TITLE: OXYGEN ADMINISTRATION PREVENTS HYPOXEMIA DURING POSTOPERATIVE TRANSPORT IN CHILDREN

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Introduction: Arterial oxygen desaturation frequently occurs in healthy adults and children during transport from the operating room (OR) to the post-anesthetic recovery room (PARR).[1,2] Monitoring of oxygen saturation (SaO_2) and/or administration of supplemental oxygen have been recommended for all pediatric patients in the recovery room.[3] This study prospectively examines the effectiveness of oxygen supplementation in the prevention of oxygen desaturation during and immediately after post-operative transport following routine surgery in pediatric patients.

Method: The study was approved by the Institutional Review Board and an information sheet was available for parents. A total of 200 ASA PS I or II patients (2 mos-9 yrs) scheduled for elective surgery were studied. Patients undergoing bronchoscopy or thoracotomy or those with a history of cardiovascular or pulmonary disease, URI within two weeks of surgery and/or incidental hypothermia were excluded. Premedication was not used; and anesthetic management was not stipulated. At the end of surgery, 100% oxygen was administered by mask, and a Nellcor(R) pulse oximeter set in Mode 3 was applied for continuous recording of SaO_2 during transport. Patients were randomly divided into two groups. Group A patients (n = 100) were transported to the recovery room while breathing room air. Group B patients (n = 100) received supplemental oxygen during transport from the OR to the PARR. Oxygen was administered at a rate of 6 L/m by a loosely held mask. The following data were recorded for each patient: number of minutes of 100% oxygen administered prior to transport, SaO_2 and Steward's recovery score[5] in the OR, duration of transport, time before onset of hypoxemia (defined as $SaO_2 \leq 90\%$, lasting > 30 seconds). Recovery scores and SaO_2 were noted upon admission to the PARR. Chi-square analysis was used for categorical variables and t-tests for continuous variables; the results expressed as mean $\pm$ SEM. The Wilcoxon test was used for comparison of Steward's PARR scores. $P < 0.05$ was considered statistically significant.

Results: The two groups were comparable in age, anesthetic technique, surgical procedures, SaO_2 in OR, anesthesia time, transport time, and recovery score in the operating room. The transport time ranged from 90 to 227 seconds. Twenty-one patients in Group A became hypoxemic during transport; vs. only 3 patients in Group B ($p<.0001$). The range of SaO_2 recorded is shown in table 1. Mean oxygen saturation in Group A was 91.7 ± 1.0, whereas it was 95.0 ± 0.6 in Group B ($p<.01$). On arrival in the PARR, mean Steward's recovery scores were not statistically different: 4.42 in Group A and 4.77 in Group B. Corresponding oxygen saturations were 94.0 ± 1.0 and 97.8 ± 0.4 in Group A and B patients respectively ($p<0.001$).

Table 1. Number of patients in different SaO_2 ranges during post anesthetic transport.

SaO_2	86-90	81-85	80
Group A (air) n = 21	12	6	3
Group B (oxygen) n = 3	1	0	2

Discussion: It has been previously reported that 23% of patients desaturate for longer than 30 seconds during transport to the recovery room.[2] PARR score or the degree of awakeness has been proven not to correlate with oxygen desaturation.[4] Routine use of supplemental oxygen was suggested to prevent hypoxemia during transport, however, its' efficacy was not proven. We have shown that supplemental oxygen will reduce the incidence of hypoxemia during transport, and SaO_2 will be higher upon admission to the recovery room. Two out of three patients who became hypoxemic despite oxygen administration were otherwise healthy 2 months old infants. The third patient was a 32 week expremature infant who underwent circumcision at the age of 8 months. Mode 3 of Nellcor(R) pulse oximeter was selected because it uses an averaging time of 10-15 seconds instead of 5-7 seconds in Mode 1. The increased averaging time is useful when the patient is active, because the instrument is less affected by patient motion.

Based on these and previous findings, we recommend routine monitoring or oxygen administration to infants and children during transport from the OR to the PARR.

References:

1. Tyler IL, Tantisira B, Winter PM et al. Continuous monitoring of arterial oxygen saturation with pulse oximetry during transfer to the recovery room. Anesth. Analg. 64:1108-12, 1985.
2. Sellman GL, Patel RI, Hannallah RS: Change in arterial oxygen saturation in the pediatric patient during postoperative transport. Anesthesiology 65: A447, 1986.
3. Motoyama EK, Glazener CH. Hypoxemia after general anesthesia in children. Anesth Analg 65:267-72, 1986.
4. Hannallah RS, Patel RI, Ehrenpreis MB. The need for oxygen following anesthesia in children: Correlation with recovery scores. Anesthesiology 65: A444, 1987.
5. Steward DJ: A simplified scoring system for the postoperative recovery room. Can Anesth Soc J 22:111-113, 1975.