

with several loud alarms signalling in close proximity to one another and the confusion that this can create in intensive care unit personnel has been recognized by Hayes and Kerr.<sup>1</sup> Alarms of this type are out of place in the operating theater, where an anesthetist attends to only one patient and needs no signal audible at a distance. An audible alarm that quickly rather than loudly calls attention to a problem, that can be adjusted to signal over the desired range of the parameter measured, and that has a volume control and a temporary silencing mode is one that will be used routinely and not circumvented. In times of emergency it is more effective for anesthesiologists to immediately deal with a problem called to their attention by a pleasant sound than it is to waste effort in silencing a noxious signal.

Presently, manufacturers of monitoring equipment can incorporate any quality of sound in audible alarms regardless of whether that sound is used in other equipment. Confusion occurs regularly in our operating theater in trying to distinguish the audible signal of our continuous infusion pumps from that of our oxygen analyzers. Confusion increases as the number of pieces of equipment with audible signals increases. During one recent operation for aortic reconstruction, 12 audible alarms on anesthetic and operating room equipment were counted, of which only 8 could be identified by the staff anesthesiologist present. Aircraft industry studies have shown that humans do not learn and remember the significance of more than six to seven sounds.<sup>1</sup> This suggests that the

number of audible signals used in the operating room should be limited to only certain physiologic functions and equipment. The quality of those audible signals should be standardized. For example, the alarm that signals "failure to ventilate" should be different from that which signals "delivery of a hypoxic gas mixture," and both should be readily recognizable to all anesthetists.

The increase in new monitoring equipment used in the surgical suite may be impairing the function of the most important monitor, the anesthesiologist. We suggest that standards for operating room alarm systems be developed to insure the effective application of new monitoring technology and to prevent the introduction of systems that create problems due to the cacophony associated with their use.

STEVEN I. SCHMIDT, M.D., M.A.J., M.C.

*Director of Anesthesia*

*United States Army Institute of Surgical Research  
Fort Sam Houston, Texas*

CURTIS L. BAYSINGER, M.D., M.A.J., M.C.

*Staff Anesthesiologist*

*Brooke Army Medical Center  
Fort Sam Houston, Texas*

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### Alarms that Speak

*To the Editor:*—The recent letter by Samuels,<sup>1</sup> which relates to the cacophony of noises generated by multiple alarm systems, is a forecast of further future problems. As more and more monitoring equipment is advertised in the pages of ANESTHESIOLOGY, one can only look forward to more beeps and banshee howls, to the bafflement of the anesthesiologist and the irritation of the surgeon. I own an alarm clock that talks, and one company manufactures a "user friendly" camera that speaks—in English. If a small camera can contain enough memory to remind me verbally to advance the film, put in new film, or use a flash, surely it is not beyond the capability of biomedical engineering to use the same principle to warn

me of decreasing  $FI_{O_2}$  or hypotension. In addition, if Dr. Samuels really wants to hear "Galway Bay," then I am sure a suitable vocal arrangement is also possible.

C. BRIAN BURKE, M.B., B.CH., F.F.A.R.C.S.(I.)

*Assistant Professor of Anesthesia*

*Dartmouth Medical School  
Hanover, NH 03756*

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1. Samuels SI: An alarming problem (letter). *ANESTHESIOLOGY* 64:128, 1986

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