The Incidence of Desaturation in a Pediatric Hospital: A Quality Control Study

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Abstract

Although mild hypoxemia is not an uncommon event during pediatric anesthesia, few studies exist that report the incidence of intra-operative desaturation. We sought to determine the incidence of desaturation at a tertiary care children’s hospital with large pediatric anesthesia fellowship and residency programs.

Materials & Methods

We conducted an anonymous, prospective observational study as part of a continuous quality improvement project. From November 9, 2011 to August 23, 2012, a data sheet for each of 15,466 patients undergoing an anesthetic was collected. Only patients with cyanotic congenital heart disease were excluded. Each data sheet was completed by the physician performing the anesthetic, and was matched with computer billing records for internal accuracy. Each sheet indicated if the patient desaturated to a level below 80% for any amount of time during the intra-operative period. In addition, the physician recorded the anesthetic start time, patient’s age and weight, and whether the attending anesthesiologist supervised a trainee or worked alone.

Results

Among the 15,466 eligible cases, 231 cases (1.5%) developed intra-operative desaturation. Of the cases with a desaturation event, 48 occurred in patients less than 3 months (21% of all desaturations (OAD)), 64 in patients 3 months to 1 year (28% OAD), 69 in patients 1 year to 4 years (30% OAD), 30 in patients greater than 4 years to 12 years (13% OAD), and 20 in patients greater than 12 years (9% OAD). The respective age groups above starting from youngest to oldest accounted for 5%, 10%, 27%, 36%, and 21% of the total 15,466 cases. Overall younger patients were more likely to desaturate (p < 0.0001). In addition, both linear regression and chi-square tests showed statistical difference existed when comparing an attending physician working alone versus with a trainee with regards to incidence of desaturation. Twenty percent of the desaturation events occurred after 1800 hours, whereas only 11% of the total cases occurred after 1600 hours (p < 0.0001). All variables were tested using logistical regression using IBM SPSS version 20.

Summary

This is the first report of which we are aware that specifically looks at the incidence of desaturation during a pediatric anesthetic in a tertiary children’s hospital with a large training program. Although the overall low desaturation rate of 1.5% probably represents some under-reporting on a continuous quality improvement form, several trends are present. For example, younger children were more likely to desaturate than older children, which likely represents the increased oxygen consumption and more challenging airway management in younger patients. In addition we found that cases with a trainee were more likely to desaturate than those with only an attending. Finally, we found desaturation to be more likely in the evening hours compared to the daytime hours. We speculate this could be due to decreased attending to trainee ratios, higher acuity cases, and increased anesthesiologist fatigue. Based on these findings, elective surgery performed after daytime hours in children less than one puts them at a disproportionate risk of an adverse respiratory event. Further investigation could help stratify this risk.

Desaturation Events by Age Group

Desaturation Events Before and After 4pm

Desaturation Frequencies with and without Trainees

Event Frequency

Comparison of Desaturation Frequencies Before and After 4pm

Comparison of Desaturation Frequency with and without a Trainee

References