Gas Flow in the Induction Period Can Have a Significant Effect On Overall Gas and Vapour Consumption Despite Low Maintenance Flows

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Background / Introduction: RK and RF have a long interest in reducing FGF to reduce cost and environmental impact and are collaborating with GE-Healthcare exploring data from anaesthesia delivery systems.

The duration of, and FGF during the "high flow" phase have a marked effect on overall mean FGF as illustrated by our "two-box" model and simple mathematical modelling which shows that for a 90 min case with a maintenance FGF 2l/min and initial FGF 6l/min, reducing the high flow period from 10 to 2 min reduces mean FGF from 2.44l/min to 2.09l/min, or 14%. This early phase is not included in several studies of FGF.

Here we present our models and updated FGF data from >4000 cases demonstrating the influence of a simple intervention directed at encouraging anesthesiologists to avoid extreme FGF and minimise the duration of the initial high flow period.

Methods: Data is logged from 4 GE-Aisys CS2 Carestations equipped with end-tidal control, in OR with a diverse mix of practice and providers. Data is analysed using rules to divide the time vapour is being delivered into blocks. The high flow period begins at the start of the case and ends once FGF drops below 5l/min.

Over 2 weeks we provided all anesthesiologists with repeated information on the importance of FGF in this high-flow phase. We compared the pattern of flow rates in (A) 3 months before this intervention, (B) 2 months immediately following and (C) the 5 months following period B. Mean FGF is a marker of vapour consumption. Kruskal-Wallis test used for comparisons.

Results: We now have data on 3190 vapour based anesthetics from 4 rooms. Pooled results are shown in the table as median [IQR]. The changes in duration and FGF during high flow phase are significantly different from A. Overall FGF decreased from A -> B but increased slightly in period C (A & C not significantly different) driven predominantly by a small rise in maintenance FGF.

	N	Initial FGF (l/min)	Duration of initial hi flow (min)	Maintenance FGF (l/min)	Time weighted mean FGF (l/min)
A	1389	6 [6, 6]	2 [0, 4]	0.5 [0.5, 0.60]	0.823
B	500	6 [0, 6]	1 [0, 3]	0.5 [0.5, 0.55]	0.736

C	1301	6 [0, 6]	2 [0, 4]	0.5 [0.5, 0.66]	0.809

Conclusions: Most efforts to reduce FGF focus on the maintenance phase. We have shown that the duration and gas flows during the early phase can have a profound effect on gas and vapor use. This effect is also seen with moderately high maintenance flows.

We observed the FGF used for pre-oxygenation was frequently maintained after induction. Although our average flows are already very low, we were able to produce an additional 10% reduction and can identify opportunities for further improvement.