Reusing the Nellcor Pulse Probe: Clarification

To the Editor—Pulse oximetry is becoming a standard monitor in anesthesia practice. Therefore, understanding the basic physical and physiological principles of pulse oximetry is essential for correct interpretation of the data provided by this monitor.

In a recent communication, Racys et al. reported inaccurate arterial oxygen saturation (SpO₂) measurements during repeated use of a Nellcor Model N-25 oximeter. The authors attributed the inaccurate measurements to partial obstruction by adhesive material on the transparent window of the optical component. The fundamental principle of pulse oximetry, however, argues against this reasoning.

The optical density of the tissue between the light emitting diode and the photosensor is not a critical factor in pulse oximetry. The sensor is designed to function when wrapped around a finger in adults, the palm in infants, and the whole foot in newborns. As stated correctly in the communication, “... pulse oximetry functions by positioning a pulsating arterial bed between a two-wavelength light source and a detector.” The crucial element of this statement is “pulsating arterial bed.” Pulsation, the relative change in absorbency, is the foundation of pulse oximetry. Fixed absorbency caused by skin pigmentation or obstruction by adhesive material, either on the skin or over the transparent window of the sensor, is compensated for by the microprocessor of the pulse oximeter by increasing the light intensity. Inaccurate SpO₂ measurements may not be explained completely by sensor opacity, since a “good signal” was detected prior to the faulty measurement. Sensor performance became unsatisfactory over a 10-min period after induction. Sudden obstruction of the transparent window was unlikely to have developed, since repeated manipulation of the sensor did not occur. It may be more likely that the sensor had become defective through repeated use and had exceeded its lifespan. We find it hard to accept that contamination with adhesive was the cause of the sensor failure.

We agree that cost containment should not become the overriding consideration in patient care. Instruments that are intended for “single patient use” should be scrutinized for both cost containment and patient safety. We commend the authors for their scrutiny of the Nellcor pulse oximeter sensor, and have offered another explanation for the inaccuracy reported.

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REFERENCES


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A Simple Method to Determine Pulmonary Capillary Pressure

To the Editor—We read the report of Collee et al., describing the least squares regression analysis technique for determining pulmonary capillary pressure (Pc), with a great deal of interest. We agree that the most important measurement of pulmonary lung water accumulation in critically ill patients is not the wedge pressure, but the prevailing capillary pressure.

The prevailing capillary pressure has been measured using isolated lungs that were not filtering or absorbing, i.e., in isogravimetric conditions. These isogravimetric capillary pressures agreed exceptionally well with an estimate of capillary pressure measured using arterial and venous occlusions. These studies were extended to measure the occlusion pressures in intact dog and human lungs. The manner in which the capillary pressure