



## Warning wristbands for patients with intra-ocular gas

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### To the Editor:

We applaud the Royal College of Ophthalmologist's Ophthalmic Safety Alert newsletter in December 2018 [1] highlighting the dangers of nitrous oxide use in patients with intra-ocular gas. Nitrous Oxide is a commonly used anaesthetic with anxiolytic properties used in a wide range of clinical settings including emergency medicine, obstetrics, as well as in anaesthetic theatres nationwide. It is known that the blood gas distribution coefficient of nitrous oxide is over 30 times higher than that of nitrogen gas. Hence, nitrous oxide diffuses much more rapidly into an air filled cavity than nitrogen can diffuse in the opposite direction [2, 3]. In the presence of an intra-ocular gas bubble in a patient, there will be a rapid, significant, spike in intra-ocular pressure, increasing the risk of a central artery occlusion and subsequent loss of sight [3]. A review by Silvanus et al. in 2008 [3] had identified 13 cases, where the use of nitrous oxide had led to sight impairment in patients with intravitreal gas bubbles. Interestingly, the longest noted interval between intravitreal gas injection and use of nitrous oxide was 42 days, suggesting that even a small residual gas bubble in the eye can expand significantly in the presence of nitrous oxide.

In our unit, we have adopted a simple method where the risk of patients receiving nitrous oxide following injection of intravitreal gas is reduced significantly, even in emergency settings where a patient's consciousness may be impaired. As a joint venture between the ophthalmology and anaesthetic departments we proposed (and have since implemented) the use of wristbands detailing the presence of intravitreal gas and the contraindication of nitrous oxide use in this patient group. The wristbands are put in place on the day of surgery and are removed in clinic once the intra-ocular gas is no longer present on follow up. Our proposal is also cost-effective as the

wristbands are already freely available from the pharmaceutical company which supplies our intravitreal gas canisters. The use of wristbands to warn of the contraindication of nitrous oxide has previously been championed by Vote et al. [4] and the use of such wristbands is already common practice in other units worldwide. We were delighted to present our use of wristbands at the Royal College Congress in May earlier this year [5]. To date, we have not had any episodes of nitrous oxide-related vision loss in our unit. In modern vitreoretinal surgery, the use of intra-ocular gas is common practice in units nationwide. The use of such wristbands reduces the risk of sight threatening complications in this large patient group.

### Compliance with ethical standards

**Conflict of interest** The authors declare that they have no conflict of interest.

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### References

1. The Royal College of Ophthalmologists. Ophthalmic Safety Alert—do not use nitrous oxide when there is gas in an operated eye. 2018. <https://www.rcophth.ac.uk/2018/12/ophthalmicsafety-alert-use-of-nitrous-oxide-when-there-is-gas-in-an-operated-eye/>. Accessed 10 Oct 2019.
2. Brown SM, Sneyd JR. Nitrous oxide in modern anaesthetic practice. *BJA Educ.* 2015;16:87–91.
3. Silvanus MT, Moldzio P, Bornfeld N, Peters J. Visual loss following intraocular gas injection. *Dtsch Arztebl Int.* 2008;105:108–12.
4. Vote BJ, Hart RH, Worsley DR, Borthwick JH, Laurent S, McGeorge AJ. Visual loss after use of nitrous oxide gas with general anesthetic in patients with intraocular gas still persistent up to 30 days after vitrectomy. *Anesthesiology.* 2002;97:1305–8.
5. Naderi K, Masoero P, Karthikeyan G, Karia N, Chandra A. Preventing sight loss from nitrous oxide intraocular gas expansion: a simple step. In: Presented at the Royal College of Ophthalmologist Congress. Glasgow, UK: RCOphth Congress; 2019. p. 20–23.

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