Title: **PULSE OXIMETRY: REDUCING COST AND IMPROVING THE QUALITY OF CARE WITH SMART TECHNOLOGY**

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Most of us feel that pulse oximetry has resulted in a higher quality of care, and data exist to support this hypothesis. We tested the hypothesis that the use of pulse oximeters has also resulted in a reduction of costs of care.

With institutional review board approval, we analyzed cost and use for all anesthetics administered at this institution since 1985. We obtained data on number of anesthesia hours performed for our patients and number of blood gas tests obtained in the anesthetic period. Since data for patients who have had pulse oximetry applied during the course of a surgical procedure is not available at our institution for the period before 1988, we estimated pulse oximetry usage for these years by the number of anesthetizing locations with pulse oximetry. Cost and charge information was obtained from the hospital.

Since 1985, blood gas determinations per hour of anesthetic time have decreased 43%, for a savings in hospital charges of more than $45,780. At the same time, we now spend $18,000 for depreciation (8-year life span of unit) and disposables for 23 oximeter units per year.

Although reductions in number of tests do not equal actual cost or dollar savings, they are good indications of savings, as personnel performing tests can be redeployed and replacement of blood gas machines delayed. Additional savings in departmental malpractice costs are not included in our calculations. We do not have an objective measure for degree of illness of our patients, but our subjective measures of ASA physical status scores and overall impressions suggest that our patients are actually sicker. A more detailed analysis is now underway to determine actual costs and savings.

Pulse oximetry may be an early example in the new era of medicine in which relatively inexpensive and versatile computer chips and software enable us to practice a higher quality of medicine more efficiently. Data exist that pulse oximetry allows our practices to be of higher quality. The reduction in number of blood gas determinations suggests that pulse oximetry allows the practice of anesthesia to be less expensive as well.

Year	1985-6	1986-7	1987-8	1988-89	1989-90
Anesthesia locations with blood gas machines (%)	0	21.7	100	100	100
OR hrs	30,257	32,313	32,891	32,977	37,974
Blood gases performed	2,311	2,306	1,938	1,733	1,657
Blood gases/ 100 OR hrs	7.64	7.14	5.89	5.26	4.36
Change in blood gases from 1985-6 (%)		-65	-23	-31.2	-43

TITLE: EVALUATION OF A SIMPLE TECHNIQUE TO PREVENT DISCONNECTIONS OF THE 15 MM TRACHEAL TUBE ADAPTER

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We investigated a common location of anesthetic disconnections, the friction-fitted 15 mm adapter-endotracheal tube junction and demonstrated an intrinsic tendency of this junction to come apart. A simple method of reducing the likelihood of such disconnections was evaluated.

Twenty size 7.0 mm ID Mallinckrodt (Glens Falls, NY) Hi-Lo™ polyvinylchloride (PVC) tracheal tubes were studied. Ten tracheal tubes (Group 1) were tested as they were received from the manufacturer, i.e., out-of-the-package. The remaining ten tracheal tubes (Group 2) had their 15 mm adapters removed, wetted with a cotton gauze soaked with 70% isopropyl alcohol in water, and forcibly replaced so that the flange of the 15 mm adapter contacted the end of the shaft of the tracheal tube. The tracheal tubes were then clamped vertically to a metal pole. A wire harness and weight holder (0.9 lb) were attached to the 15 mm adapter and weights were suspended from the weight holder. Beginning with 5 lb, weights were carefully added 1 lb at a time until the 15 mm adapter separated from the tracheal tube. The mean forces of ten trials in each group were compared using the unpaired Student's t-test. Intergroup mean differences were considered statistically significant at $p < 0.05$.

The force for 15 mm adapter separation in group 1 was 15.5±4.8 lb (mean±S.D.) with a range of 6.9-20.9 lb. In group 2 none of the 15 mm adapters could not be dislodged with 32.9 lb of force. The mean intergroup force difference between the two groups was significant ($p < 0.01$)

The anesthetist's armamentarium of sophisticated electronic monitoring equipment has grown substantially in recent years. The advent of capnopgraphs, pulse oximeters and mass spectrometers should contribute to patient safety by detecting airway disconnections. However, the continued use of the friction fittings for connection of the tapered 15 mm adapter to the tracheal tube and the corrugated breathing circuit hoses to the anesthesia machine remains a hazard to the patient. Our study shows that a simple technique can substantially lessen the likelihood of a disconnection at the 15 mm adapter-tracheal tube junctions. The application of alcohol to the 15 mm adapter of polyvinylchloride tracheal tubes and the maximal forcing of the adapter into the tube results in a union that is significantly more resistant to disconnection than that found in the tracheal tubes as received from the manufacturer. This technique should result in fewer airway disconnections, a common source of anesthesia-related morbidity and mortality.