

on the box and their terminal electrodes are fixed on the corresponding areas of the skin with small pieces of Steridrape®. All switches and outlets, as well as the coaxial cables, are identified with labels showing the sites of the electrodes' placement and hence stimulation.

Before the preparation of the surgical field, the electrodes are applied on the desired dermatomes of the skin (fig. 2) and the minimally perceptible electric stimulus determined. The tolerable sensations may vary among patients from a slight pinprick to a fleeting, painful sensation. Once the threshold intensity of current has been found, it must remain unchanged for the subsequent evaluations, although it may be changed for special studies. After the

epidural or spinal anesthesia has been completed, and at any time during the operation, it is easy to test for sensory level on either or both sides of the body by pressing the appropriate switches on the panel.

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(Accepted for publication September 24, 1979.)

Anesthesiology  
52:190, 1980

### Moisture-proofing the Beckman D2® Oxygen Analyzer

*To the Editor:*—The Beckman D2® oxygen analyzer does not function properly when moisture is allowed to enter the magnetic unit analysis cell assembly. Once water has entered the analyzer cell it must be replaced. Current replacement cost is approximately \$375, not including labor. To prevent this problem, a silica gel drying tube is provided to dry sample gas prior to entry into the unit. This drying tube is adequate when used with nonpressurized systems or ventilator circuits without PEEP. However, the silica gel drying tube is not capable of preventing entry of water when gas is sampled from ventilator circuits used to deliver higher levels of PEEP, especially when used with in-line nebulization therapy.

Hemodialysis units have used in-line venous pressure isolators (transducer filters) to prevent blood or fluid contamination of venous pressure monitors. We have adapted the Gelman transducer protector\* for use with the Beckman D2 analyzer to prevent water contamination of the analyzer cell. The filters contain a 0.2  $\mu$ m Acropor® hydrophobic membrane that acts as a barrier to any aqueous or aerosol medium, but allows free transmission of sampled gas. It is placed in the gas sampling line just prior to the silica gel drying

tube using a short length of disposable oxygen tubing. The filter need only be changed when it becomes wet.

We have tested D2 analyzers with this modification both in clinical use and with a lung simulator, using heated humidifiers, aerosol and ultrasonic nebulizers, tubing partially filled with water, and from zero to 25 torr PEEP, without being able to force water into the analyzer cell. The modified analyzers were compared with unmodified units regarding response time, reproducibility and accuracy. This modification does not produce any alteration in the functional characteristics of these analyzers. Prior to our regular use of this modification, we had been replacing eight to 12 magnetic unit analyzer cells per year. Following installation of these filters we have not replaced any unit because of water contamination.

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(Accepted for publication September 27, 1979.)

\* Product No. 6004185, Gelman Sciences, Inc., Ann Arbor, Michigan 48106.

Anesthesiology  
52:190–191, 1980

### An Anesthesiology Liaison Service

*To the Editor:*—In 1975, after serving for more than 25 years as the chairman of an anesthesiology department and as a program director for a residency

training program in anesthesiology, and after having experienced one major myocardial infarction, I made the decision to shed the stresses of anesthesiology

practice and to take up a position with the American Medical Association's Committee on Graduate Medical Education. As a Field Representative, my job has been to travel to various institutions where residency training programs were being proposed or were active to survey and to report on the quality of the residency training programs. My responsibility extended to nearly all types of residency training programs, not just to anesthesiology.

This has proven to be a very rewarding experience. Initially I anticipated that since my prior experience with residency training had been limited to anesthesiology, the likelihood would be that only programs in anesthesiology would hold a deep interest for me. This proved to be wrong. I found myself just as interested and capable of examining a residency in psychiatry as in anesthesiology. I found that in broad terms all residencies share a number of qualities (faculty, clinical material, physical facilities, administrative support), and the finer details of each discipline are not difficult to discern. This is made more precise by the fact that all programs must conform to a published set of "essentials" in order to qualify for accreditation. Perhaps one of the most rewarding aspects of this job has been the close contact with all the specialties. I liken it to being back in medical school, and my years in medical school were among the happiest years that I have experienced.

During the past four years I have seen some major changes taking place in several disciplines. In most instances these changes are related to a broadening of the commitment of that particular discipline into areas that traditionally have been given little attention. This broadening has served to break down the fences that have in the past succeeded in isolating that discipline from other specialties. There is today little disagreement with the proposition that what is needed in all disciplines is a holistic approach which fits together the patient with his (her) many signs and symptoms. A couple of examples may serve to clarify these thoughts. In psychiatry a major subspecialty has arisen which has helped to bring the psychiatrist out of the almost too comfortable surroundings of his consultation room. More and more departments have organized a liaison service whose members are assigned the responsibility, on a day-to-day basis, of seeing and treating those patients who have come to the hospital because of physical problems and have acquired an additional set of psychiatric problems. Experience has taught us that prompt attention to the psychiatric problems often can have a salutary effect on resolving the original medical problems, thus sparing the patients much anguish during their hospital stays.

In pathology, more and more departments are broadening the residents' contacts with patients and

clinical medicine. For years this was the practice at Presbyterian-University of Pennsylvania Medical Center in Philadelphia, and I am impressed with the fact that many pathology departments have come to adopt a similar approach, in a sense a pathology liaison service. Pathology residents are encouraged to visit the patient who has shown some unusual laboratory result. The resident brings back to the pathology conferences the details of the patient's clinical problems and the discussion takes on additional meaning. In one department which I visited recently the resident in pathology, together with his assigned attending physician, made patient rounds with the staff in internal medicine, armed with the updated laboratory data for specific patients. This practice brings an additional dimension to the residency training program.

