

TITLE: MIXED VENOUS OXIMETRY IN CARDIAC SURGICAL PATIENTS**AUTHORS: C.W. Hanson III MD, R.T. Geer MD****AFFILIATION: Department of Anesthesia
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Introduction: Mixed venous oximetry (MVOX) permits continuous assessment of the balance between systemic oxygen supply and demand. The following study was designed to evaluate the ability of MVOX to predict deterioration or improvement in a patient's oxygen balance in the relatively unstable 2-3 hours after cardiac surgery.

Methods: 10 cardiac surgical patients (7 CABG, 3 valve) had an Oximetrix (Abbott, Mountain View, Ca.) PA catheter placed preoperatively. Continuous MVOX monitoring was instituted for 150 minutes postoperatively. The physician caring for the patient was blinded to the MVOX data. At every point of medical intervention, that physician was asked to categorize the reason for intervention into one of 7 groups: hypovolemia, increased inotropy, anemia, hypoxemia, increased afterload, increased O_2 demand, decreased mixed venous pO_2 on a blood sample. A data record was generated for each intervention. If no intervention occurred in a fifteen minute period, a control record was generated.

Results: A total of 99 records were generated, 45 representing interventions and 44 controls. 22 interventions were made for hypovolemia (VOL), 2 for inotropic support (PUMP), 10 to decrease afterload (SVR), and 11 to decrease O_2 consumption (O_2C). No interventions were made specifically to treat anemia, low MVO₂ or low arterial O_2 saturation. The change in MVO₂ (Δ MVOX) from 15, 10 and 5 minutes before and 5 and 10 minutes after the point of intervention were calculated (table). Interventions were compared to controls with Student t-tests.

Discussion: There were no significant differences between ALL interventions and controls, PUMP and controls, or O_2C and controls at any point of comparison. Δ MVOX for VOL was significantly different from controls at 15, 10 and 5 minutes before intervention, but not after; and Δ MVOX for SVR was different from controls at 5 and 10 minutes after intervention, but not before. MVOX performs well as an indicator of hypovolemia showing significant dips as much as 15 minutes before clinicians intervene based on standard monitors. MVO₂ also showed significant drops after clinician intervention to lower SVR when compared with controls, probably indicating inadequate volume resuscitation at the time of intervention. In this study, a sustained (>5-10 min.) change of > 2%, although of small magnitude, correlates with significant alterations in MVO₂.

**Relative Change in MVO₂
Before and after Intervention**

GROUP	-15'	-10'	-5'	+5'	+10'
CONTROL (N=44)	-0.2	-0.3	-0.5	0.0	-0.1
ALL (N=45)	1.2 p=0.04	0.5 p=0.07	0.2 p=0.13	-0.2 p=0.4	-0.5 p=0.27
O_2C (N=11)	0.2 p=0.37	-0.8 p=0.3	-1.9 p=0.09	-0.2 p=0.4	-0.7 p=0.26
PUMP (N=2)	-2.5 p=0.17	-1.5 p=0.24	-1.5 p=0.27	-2.0 p=0.1	-2.0 p=0.13
VOL (N=22)	2.4 p<.002	1.4 p<.004	1.5 p<.0005	0.8 p=0.11	0.8 p=0.11
SVR (N=10)	0.5 p=0.29	0.5 p=0.17	0.5 p=0.5	-2.3 p<.0004	-3.2 p<.0001

A439**TITLE: DOCUMENTATION TIME REQUIREMENTS
COMPUTERIZED INFORMATION MANAGEMENT
SYSTEMS VERSUS HANDWRITTEN RECORDS****AUTHOR: David W. Edsall, M. D.****AFFILIATION: Anes Dept, Burbank Hospital, Fitchburg, MA**

Many anesthesiologists fear the introduction of computerized information management systems on the basis that this technology will further complicate their working environment in the anesthesia cockpit. The increase in time load and stress of utilizing the technology will further detract from care of the patient. This fear is not supported by personal experience nor literature data.

Two groups, of 3 cases each, were completely videotaped. All 6 cases had the same anesthetist, surgical procedure, surgeon, and operating room. Three cases were done with a patient information management system (Arkive, Diatek, San Diego, CA), and 3 cases were hand recorded on the same anesthesia record template. The videotapes were reviewed and all documentation time was clocked and totalled. Following the procedure, anesthesia records were compared for clarity, completeness and amount of data.

Some of the results are shown on Table 1. The differences between the documentation time for Arkive versus manual records was significant ($t=22.7$, $df=4$, p less than 0.001; 2-tailed t-test). The difference between documentation time/minute of anesthesia for Arkive versus manual records was also significant ($t=13.49$, $df=4$, p less than 0.001; 2-tailed t-test). Record preparation time and, the number of drugs and note entries was not significantly different. Clarity

was better with the automated record, although all handwritten records were legible. The amount of vital sign data recorded by the computer on the printed record was double the handwritten record, although it was one third of data on the floppy disk.

A survey of the Anesthesia Department shows that 100% of the anesthesiologists believe that they produce a better, more accurate, and more complete anesthesia record with the computer, while they are more vigilant toward the patient. Although others feel that there is a vigilance benefit to the recording of vital signs with a hand method, we believe it is far better to frequently review accurate data on a computer screen than it is to write down inaccurate values on the handwritten chart. Computerized records not only provide you with more time to spend with your patient, but actually provides you with information about your patient.

In Summary, computerized anesthesia information management systems are a technological advance which makes the work environment in the anesthesia cockpit more convenient for the anesthetist. It allows for the potential of better patient care by allowing the clinician more time for direct patient observation.

	ARKIVE		HAND RECORDS	
	Documentation Time	Case Time	Documentation Time	Case Time
Mean	4.46	34:07	13:28	33:57
Standard Deviation	23 sec		22 sec	