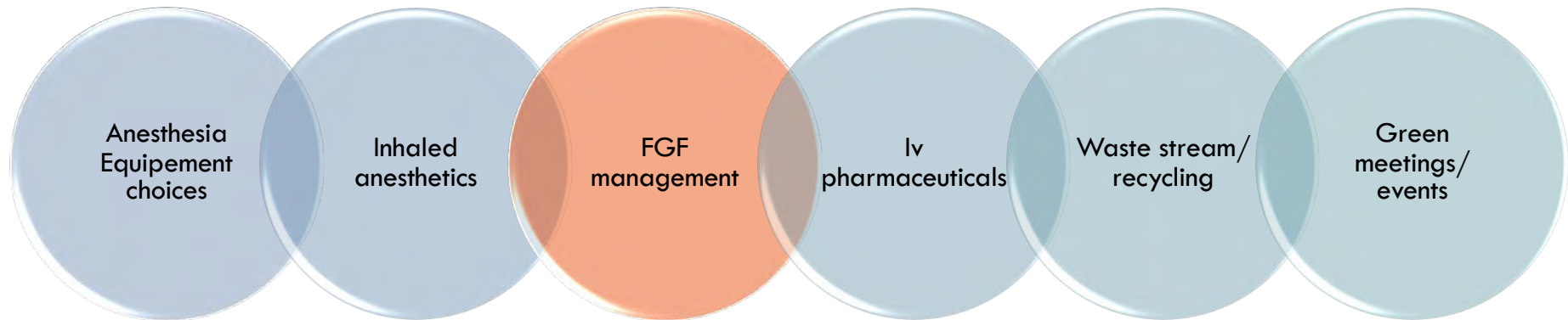
ENVIRONMENTAL IMPACT OF ANESTHETICS IN GENERAL



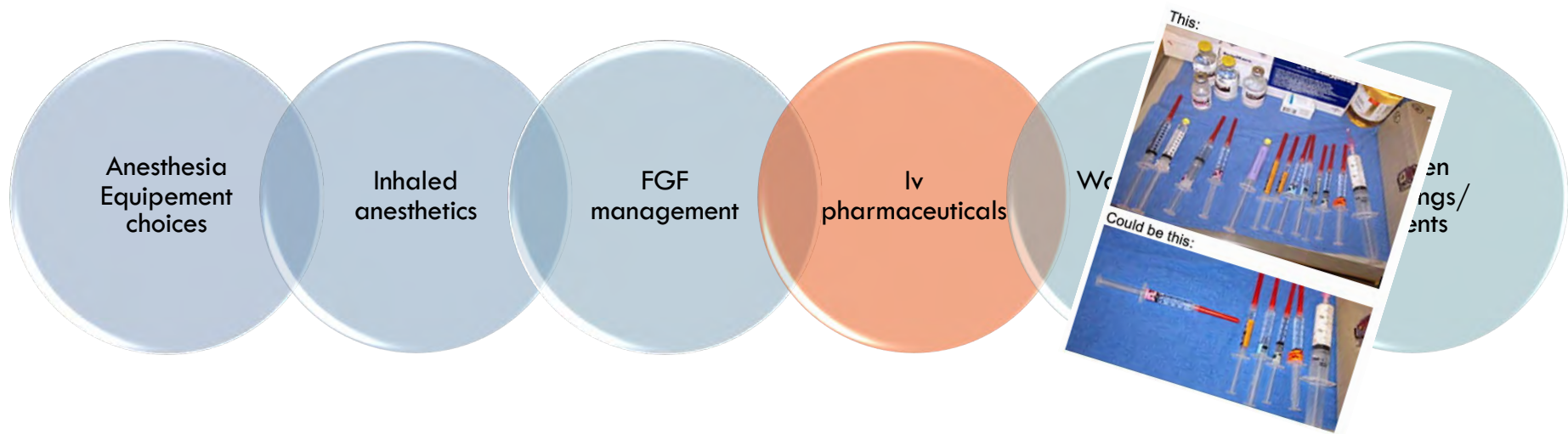
Life cycle greenhouse gas (GHG):
A: emissions of anaesthetics including waste anaesthetic gas emissions of halogenated drugs and nitrous oxide (N₂O)
B: excluding waste anaesthetic gas emissions

Life Cycle Greenhouse Gas Emissions of Anesthetic Drugs Anesthesia & Analgesia 14(5):1086-1090, May 2012

