Quantifying the carbon footprint of labour analgesia in our unit: a service evaluation

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Introduction

In 2019 Welsh Government declared a climate emergency and committed to achieving a carbon neutral public sector by 2030. The 2021 NHS Wales Decarbonisation Plan specifies medical gases including nitrous oxide, which has a global warming potential 310 times greater than carbon dioxide (CO_2), as a key area. This project aimed to calculate the annual carbon footprint of different forms of labour analgesia on our large delivery unit (5700 deliveries/year), including Entonox, epidural analgesia and remifentanil patient controlled analgesia (PCA).

Methods

Annual consumption of Entonox in 2019 and 2020 by delivery suite was calculated using returns data from the British Oxygen Company. This volume was converted to carbon dioxide equivalents (CO_2e) using the AAGBI anaesthetic gases calculator [1]. Epidural and remifentanil PCA carbon footprint was calculated using the number of each procedure performed in 2019 and 2020, multiplied by the estimated carbon footprint published in the ANZCA blue book for a four hour period of use [2].

Results

16,250,000 and 16,065,000 litres of Entonox were purchased in 2019 and 2020 (equating to 8,125,000 and 8,032,500 litres of nitrous oxide). 1358 and 1548 epidurals were done in 2019 and 2020. 41 and 41 remifentanil PCAs were set up in 2019 and 2020. Table 1 shows the estimated CO_2e in tonnes created by each form of analgesia on our unit, each year.

Table 1: CO_2 equivalents by analgesia in our unit in 2019 and 2020.

Analgesia	CO2e tonnes 2019	CO2e tonnes 2020	% of total footprint	Distance travelled in average new car [1]
Entonox	4546	4495	99.9%	930 trips around the globe
Epidural	1.6	1.8	0.004%	11,346 km
Remifentanil PCA	0.05	0.03	0.000007%	354 km

Discussion

Entonox consumption of 4495 CO_2e tonnes per year, in our unit, is equivalent to driving 37.5 million km in a petrol car (935 journeys around the globe) [1]. Epidurals and remifentanil PCA have a much lower carbon footprint. We urgently need to improve how we use Entonox: better manifold efficiency, reducing leaks in pipework, utilising scavenging and cracking technologies and legislation to prevent the release of returned nitrous oxide into the atmosphere. Image shows how Entonox use could become more sustainable. It is important that service users have access to safe, effective analgesia and the NHS has a responsibility to limit environmental damage.

References

1. Pierce T. Anaesthetic gases calculator. 2021. https://anaesthetists.org/Home/Resources-publications/Environment/Guide-to-green-anaesthesia/Anaesthetic-gases-calculator.
2. Gynther A, Pearson F, McGain F. Nitrous oxide use on the labour ward: Efficacy and environmental impact. ANZCA Blue Book 2021. https://www.anzca.edu.au/news/safety-and-advocacy-news/publications/blue-book

Image 1: Targets for carbon reduction of Entonox