It occurs to me that anesthesiology training programs should consider establishing liaison services. While it is no doubt true that anesthesiology has broadened its vistas by assuming responsibility in such related areas as the treatment of pain, the management of depressant drug overdosage, the handling of problems in ventilatory insufficiency, it is nevertheless true that anesthesiology's principal task is the proper management of clinical anesthesia. Too frequently a patient admitted to hospital for study and preparation in anticipation of surgical treatment is not seen by the anesthesiology service until the day before operation. Not uncommonly, the anesthesiologist will decide that the patient needs certain special treatment before being subjected to anesthesia. This then dictates a delay of the surgical procedure. I recall vividly a middle-aged patient with fairly advanced bronchiectasis who was admitted and scheduled for cholecystectomy the following day. On advice of the anesthesiologist, this operation was postponed for several days while the patient's pulmonary status was brought under proper control. Had this patient been seen before admission by an anesthesia liaison service, much of this preparation could have been performed on an outpatient basis and the patient spared needless hospital stay. Another case in point is that of an elderly patient, with a huge tumor of the thyroid which had progressed to where it produced marked pressure on the trachea, with very evident airway obstruction. A special type of endotracheal tube that would prevent collapse of the trachea during the operation was indicated. The anesthesia technique planned required the services of two experienced anesthesiologists. Fortunately, the anesthesia service had the opportunity to see the patient well in advance of the operation so that all matters could be carefully worked out.

The practice of consultation and evaluation in advance of proposed surgery is routine among anes-

thesiologists who specialize in anesthesia for cardiac surgery. They often attend preoperative conferences at which cardiac catheterization, electrocardiographic and radiologic data are presented and evaluated. This practice prepares the anesthesiologist in such a way that there should be no intraoperative surprises. Why limit this to cardiac surgery patients?

Finally, most patients are very knowledgeable about their surgeon but know very little, if anything, about their anesthesiologist. It is many times very difficult, if not impossible, for the patient to get to know the anesthesiologist during the standard preoperative visit. Indeed, the patient may appear to be listening to the anesthesiologist but may hear very little of what the anesthesiologist has to say during this visit. In that situation the anesthesiologist seems to be just one more interloper thrust upon him at a most inappropriate moment. How much more satis-

factory it would be if the anesthesiologist had seen and come to know the patient in advance of the operation.

How to organize an anesthesia liaison service would vary from hospital to hospital, depending on just what is expected of this service. It might start as an outpatient service, or an inpatient service, depending upon where the greater need is. In some hospitals it might involve both inpatients and outpatients from the start. One thing is certain: the value to all concerned, including the resident in training, is immediately evident.

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Anesthesiology  
52:192, 1980

### Audio vs. Visual Oxygen Alarm

*To the Editor:*—The use of an in-line oxygen monitor for anesthetic gas mixtures is rapidly becoming an established routine, considered by many to be essential for patient safety during inhalational anesthesia. Unfortunately, some models of these oxygen monitors are not as foolproof as they might be.

We recently became aware of a case in which a serious hypoxic incident was narrowly averted despite the use of an in-line oxygen monitor. In this instance, an Ohio 200 oxygen monitor was in use and had been correctly calibrated. Following this, however, it had been switched to the "visual alarm on" position, rather than the "audio-visual alarm on" position (fig. 1). When, subsequently, the hypoxic mixture of gases was accidentally selected, the anesthesiologist did not observe the small flashing warning light on the oxygen monitor that indicated a hypoxic mixture until the patient became cyanotic.

It is our opinion that any warning system should have a single on/off switch, and in the on position all possible warning systems should be activated (including visual and audible). Accordingly, we have modified all our oxygen monitors so that with the switch on either "on" position both visual and audible alarms are activated. We can see no reason for equipping a piece of safety equipment as vital as an oxygen alarm with a silent mode.

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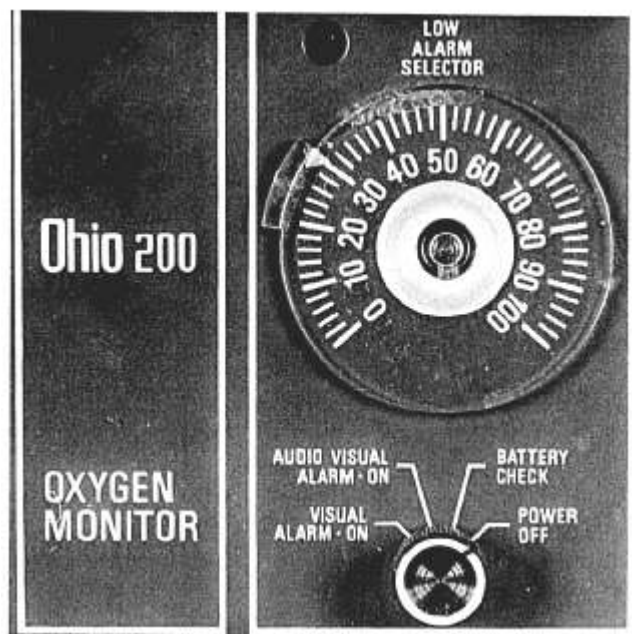


FIG. 1. The monitor, showing switch positions.

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(Accepted for publication September 28, 1979.)