

**TITLE:** INCIDENCE OF HYPOXEMIC EVENTS DURING ANESTHESIA IN CHILDREN WITH UPPER RESPIRATORY INFECTION

**AUTHORS:** N. Rolf, M.D., C.J. Cote', M.D.

**AFFILIATION:** Department of Anesthesia, Harvard Medical School at the Massachusetts General Hospital, Boston, MA 02114

The significance of upper respiratory infection (URI) in children scheduled for elective surgery under general anesthesia remains controversial. This study examined the incidence and severity of hypoxemic events during anesthesia in children with and without a URI.

The data are abstracted from an institutionally approved, single blinded, prospective study on pulse oximetry and capnography. An additional anesthesiologist recorded all intra-anesthetic problems and made a continuous strip chart recording of the SpO<sub>2</sub>, capnogram, and ECG. URI was defined according to the criteria of Tait and Knight.<sup>1</sup> Patients with purulent rhinitis or fever were not anesthetized. Hypoxemic events were classified as mild (SpO<sub>2</sub> ≤ 95% for ≥ 60s) or major desaturations (SpO<sub>2</sub> ≤ 85% for ≥ 30s). At the end of anesthesia the patients were allowed to breathe room air to

ascertain that they could maintain the SpO<sub>2</sub> ≥ 93% prior to transport to the recovery room.

A total of 402 patients were studied; 30 patients had a URI the day they received anesthesia and in 372 patients there was no evidence of a URI. In the 30 patients with a URI we observed 22 episodes of mild (73%) and 7 episodes of major oxygen desaturation (23%) as compared to 113 mild (30%) and 52 (14%) major desaturations in the 372 patients without URI (P < 0.0001). The incidence of major desaturations was not significantly different in patients with or without a URI. The nadir oxygen saturation in room air was 93±3% in patients with a URI and 95±4% in patients without a URI (P = NS).

This study demonstrates that children with symptoms of a URI are more likely to develop intraoperative hypoxemia but the incidence of severe hypoxemic events is not increased. These observations are consistent with those of other investigators. Since most of the hypoxemic events were mild, this observation does not mandate cancellation of anesthesia in these children.

**References:**

1. Anesthesiology 67:930-935, 1987.  
Funded in part by the Anesthesia Patient Safety Foundation.

### A1125

**TITLE:** A SINGLE-BLIND STUDY OF COMBINED PULSE OXIMETRY AND CAPNOGRAPHY IN CHILDREN

**AUTHORS:** N. Rolf, M.D., C.J. Cote', M.D., L.M.P. Liu, M.D., N.G. Gousouzian, M.D., J.F. Ryan, M.D.

**AFFILIATION:** Department of Anesthesia, Harvard Medical School at the Massachusetts General Hospital, Boston, MA 02114

The purpose of this study was to evaluate the value of capnography and pulse oximetry in diagnosing problems related to oxygenation and ventilation.

Children (ASA status 1-4) scheduled for surgical procedures under general anesthesia were studied in an institutionally-approved single blinded prospective manner. Patients were randomly assigned to 1 of 4 groups: A: pulse oximeter & capnograph data; B: only oximeter data, C: only capnograph data, D: neither oximeter nor capnograph data available to the anesthesia team. An additional anesthesiologist recorded events, made a continuous strip chart recording of SpO<sub>2</sub>, PECO<sub>2</sub>, ECG, oximeter plethysmograph, and informed and interviewed the anesthesia team whenever a problem occurred. A major event was defined as a decrease in SpO<sub>2</sub> to ≤ 85% for ≥ 30 sec; hypo- and hypercarbia were defined as a PECO<sub>2</sub> ≤ 25 mmHg or ≥ 55 mmHg for ≥ 60 sec.

402 children (2 wks - 17 yrs) were studied and 232 problems occurred in 142 patients. 59 major hypoxic events occurred in 43 patients and 73 problems related to ventilation occurred in 58 patients. The number of patients with hypoxic events was significantly higher in Groups C & D (no oximeter

available) compared to the oximeter available Groups A & B (Table) (P<0.005). Patients ≤ 2 yr and those managed by endotracheal intubation had a higher incidence of major events (P < 0.005). The pulse oximeter diagnosed 41 major events (69%); the diagnosis was made clinically in 13 (22%), and by the capnograph in 5 (9%) of the 59 major hypoxic events. The capnograph first detected 88% of 73 problems (not necessarily major events) related to ventilation: 51 hypercarbias, 7 hypocarbias, 8 esophageal intubations (only 3 were first diagnosed by the capnograph), 3 disconnects, and 4 tube obstructions. Only 5 of these 73 problems resulted in major episodes of desaturation.

This study confirms the efficacy of pulse oximetry in detecting and preventing intraoperative hypoxemic events in children. The capnograph does not make a significant contribution in reducing major hypoxic events; nonetheless, its usefulness in detecting problems of ventilation that do not necessarily lead to hypoxemia is evident. Pulse oximetry is the more specific monitor in safeguarding against clinically important incidents leading to hypoxia during pediatric anesthesia.

**Major Hypoxic Events**      **First Diagnosis**

Group	Major Hypoxic Events		First Diagnosis	
	N	Events (Patients)	Clin.	Cap. Ox.
A (Ox & Cap)	100	10 (7)	5	0
B (Ox)	100	6 (5)	2	1
C (Cap)	100	24 (16)	4	1
D (None)	102	19 (15)	2	3

Funded in part by the Anesthesia Patient Safety Foundation.