nursing chart. We intend to continue to use this recovery record when our new building with a recovery room is completed. It also eliminates the problem of recording the care given to emergency cases operated on in the evenings, holidays, or weekends, when the recovery rooms in smaller hospitals are not functioning.

In the belief that other anesthetists in small hospitals may have a desire to change their anesthesia forms, I believe it may be of general interest to have this form publicized. It was printed locally, and I would be happy to hear what other men think of it.

LOUIS EISENBERG, M.D.
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CARBON DIOXIDE ABSORBERS

To the Editor.—I shall be grateful if you will allow me to reply to your correspondent Dr. H. P. L. Ozorio. (ANESTHESIOLOGY 18: 793, 1957).

Dr. Ozorio states that Waters' canister "remained faithful all these years." Surely he does not really mean this. Waters' canister is merely a container and so constructed as to make no provision for the prevention of canalization and dead space. These serious disadvantages are often responsible for many of the weird and dangerous phenomena which make their intrusion into general anesthesia. As a matter of fact, your correspondent admits using canisters in which provision is made for ensuring compactness of the granules by mechanical compression. However, I feel that Professor Pask's idea of using a scourer is not technically sound, since in compressing the granules the apertures in the scourer tend to become obliterated; thus the presence of a scourer in the canister will act as a hindrance to the expired gases. This is obviously undesirable; also, the partially blocked scourer cannot disperse the gases uniformly.

May I again stress the virtues of the improved carbon dioxide absorber (ANESTHESIOLOGY 18: 339, 1957): (1) The granules are compressed evenly but minimally by means of a spring on a movable stainless steel filter, thus avoiding uneven dispersal of the gases. (2) The elimination of dead space. (3) The extreme ease with which the canister can be filled. (4) Different size canisters can be used with the same screw-in heads for varying respiratory requirements.

DR. H. H. SAMSON
Johannesburg, South Africa

MOUTH-TO-MOUTH RESPIRATION

To the Editor.—A description of Dr. Peter Safar's technique of mouth-to-mouth respiration was published in ANESTHESIOLOGY 18: 904, 1957.

I wish to state that the same technique and device were reported by J. Graziano and myself (Respiración Boca a Boca, V° Congreso Argentino de Anestesiología, pp. 43–46, October 1955, Ed. Nocito y Raño, Buenos Aires) in Buenos Aires at the Fifth Congress of Anesthesiology, October 1955. Just to estimate the value of the method we did oximeter measurements in some apnoeic patients during mouth-to-mouth respiration with our airway, and the readings were always below normal (75 to 91 per cent) after the first one to three minutes. We did not check alveolar carbon dioxide, but most probably it must be also hard to get low or normal levels.

ACTUAL OXIMETER READINGS: *Case 1*—34 years, orthopedic operation, thiopental-ether-oxygen-Flaxedil. Oximeter: before apnoea, 94 to 96 per cent; during apnoea (1 minute), 70 to 80 per cent; during mouth-to-mouth respiration with special airway, 83, 86, 90, 86, 88, 84, 80 per cent; and oxygen with gas machine, 88, 90, 95, 98 per cent. *Case 2*—50 years, abdominal operation, thiopental-ether-oxygen-Flaxedil. Oximeter: during apnoea (30 seconds), 75 per cent; during mouth-to-mouth respiration (3 minutes), 80, 85, 83, 86, 87, 86, 84 per cent; oxygen with gas machine, 86, 90, 93, 95, 94 per cent. *Case 3*—electroshock therapy, succinylcholine (175 mg.), apnoea 5 minutes. Oximeter: before apnoea, 98 per cent; during apnoea, 83 to 77 per cent; during mouth-to-mouth respiration (1 minute), 90, 86, 91, 88, 80, 81, 88, 85

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per cent; oxygen with mask and bag, 86, 90, 93, 95, 94 per cent. *Case 4*—59 years, electroshock therapy, succinylcholine (200 mg.), apnoea 4 minutes. Oximeter: before apnoea, 90 to 93 per cent; during apnoea, 89, 90, 88, 85, 82, 80, 79, 78, 76 per cent; during mouth-to-mouth respiration (1 minute), 75, 76, 78, 89, 79 per cent; same plus oxygen, 79, 80 per cent; oxygen with mask and bag, 80, 82, 84, 86, 88, 90, 91 per cent; compressed air with mask and bag, 92, 91, 92, 90, 89, 86 per cent.

This result is quite reasonable since the lungs are being ventilated with a mixture of the patient's dead space air plus the operator's dead space air and expired air. The greater the volume of air blown into the lungs by mouth the larger will be the expired fraction of the mixture.

The technique works nicely in infants and small children whose tidal volume is smaller, equal to or not much greater than the operator's dead space, which is composed of pure atmospheric air after inspiration and before blowing through the pipe. We believe that mouth-to-mouth respiration in adults may be a life-saving resource for a very few minutes, just the time to get something better in a hurry.

DR. JUAN A. NESI
Caracas, Venezuela

To the Editor.—This is a reply to Dr. Nesi's letter.

Mouth-to-mouth breathing was done many centuries ago. Actually, "the Lord breathed life into the first man."

Dr. Nesi's paper is unknown to me, and I cannot find it in any library in Baltimore. I am looking forward to receiving a reprint. Significant contributions by colleagues of foreign countries should be made more easily accessible to the rest of the world.

Dr. Nesi found ear oximeter values slightly below control levels during mouth-to-mouth breathing in curarized adults. *How much air did he move with each breath?* Probably too little. Elam and associates showed that during expired air inflation in the adult one must double the victim's normal tidal volumes to maintain normal oxygen and carbon dioxide values (New England J. Med., 250: 749, 1954). We confirmed Elam's data (ANESTHESIOLOGY 19: 111, 1958). Also by inhaling deeply *immediately* before blowing the rescuer can increase the amount of dead space air in his expired sample. With forceful blowing, prevention of air leakage and optimal head and jaw support our lay rescuers maintained the victims' oximeter values slightly above normal and the end-expiratory carbon dioxide values slightly below normal even in heavy curarized adults during periods of up to 30 minutes.

Let us assume the rescuer produces Dr. Nesi's oximeter values of 75 to 91 per cent because of too small inflations. The victim is still better off this way than with *no* ventilation during performance of a push-pull method (New England J. Med. 258: 671, 1958) or with *no* ventilation because the rescuer is searching for oxygen equipment. I agree with Dr. Nesi that after initial reoxygenation by any mouth-to-mouth method one should change as soon as possible to a method using 100 per cent oxygen. We learned, however, that people not trained in anesthesiology often are unable to ventilate an apneic patient by bag and mask because of difficulty in holding both the mask and mandible with one hand.

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