CALCULATE YOUR FGF

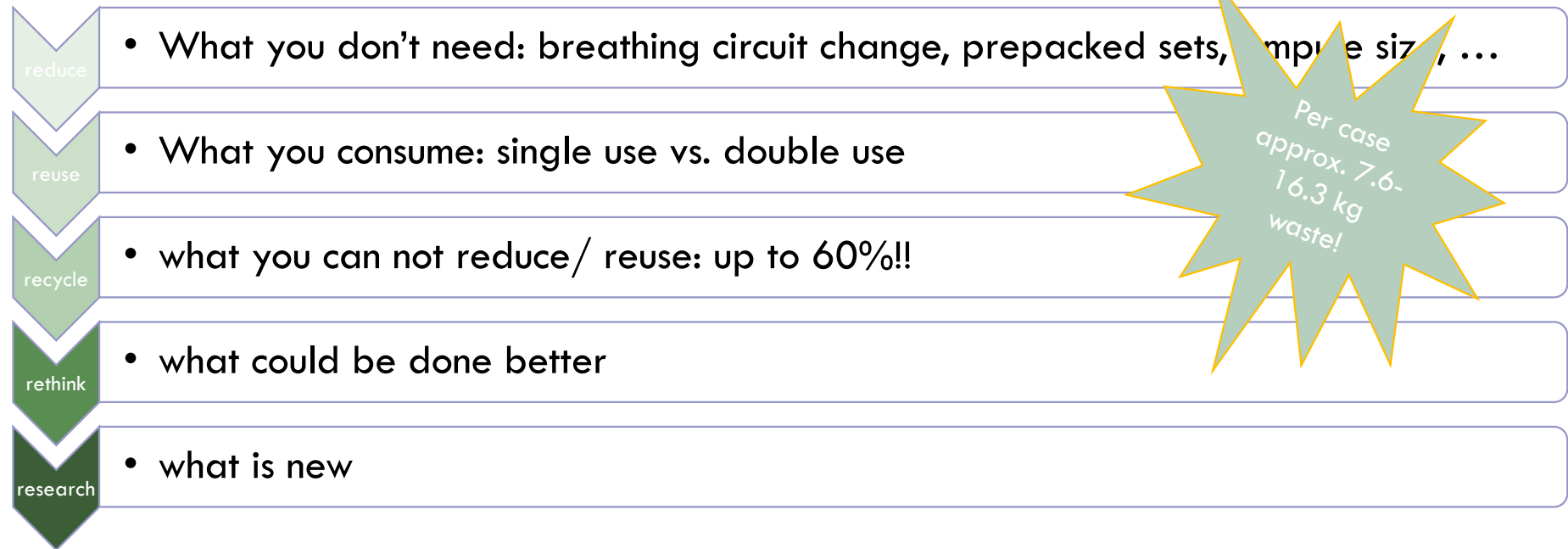


HOW TO HANDLE PHARMACEUTICS





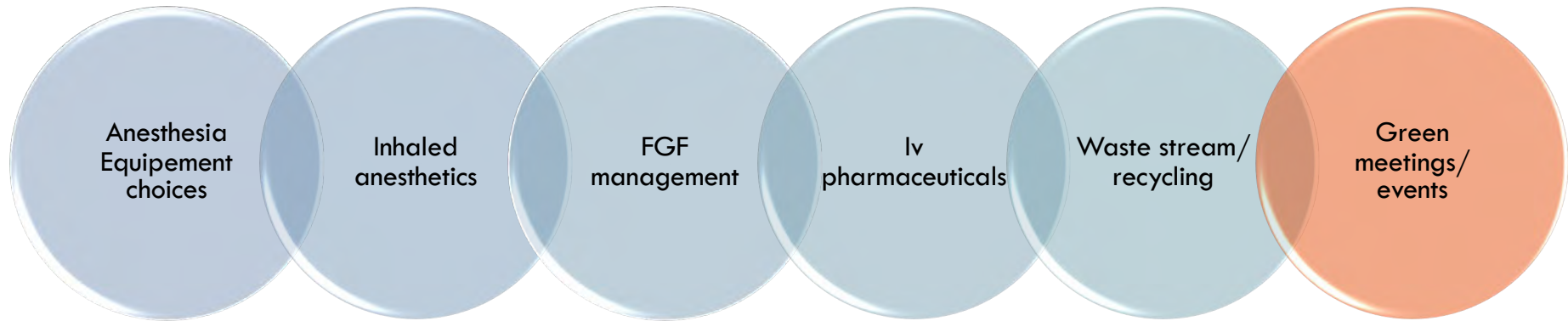
WASTE MANAGEMENT



McGain: The financial and environmental costs of reusable and single-use anaesthetic drug trays. AIC 2010

Sherman et al: LCA and costing methods for device procurement: comparing disposable and single-use disposable laryngoscopes. Anesth Analg 2018

GREEN MEETINGS / EVENTS



TAKE HOME MESSAGES

- Climate change is the single biggest health threat facing humanity
- Awareness is there, and rising
- The health care system is at the focus, for multiple reasons
- Anaesthetists are key players in bringing about a change
 - Question indication
 - Make sustainability reflection a key priority