

Statewide Anaesthesia and Perioperative Care Clinical Network Environmental Accountability Working Group

Communique – Sevoflurane

Purpose

This communique has been developed to raise awareness of the environmental impact of Sevoflurane and provide practical suggestions to support the reduction of its impact.

Issue

Sevoflurane is the most used anaesthetic agent in Australia and New Zealand¹.

Sevoflurane undergoes little metabolic change in the body². When exhaled it is scavenged by anaesthesia machines with little additional degradation³, and then vented into the environment.

Fluorinated anaesthetic agents such as Sevoflurane do not destroy ozone compared to Halothane, Enflurane and Isoflurane which contain Bromine and Chlorine and have ozone depleting effects.

Sevoflurane is a greenhouse gas. The earth's surface is warmed by incoming solar radiation and cools by emitting radiation. A greenhouse gas absorbs the emitted radiation and re-emits it leading to a positive energy balance⁴.

The global warming potential of Sevoflurane is 130, which means over 100 years Sevoflurane absorbs 130 times more radiation than Carbon Dioxide⁵.

Supporting information

Decreasing fresh gas flow rates while using Sevoflurane would decrease its environmental impact and the cost.

Compound A is generated by Sevoflurane when it reacts with carbon dioxide absorbers at minimal fresh gas flow. In animal studies Compound A is nephrotoxic. Nephrotoxicity at low fresh gas flows has not been shown in human studies^{6,7}. Potassium Hydroxide and Sodium Hydroxide were implicated in the production of Compound A. Potassium Hydroxide has been removed from carbon dioxide absorbers and sodium hydroxide levels have been reduced.

The Australian Therapeutic Goods Administration (TGA) recommends a minimum gas flow of 2L/min. However, the Queensland Health List of Approved Medicines (LAM), American Food and Drug Administration⁸ and the New Zealand Drug Administration recommend a minimum flow of 1L/min⁹. The United Kingdom and Ireland do not have a recommended minimum gas flow¹⁰. There is no evidence of harm from Sevoflurane use with gas flows of 1L or less and it has become widely accepted to use low fresh gas flows when using Sevoflurane.

Propofol total intravenous anaesthesia and neuraxial and regional anaesthesia have a lower environmental impact compared to Sevoflurane even when disposables are accounted for¹¹. These techniques should be considered as alternatives to Sevoflurane.

Sevoflurane has a well-established place in anaesthesia and there is no alternative for gas inductions. Exhaled sevoflurane can be captured in the anaesthetic breathing circuit. The gas can be recovered and reused. This technology has been used successfully in Germany¹². Gas capture and recovery is not available as yet in Australia, but research is active in this area¹³.

Disclaimer: The content of this communique is provided as information only. Staff in Queensland Health facilities are advised to follow local practice and processes as required.



*An example of a gas capture canister
[CONTRAfluran \(baxterglobal.com\)](http://baxterglobal.com)

Recommendations

1. When using Sevoflurane, use fresh gas flow rates of 1L or less.
2. Consider using alternatives to Sevoflurane, such as total intravenous anaesthesia, regional and neuraxial anaesthesia.
3. Consider using gas capture when available.

References

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