

CORRESPONDENCE

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Why We Should Use Pulse Oximetry

To the Editor:—Despite the brave attempts of Orkin and colleagues¹ and Eichhorn,² there is no avoiding the conclusion of the Danish work:^{3,4} there is no evidence that pulse oximetry reduces the incidence of serious postoperative harm. The editorialists raise many interesting general topics in their discussions, some important to pulse oximetry and some important in a broader sense: sample size, rare events, confidence intervals, benefits and harm, trials with negative results, how to define damaging hypoxia, and the definition of quality of care. But they also open some dangerous doors.

The first door is to generalism. Orkin and colleagues write, "The inability to document *the pulse oximeter's* efficacy should not detract from its use, given the difficulty of proving efficacy relating to rare events and of evaluating one factor in a complex chain of accident evolution." The italics are mine: try substituting *computerized anesthesia records, continuous intraoperative measurement of cardiac output, continuous intraoperative monitoring of cerebral function*, or any number of other nascent techniques. One could also substitute medical treatments, such as infusions of dopamine for renal protection in aortic surgery.

The second door is to the denigration of randomized clinical trials, which are not perfect but are the best method so far devised for judging medical treatments. The argument that " $P < 0.05$ scientific data" are inappropriate is used as justification for not testing their treatments by exponents of complementary therapies. Eichhorn writes that pulse oximetry is "so strongly perceived as beneficial" that it will remain a *de facto* standard of care, which is perfect illustration of human fallibility. If failure to use this monitoring device is taken in law as proof of substandard practice, when it has been shown by the best method available to have no effect on outcome, we anesthesiologists may find ourselves in a leading position to which we are unaccustomed: leading the way *back* to the days when opinion ruled over evidence.

In common, I suspect, with most of the Danes who took part in the study, these results surprised me. (It is interesting that there was not a positive outcome to the study despite the Danes' positive bias.) Before this study was published, anesthesiologists said, "We must use pulse oximetry because earlier detection of events prevents untoward outcomes." Now we know (to the best of our ability to assess) that they do not, we must find a positive reason for continuing their use, rather than try to pretend that the Danish trial has not been done or that its result can be ignored. If we accept that we must monitor

our patients in some way (a begged question, but certainly an untestable one), then pulse oximetry is the easiest, most convenient way of obtaining information about a number of variables and systems at once: pulse rate and rhythm, cardiac output, peripheral perfusion, and oxygenation. Pulse oximetry can be used and understood in the operating theater (and, where they exist, in the preanesthetic room), recovery room, intensive care unit, and open ward. Most anesthesiologists, if asked the "balloon debate" question, "If you had only one form of monitoring . . .," would want pulse oximetry.

There is no doubt it is a valuable monitor. I shall not banish it from my anesthetic practice because of the Danish study, but I shall admit that, in common with all monitoring devices, it is not perfect; and that, unfortunately, it is a little less perfect than most of us thought.

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In Reply:—Goodman misstates our position when he quotes *out of context* a concluding statement: "The inability to document the pulse oximeter's efficacy should not detract from its use, given the difficulty of proving efficacy relating to rare events and of evaluating one factor in a complex chain of accident evolution."¹ Such a conservative viewpoint is warranted because of the many technical problems discussed earlier in the editorial, which preclude a satis-

factory demonstration of pulse oximetry's efficacy, given the very low rates of occurrence of target events and the nature of accident evolution. Although the true benefit of this technology for the anesthetized patient may be exceedingly small, perhaps even negative (*i.e.*, potentially harmful), the Danish trial^{2,3} alone does not provide a sufficient basis on which to abandon pulse oximetry.

Yet, very definitely, we are not suggesting that this technology, or