

NITROUS – Maybe it's time to move on?

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Introduction

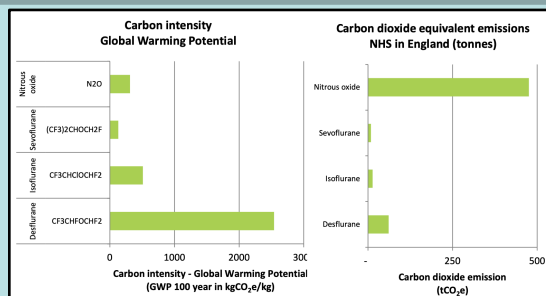
The Royal Alexandra Children's Hospital (RACH) provides children's services at Brighton and Sussex University Hospitals (BSUH). After a recent sustainability review at BSUH within the anaesthetic department, it was noted that piped nitrous oxide (N₂O) contributed to 42% of the anaesthetic greenhouse gases emitted by the hospital. The exact end user was unknown, however, the RACH is believed to be the majority user. We planned to investigate the use of N₂O in RACH, identify the main end users and educate to attempt to reduce its use and bring about 'greener' practice.

Strategy for change and measure of Improvement:

The initial phase of our sustainability push was to audit the current practice of N₂O use at RACH. It included an anonymous questionnaire looking at current practice and willingness to change. Data was collected in November 2019 for all children having inhalational inductions and any complications encountered. This data informed our change strategy which included a series of presentations at department meetings. Our aim was to promote a culture of nitrous free anaesthesia. A re-audit was underway but had to be postponed due to the pandemic.

Background

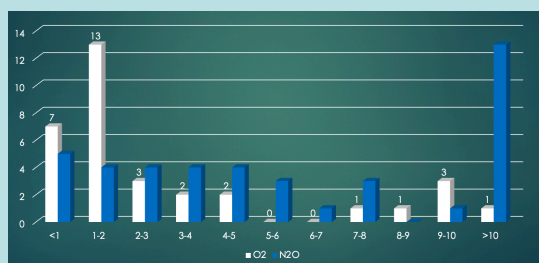
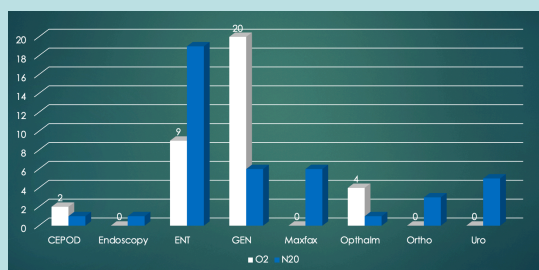
With the abundance of media coverage over the last few years we are all very much aware of climate change and greenhouse gases. At home we may well adopt a 'greener' way of life, however, at work it is our belief that there is a lack of understanding about the profound impact we have with our use of anaesthetics gases. There are also several long-held beliefs regarding the additional benefit N₂O has to anaesthesia in its use for gas inductions and maintenance. These long-held beliefs have been consistently questioned the world over, however, N₂O still remains a part of routine practice.



Results

The initial questionnaire confirmed our impression that the majority of paediatric anaesthetist would often use N₂O for their gas inductions, but were willing to change their practice. Less anaesthetists were using N₂O in their intra-operative gas mixture, and again there was willingness to change practice.

During November 2019, 69 lists were undertaken, and 77 gas inductions were performed, of which N₂O was used in 55%. The graphs below shows the distribution of N₂O gas inductions by specialty and age:



The chart below shows the use of premedications and the incidence of complication encountered.

	Premed	Induction	Compliant	Failed	Apnoea	Laryngospasm	Other
With N ₂ O	4 Midazolam 1 Ketamine	42 (55%)	35/42 (83%)	0	0	3/42 (7%)	
Without N ₂ O	1 Midazolam	35 (45%)	15/35 (43%)	0	0	1/35 (3%)	1
Total	6	77	50 (64%)	0	0	4/77	

Discussion

During this initial phase of this project it was clear that using N₂O for gas inductions was part of routine practice at RACH. Only the total hospital consumption of N₂O was known, and it was impossible to distinguish the departmental distributions of the piped supply. The A&E department and obstetric ward only use cylinders, which meant that cardiac, neurosurgical, obstetric and main theatres and the endoscopy unit were the only other areas that would use piped N₂O supply. Discussion with these department leads confirmed that N₂O use in these settings was infrequent, supporting the belief that the majority user was the RACH. The economic and environmental impact of the use of N₂O during November 2019 at BSUH is summarised below:

📦	Estimated that 8 J size cylinders of N ₂ O were delivered during the audit
£	Cost of cylinder = £59.67
💰	Total cost = £477.36
🗑️	Each cylinder holds 18000 L
🔥	Total gas released into atmosphere 144000L
📉	CO ₂ e = 83Tonnes (83000 kg)
🚗	Equivalent to 188.6 large car journeys from Southampton to Aberdeen.

Summary

- Ⓜ Anaesthetic gases are potent contributors to climate change. Reviewing our data, the quantity of N₂O used in our hospital is high.
- Ⓜ As part of a push towards sustainable anaesthesia we must question our use of anaesthetic gases, especially N₂O.
- Ⓜ Our Audit has shown a willingness to change practice and work towards reduced nitrous use.

Referees:

1. Image taken from: Carbon Footprint from Anaesthetic gas use report published December 2013 by the NHS Sustainable Development Unit