

## Statewide Anaesthesia and Perioperative Care Clinical Network Environmental Accountability Working Group

### Communique – Nitrous Oxide

#### Purpose

This communique has been developed to raise awareness of the environmental impact of Nitrous Oxide ( $N_2O$ ) and recommend practical ways to reduce its impact.

#### Issue

$N_2O$  is a greenhouse gas.  $N_2O$  has a global warming potential (GWP) 273 times that of  $CO_2$  for a 100-year timescale<sup>1</sup>.

$N_2O$  emitted today remains in the atmosphere for more than 100 years, on average.

$N_2O$  is the only anaesthetic gas to enter the stratosphere, where the highest concentration of ozone is found.

$N_2O$  destroys ozone directly<sup>2</sup>. It is less potent than other inhalational anaesthetics and therefore is used in higher concentrations.

#### Supporting information

It has been estimated that anaesthetic gases make up 5% of total healthcare emissions.  $N_2O$  accounts for approximately 75% of the total emissions from anaesthetic gases<sup>3</sup>.

Massive quantities of  $N_2O$  are lost pre-clinical, via piping and manifold systems<sup>4</sup>. When cylinders are returned to the supplier to be refilled, the residual gas is vented into the atmosphere. When considering the use of  $N_2O$ , the entire life cycle must be considered.

It is widely accepted that  $N_2O$  has limited value in modern anaesthesia. Its declining use in anaesthesia is due partly to improved alternatives and partly to the growing environmental conscience of anaesthetists.

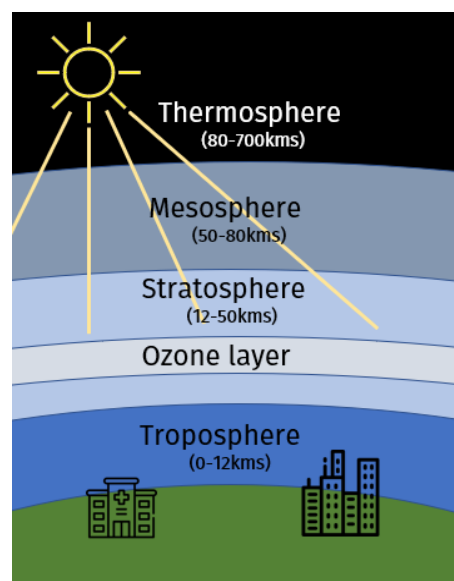
When using  $N_2O$ , utilising lower fresh gas flows and a lower nitrous/oxygen mixture will reduce the environmental impact.

Building recommendations in Australia are changing<sup>5</sup>. It is recognised that piped  $N_2O$  is no longer needed in non-obstetric and non-paediatric hospitals, and the cost of supplying and maintaining piped systems is no longer justified given declining use.

It is recommended that a stand-alone cylinder be available in operating theatres to use if required instead of piped  $N_2O$ .

$N_2O$  is used widely in the birthing suite.

Destruction units exist but are currently not widely available in Australia. Destruction units, such as the Medclair mobile destruction unit<sup>6,7</sup> “crack” the  $N_2O$  into Nitrogen and Oxygen which is then released into the atmosphere. The device delivers the gas oxygen mixture and collects it. The patient must exhale into the device via a facemask (see image below). The units have recently been approved by the Therapeutic Goods Administration (TGA) in Australia.





Alternatives to N<sub>2</sub>O in labour include Remifentanyl Patient Controlled Analgesia (PCA) and epidural anaesthesia. Both require IV access and an anaesthetist. Whereas N<sub>2</sub>O is freely available, and midwife administered.

Until acceptable alternatives are established and/or destruction units become more available N<sub>2</sub>O remains a useful gas in obstetrics. However, we know from investigations that a sizeable portion of N<sub>2</sub>O waste leaks from manifold and piping systems<sup>9</sup>.

A site-specific investigation of N<sub>2</sub>O manifolds and piping systems by gas technicians is recommended to limit leakage.

Patients and medical staff are becoming more environmentally aware. Educating patients and staff about the environmental impacts of N<sub>2</sub>O and increasing awareness of the detrimental climate effects of N<sub>2</sub>O will change the way it is used<sup>9</sup>.

## Recommendations

1. Avoid N<sub>2</sub>O where possible.
2. Avoid installing new N<sub>2</sub>O centralised piping.
3. Investigate existing manifold and piping systems for leaks and repair leaks when identified.
4. Decommission central N<sub>2</sub>O piping.
5. Provide portable cylinders that can be switched off between use.
6. Consider the use of N<sub>2</sub>O destruction units in birth suites.
7. Increase awareness of the environmental effects of N<sub>2</sub>O, particularly in the birth suite.

## References

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