Comparison of sevoflurane with halothane: statistically valid?

Sir,—I read with interest the article by Taivainen and colleagues [1] comparing the effects of sevoflurane and halothane on the quality of anaesthesia and serum glutathione transferase alpha and fluoride in paediatric patients.

The authors mentioned the use of the Student's t test or Fisher's exact test for intergroup comparisons of anaesthesia data. They also mentioned the use of analysis of variance (ANOVA) to test the statistical significance of the differences of the cardiovascular and laboratory variables between baseline and each timepoint.

Detailed examination of table 3 (recovery data) shows that the mean extubation time in the sevoflurane group is 3.5 (SD 3.4) min. This suggests that a patient's trachea could have been extubated at -3.3 min (mean - 2 SD). The same is true for the extubation at -3.3 min (mean - 2 SD). This pattern is repeated through the rest of the data in table 3. Emergence could have occurred in the sevoflurane group at -9.4 min (mean - 2 SD). In the halothane group emergence could have occurred at -0.2 min (mean - 2 SD).

Hand squeeze is another variable the authors studied as part of the recovery data. Again, hand squeeze may occur at -5.1 min (mean - 2 SD) in the sevoflurane group and at -2.6 min (mean - 2 SD) in the halothane group.

The data obtained from such a scoring system is ordinal data and not continuous data. Hence the authors had two options; they could have used the data in contingency tables and used chi-square or, as they did, represent the data in bar graph. With the second option it is necessary to use medians and ranges, and if they used the Kruskal–Wallis test they failed to mention it.

The authors evaluated physiological variables, that is motor activity, respiration and arterial pressure, using a modified Aldrete score system. In figure 2 they represented their results as mean ± 1 SD in several groups. However, SEM is always smaller than SD and this may be misleading.

The authors mentioned the use of analysis of variance (ANOVA) to test the statistical significance of the differences of the cardiovascular and laboratory variables between baseline and each timepoint. Detailed examination of table 3 (recovery data) shows that the mean extubation time in the sevoflurane group is 3.5 (SD 3.4) min. This suggests that a patient's trachea could have been extubated at -3.3 min (mean - 2 SD). The same is true for the extubation at -3.3 min (mean - 2 SD). This pattern is repeated through the rest of the data in table 3. Emergence could have occurred in the sevoflurane group at -9.4 min (mean - 2 SD). In the halothane group emergence could have occurred at -0.2 min (mean - 2 SD).

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Table 4 presents laboratory data on alanine aminotransferase (ALT), alkaline phosphatase (ALP), aspartate aminotransferase (AST), bilirubin and creatinine concentrations within and between groups. A concentration of ALT of -2.2 iu litre^{-1} (mean -2 SD) is possible in the baseline sevoflurane group. A concentration of ALT of -3.2 iu litre^{-1} (mean - 2 SD) is possible in the same group at 24 h. In the same group, a concentration of bilirubin -5.7 umol litre^{-1} (mean - 2 SD) is possible in the baseline group and -6.9 umol litre^{-2} at 24 h.

The reason why these values can be obtained is because the data do not follow a normal distribution and are skewed. In this case the authors have used incorrect tests. They should have used medians and ranges, and if they used the Kruskal–Wallis test they failed to mention it.

Finally, the authors failed to mention the method for randomization. They cannot be criticized for not doing so as randomization is almost never mentioned in scientific literature. We used sealed envelopes containing a letter to indicate either sevoflurane or halothane. This closed randomization was made by random number tables.

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Rechargeable Optima laryngoscopes

Sir,—We wish to draw your attention to two incidents involving rechargeable Optima laryngoscopes. In the first incident, a 2.5-V (medium size) rechargeable battery was inserted in the incorrect direction into the Optima laryngoscope. When used, the handle was extremely hot, so much so that it could not be hand-held, and the battery had burned at its two points of contact. It would seem that the charging unit had no effect in this case as, when we purposely re-inserted the battery (again in the incorrect direction) some time later, the incident could be reproduced, with the handle becoming extremely hot within seconds.

The mechanism in this instance seems to be that the battery makes contact at the base of the laryngoscope and against the handle (via a metal connector incorporated into the battery connector) which creates enough heating to achieve ignition. A rechargeable battery contains a nickel–cadmium cell, which is why the battery was extremely hot. A rechargeable battery has a lower resting voltage than the standard Optima battery, which is why it was not recognized as a problem during the initial usage of the device.

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Rechargeable battery for the Optima laryngoscope.
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Figure 2  The melted and burned plastic casing in contact with the base of the laryngoscope handle.

housing), but not at the top of the laryngoscope as the plastic housing prevents contact. The current discharged then travels from the base to the handle only and the handle heats rapidly. The halogen bulb in the laryngoscope blade will not illuminate when this occurs. Such an incident is potentially quite hazardous with the obvious risk being a burn from the hot handle. Placing the battery backwards in the handle is itself an understandable error. It is not clearly labelled and its structure is such that it resembles an ordinary battery, but is in fact designed to be used the other way round (fig. 1).

The second incident involved a paediatric laryngoscope of the same design. In this case it was not operator error but equipment failure that resulted in the incident. On operating the laryngoscope by opening the blade fully, flames (1-2 cm high) shot from the charging end of the handle. The battery (2.5 V small) was correctly positioned but on later inspection the battery terminal contacting the charging unit had melted and burned.

The charging unit contains two "pins", one of which passes through the base of the laryngoscope and makes contact with the battery terminal, and the other which makes contact with the base of the laryngoscope handle. In this incident, the coiled spring that pushes the battery upwards in the casing had bent so that part of the spring covered the entry hole for the charging pin. It appears that the charge was delivered to the handle directly and a short circuit resulted in the plastic casing in contact with the handle’s base melting and subsequently igniting (fig. 2).

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