Choice of Endotracheal tubes (ETT) for pediatric intubations: An audit in 2 countries

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Background
A correctly sized endotracheal tube (ETT) reduces the number of re-intubation attempts and reduces the rate of ETT exchange [1,2], thereby limiting airway trauma and post-intubation morbidity. However the routine use of cuffed ETTs in children is controversial, with higher costs and lack of cuff pressure monitoring undermining its safe use [3].

In a 2009 study, Weiss [4] reported an ETT exchange rate of 2.1% in cuffed ETT compared to 30.8% in the uncuffed group. More than 10 yr ago, Khine [5] reported an ETT exchange rate of 1.2% in the cuffed ETT group, compared to 23% in the uncuffed ETT group. The formulae used to determine ETT size differ in each study. Currently there is no consensus on the best formula to guide the choice of ETT size for children and no formulae has been validated for < 1yr olds. A myriad of ETTs brands with differing external diameters further complicates the picture [6,7].

In a recent survey of 43 pediatric anesthesiologists from the UK (n=28) and Singapore (n=15), 46.3% of the respondents have felt the current formula to calculate the size of ETTs used were 6 (range 4.5) and 5 (range 8.6) respectively. Median size of cuffed ETTs and uncuffed ETTs used were 6 (range 4.5) and 5 (range 8.6) respectively. Majority (79.2%) of the cuffed ETTs were made by Intersurgical.

Median size of cuffed ETTs and uncuffed ETTs. (mean age 10.4, SD 4.03, n=243).

Table 1: ETT exchange rate and failure of first attempt intubation

Conclusion
The 2 centres differ in ‘who selected the ETT’ and ‘how the ETT was selected’. The correct-size ETT was successfully chosen in 78.3% of cases regardless of centres. This is lower than what was perceived by the same pediatric anesthesiologists surveyed prior to the audit, but comparable to the ETT exchange rates reported in earlier international studies [1,2]. We also note that the rate of successful first-attempt intubation with cuffed ETT was also lower than that previously reported. This highlights that further education and training is essential to increase awareness and improve successful first attempt intubation with both cuffed and uncuffed tubes.

Overall, the rate of successful first-attempt intubation was higher with cuffed ETTs (84.1%) compared to uncuffed ETTs (80.0%) vs uncuffed ETTs, p=0.049; UK: 85.6% with cuffed ETTs vs 67.8% with uncuffed ETTs, p=0.010 (Table 1)

The overall rate of successful first-attempt intubation did not differ significantly between institutions, p=0.062, except when only intubations using uncuffed ETTs were analysed. Success rate was significantly higher using uncuffed ETTs amongst the anesthesiologists in Singapore. (80.0% vs 67.8%, p=0.032) (Table 1)

Overall, successful first-attempt intubation was higher with cuffed ETTs compared to uncuffed ETTs (84.1% vs 73.9%, p=0.013). However, this difference was not significant when the cases were analysed separately in each institution: Singapore: 83.5% success with cuffed ETTs vs 80.0% with uncuffed ETTs, p=0.496; UK: 85.6% with cuffed ETTs vs 67.8% with uncuffed ETTs, p=0.010 (Table 1)

Overall, successful first-attempt intubation was higher with cuffed ETTs (84.1%) compared to uncuffed ETTs (73.9%). This difference became insignificant when the cases were analysed separately in each institution where practice of size selection and patient demographic differs.

Higher incidence of successful first intubation with uncuffed ETT in Singapore compared to UK may be related to the more frequent use of formula (age/4 + 4.5) in its predominant Asian patient population.

The pros and cons of routine use of cuffed ETTs for pediatric intubations for general anesthesia, should be considered according to local practices guiding the choice ETTs. The added costs and danger of high cuff pressures due to lack of cuff pressure monitoring may be considered. Experience and use of a more accurate formula may obviate the advantage of using cuffed ETTs.

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