

## **The Contribution of the Induction Period to Overall Gas and Vapour Consumption**

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**Background / Introduction:** Reducing fresh gas flow (FGF) during volatile anaesthesia reduces agent consumption, cost and environmental footprint without reducing drug delivery to the patient. RK and RF have a long interest in this area<sup>1</sup> and are collaborating with GE-Healthcare exploring data collected routinely by anaesthesia delivery systems.

While our work includes all phases of anaesthesia some studies exclude induction or the pre-surgical phase from analysis<sup>2,3</sup>. This project allows us to explore the influence of this early phase on total gas flows by investigating and understanding FGF data from a large number of cases; by a simple modelling; and by observing the effect of a simple intervention directed at the early phase on overall gas consumption.

**Methods:** Data is logged from 4 GE-Aisys CS2 Carestations. The high flow period starts when vapour delivery begins and ends when FGF < 5l/min.

Early data suggested that both the flow rate and the duration of the “high flow” phase have a significant influence on overall mean FGF. A simple spreadsheet was constructed to explore this. Over a 2 week period we provided all anesthesiologists with repeated information on the importance of FGF in the high-flow phase. We compared the pattern of flow rates in the 3 months before this information and the 2 months following. Mean FGF is a marker of vapour consumption.

**Results:** We have data on 2089 vapour based anaesthetics from 4 OR. Mean FGF decreased from 920ml/min to 860ml/min associated with a decrease in the mean duration of the high flow period from 3.3min to 2.3min.

For a single OR with a consistent, case mix, mean FGF decreased from 1.102 l/min to 0.871 l/min ( $p < 0.0001$ ). The median [IQR] for FGF during the high flow phase were 6 [6,6] l/min before and 6 [0,6] l/min after and the median durations of the high flow period were 2 [0, 4]min and 0 [0, 3]min ( $p < 0.0001$ ).

Simulation shows that for a 90 min case with a maintenance FGF 2l/min and a high flow

period FGF 6l/min, reducing the duration of the high flow period from 10 to 2 min reduces mean FGF from 2.44l/min to 2.09l/min, or 14%. If the maintenance flow is 1 l/min, the overall reduction is 29%.

**Conclusions:** The primary focus of FGF reduction efforts is on maintenance. We have identified that the duration and gas flows during the early phase can have a significant effect on total consumption with the FGF used for pre-oxygenation frequently maintained after induction. We were able to produce an additional 10% reduction to our already low average flows. Modelling suggests that even in an environment where maintenance flows are moderately high, attention to the early / induction phase can produce additional, useful reductions in gas flows and vapour consumption.

**References:**

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3. Singaravelu S, Barclay P. *Br J Anaesth.* 2013;110:561–6.