

Sevoflurane Consumption at Different Stages of Paediatric Anaesthesia – an Observational Audit

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We are interested in patterns of volatile anesthetic use so that we can work to minimise wastage (1). The cost saving and environmental implications of reducing unnecessary volatile use is well recognised. We previously reported (2) that short pediatric ORL cases, using inhalational induction used as much sevoflurane as major abdominal operations in adults lasting four times as long. We now wish to gain a better understanding of the pattern of use of inhalational anesthetics in our paediatric patients.

Methods: This study was approved by the New Zealand HEDC. We observed all cases occurring during normal working hours in patients ≤ 16 yr in a single OR dedicated to paediatric surgery over an eight week period. This OR has an induction room with a GE-Avance machine and a GE-Aisys in the OR itself. In our hospital all adults are induced in the OR. We recorded basic demographics, timings, breathing circuit and airways used along with sevoflurane consumption taken from the logs of the machines. Patients not receiving sevoflurane for maintenance of anaesthesia were excluded.

Results: We collected data from 111 cases, 18 were excluded leaving 94 cases for analysis. Data are presented in the tables. In essence, children receiving inhalational induction were younger and, on average, lighter than those having an iv induction. Cases utilising an inhalational induction consumed twice as much sevoflurane as those with an iv induction (median 22 [quartiles 16, 26]ml vs 11 [7, 17] ml, $p < 0.00001$) although the duration of anaesthesia was similar in the groups (49 [35, 17] min vs 57 [33-79]min, $p = 0.79$) and sevoflurane usage during the maintenance phase was similar. The use of the induction room and a second machine did not affect sevoflurane consumption.

Discussion: There is increasing awareness of the financial and environmental cost of the wastage of volatile anesthetics. In this study we found that use of inhalational induction doubles the amount of sevoflurane used. This parallels our data in adults which suggests that although gas flow rates during the maintenance phase are an important determinant of overall vapor use, the induction period can have a significant effect on overall consumption.

The next stage is to understand the patterns of FGF & vapor settings used by anesthesiologists in our department during inhalational induction to look for ways this procedure can be modified without impairing the clinical utility of this procedure.

References:

1. Kennedy, R., French, R., Vesto, G., & Hanrahan, J. (2017). Gas flows during induction have a major effect on overall vapor consumption despite low

maintenance flows. *Proceedings of the American Society of Anesthesiologists (ASA) Anesthesiology Annual Meeting*. A3039.

- Kennedy, R., van der Griend, B., Page, J., Vesto, G., & French, R. (2017). Brief pediatric cases use a similar mass of sevoflurane as adult anesthetics lasting over an hour. *Proceedings of the International Society for Anaesthetic Pharmacology (ISAP) Annual Meeting*. (pp. 24).

Table 1: Patient Age and Weight of Included Cases

	Total n=94	Gas induction n=65	IV induction n=29	p (Mann Whitney)
Median Age (years)	4 (IQR=2- 6.75)	3 (IQR=1-5)	6 (IQR=4-11)	<0.001
Median Weight (kg)	16 (IQR=12- 26)	15 (IQR=10- 21)	24 (IQR=16- 40)	0.002

Table 2: Median Liquid Sevoflurane Consumption (mL)

	Total n=94	Gas induction n=65	IV induction n=29	p (Mann Whitney)
Sevoflurane total	19 (IQR=13- 24)	22 (IQR=16- 26)	11 (IQR=7-17)	<0.00001
Induction Phase*	12 (IQR=6.5- 16)	13.5 (IQR=11- 18)	4 (IQR=1-7)	<0.00001
Maintenance	7 (IQR=5-10)	7 (IQR 4.75- 10)	8 (IQR=6.75- 10)	0.53

*Induction Phase is defined as the time from the commencement of anesthesia until the patient was ready for positioning for surgery.

