TITLE: THE ROLE OF EXPERIENCE IN THE RESPONSE TO SIMULATED CRITICAL INCIDENTS

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INTRODUCTION: In an earlier study[1] we investigated the response of anesthesia residents to critical incidents, using a comprehensive anesthesia simulator[2]. We showed that the level of experience between residents was a significant factor in the overall rapidity of response to incidents, and pointed out that the behavior of outliers within groups might be more meaningful than the mean performance of the groups. In this follow-up study, we looked at faculty and private practitioners, and compared this "experienced" group to the earlier resident results.

METHODS: All members of the faculty from the Anesthesia Department, Stanford University School of Medicine, as well as private practitioners from the community, were invited to participate in this study. Eight volunteers (5 Faculty, 3 private practitioners) gave written informed consent (as approved by the Human Subjects Committee) and participated over a 2-month period. Using the same simulator scenarios[1,2] as previously described, the subjects were presented with six pre-defined problems: short breathing circuit hoses, endobronchial intubation (EBI), intravenous line kink (IVK), atrial fibrillation (AFB), airway circuit disconnection (ACD), and cardiac arrest (VT). The response times for detection, diagnosis, and correction of each of these problems were recorded, as well as compliance with ACLS protocols for rescusitation. The data were then analyzed using two-way ANOVA. Significance was considered at $p \leq 0.05$.

RESULTS: Table 1 summarizes the differences in response times (sec., mean ± SD) for detection and Table 2 summarizes the differences in response times for beginning definitive correction of 4 of the planned incidents after detection. Comparison is made between each resident group (R1,R2) and the combined "experienced" (E) group. Table 3 summarizes the ACLS protocol compliance.

DISCUSSION: With some exceptions, there is a trend toward more rapid detection and correction time as the level of experience increases. However, the data suggest that differences in experience level are noticable only between first-year residents and all others. As was the case with residents, there is marked variation within the group of experienced practitioners, and in fact some experienced practitioners made significant errors in their recognition and handling of critical incidents - one subject failed to correctly diagnose the endobronchial intubation, and the ACLS protocol results were surprising, with deviations ranging from markedly incorrect energies during defibrillation (i.e. 10 joules applied externally) to failure to defibrillate, deviations which might have resulted in failure to successfully rescusitate.

Table 1: Detection Times for Planned Incidents

Incident	R1	R2	E	P
EBI	137±180	72±90	46±32	ns
IVK	281±298	191±241	474±284	ns
AFB	176±199	39±26	31±45	p<0.05
ACD	25±23	17±4	9±5	ns
VT	10±5	4±2	4±4	ns

Table 2: Correction Times for Planned Incidents

Incident	R1	R2	E	P
EBI	485±341	412±350	424±360	ns
IVK	203±245	53±32	35±26	p<0.05
AFB	231±180	279±143	104±113	ns
ACD	47±43	15±6	18±10	p<0.05

Table 3: ACLS Protocol Compliance

Deviation	R1	R2	E
Perfect Compliance	2	1	0
Minor Deviation	2	3	5
Major Deviation	6	5	3

REFERENCES: 1. Anesth Analg 68:444-451, 1989
2. Anesthesiology 69:387-94, 1988

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Title: PLETHYSMOGRAPHIC PULSE OXIMETRY: A TEACHING TOOL IN LUMBAR SYMPATHETIC BLOCKADE

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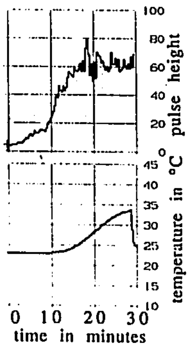
A successful Lumbar Sympathetic Block [LSB] is usually denoted by temperature elevation in the ipsilateral leg. Plethysmographic pulse wave monitoring [PPWM] has been shown to reliably detect successful sympathectomy, as increases in pulse amplitude indicate increased blood flow to the treated limb.[1,2] We sought to show that PPWM can detect a successful LSB predictably before temperature changes become apparent.

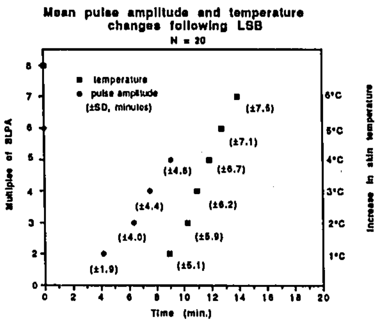
The Puritan Bennett PB240 monitor incorporates PPWM in its pulse oximetry display. The amplitude of the wave form is proportional to the analog signal and not automatically adjusted, thus reflecting actual changes in blood flow.

With institutional approval and informed consent we prospectively studied 20 LSBs in 13 patients. Skin temperature probes were placed on both forefeet and the pulse oximeter probe was placed on the 2nd toe of the affected foot. After 10 minutes of baseline recording, LSB was performed using standard methods. 0.25% or 0.5% bupivacaine in 5ml test doses were injected via a 25g needle at the 2nd or 3rd lumbar level. A tripling of baseline pulse amplitude [BLPA] or a 2°C rise above baseline temperature [BLT] within 10 minutes was considered indicative of correct needle position, and a full blockade dose was then given. Needles were repositioned if the above requirements were not met.

Tripling of BLPA preceded 2°C elevation in 19 of 20 LSBs. In one block it occurred 30 seconds after a 2°C rise. Tripling also corresponded to at least a 6°C rise over the next 35 minutes in all cases, and in no case did even a 3°C rise occur before a tripling of BLPA. All comparisons are significant by paired t-test, p<.003.

We conclude that a pulse oximeter which offers PPWM presents a reliable, time-saving alternative to temperature monitoring during LSB. This is particularly useful in a busy teaching environment as it allows more rapid assessment of the accuracy of the novice operator.





References: 1. Br. J. Anaesth. (1985), 57; 524-530
2. Anes. and Analg. (1975) 54, 3; 289-296