Rearranging:

$$P_{\bar{E}CO_2} = \frac{P_{ACO_2} - \dot{Q}_s/\dot{Q}_t P_{\bar{V}CO_2}}{1 - \dot{Q}_s/\dot{Q}_t}$$

The Bohr equation where $P_{\bar{E}CO_2}$ is used for P_{ACO_2}:

$$\frac{V_D}{V_T} = \frac{P_{\bar{E}CO_2} - P_{\bar{E}CO_2}}{P_{\bar{E}CO_2}} \quad (2)$$

Substituting for $P_{\bar{E}CO_2}$:

$$= \frac{\dfrac{P_{ACO_2} - \dot{Q}_s/\dot{Q}_t P_{\bar{V}CO_2}}{1 - \dot{Q}_s/\dot{Q}_t} - P_{\bar{E}CO_2}}{\dfrac{P_{ACO_2} - \dot{Q}_s/\dot{Q}_t P_{\bar{V}CO_2}}{1 - \dot{Q}_s/\dot{Q}_t}} \quad (3)$$

Rearranging:

$$= \frac{P_{ACO_2} - \dot{Q}_s/\dot{Q}_t P_{\bar{V}CO_2} - P_{\bar{E}CO_2} + \dot{Q}_s/\dot{Q}_t P_{\bar{E}CO_2}}{P_{ACO_2} - \dot{Q}_s/\dot{Q}_t P_{\bar{V}CO_2}}$$

Finally, we have the revised deadspace equation:

$$\frac{V_D}{V_T} = \frac{P_{ACO_2} - P_{\bar{E}CO_2} - \dot{Q}_s/\dot{Q}_t (P_{\bar{V}CO_2} - P_{\bar{E}CO_2})}{P_{ACO_2} - \dot{Q}_s/\dot{Q}_t P_{\bar{V}CO_2}} \quad (4)$$

This form of the equation closely resembles the original Bohr equation and should permit easy determination of deadspace (V_D) in the presence of shunts ($\dot{Q}_s/\dot{Q}_t$) greater than 20% of cardiac output.

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Reference

1. Rossier, P. H., Buhlmann, A. A., and Weisinger, K. (Luchsinger, P. C., and Moser, K. M., editors and translators): Respiration: Physiologic Principles and their Clinical Applications. St. Louis, C. V. Mosby, 1960, p. 58.

To the Editor:—We would like to thank Dr. Waltuck for confirming the mathematical accuracy of our modification of Enghoff's modification of the Bohr equation. We agree with him that our revision is cumbersome and difficult to commit to memory. Unfortunately, his rearrangement has not resolved these limitations and, although superficially it may appear easier to use, it actually involves one additional mathematical step for its final solution (2 multiplications, 4 subtractions and 1 division, compared with 4 subtractions and 2 divisions with our equation). In our equation the component which is equivalent to $P_{\bar{E}CO_2}$ is located in the same positions as P_{ACO_2} in the familiar Enghoff's modification of the Bohr equation. This symmetry between the two equations is not apparent in Waltuck's rearrangement which, incidentally, bears no obvious resemblance to the original Bohr equation. In practice we use a small computer to calculate V_D/V_T so that the exact arrangement of the terms is unimportant.

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Safety and Performance of Anesthesia and Ventilatory Equipment

To the Editor:—In response to widespread interest in the safety and performance of anesthetic and ventilatory equipment, expressed by anesthesiologists, by congressmen, and by the FDA, the American National Standards Association's Sectional Committee Z-79 has formed subcommittees to work on performance standards.

At a recent panel discussion at the N.Y.S.S.A., PCA, "Problems with Anesthesia and Ventilatory Equipment," under the chairmanship of Eugene L. Nagel, M.D., 48 questions were received from the audience reporting serious problems that had arisen with such items as endotracheal tubes and cuffs, vaporizers, gas pipelines and fittings, flowmeters and ventilators.

Our engineering colleagues on the Subcom-

mittee for Anesthesia Gas Machine Performance Requirements have asked that we seek out and collate the problems which are being experienced with apparatus throughout the country, as a first step in the evolution of pertinent performance specifications.

To dispel reticence owing to fear of possible legal action, we ask that, though the precise type and make of apparatus used be specified, the names of the people involved and the institution should not be given. All replies will be submitted to both the manufacturer's engineers concerned and the engineers on the subcommittee so that they may evolve specification for better and safer equipment.

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Obstetrics and Pediatrics

STEROIDS IN CROUP The value of a single large dose of dexamethasone sodium phosphate in children with acute croup was assessed in a controlled double-blind study. The signs of respiratory obstruction subsided more rapidly in the dexamethasone-treated patients, but the average hospital stay was not significantly reduced with dexamethasone. Croup is a symptom complex with multiple etiologies, and it is possible that the cases in the control and experimental groups may not have been comparable in cause or severity. Hence, the results of this study should be interpreted with caution. (*James, J. A.: Dexamethasone in Croup—a Controlled Study, Amer. J. Dis. Child. 117: 511 (May) 1969.*)

SURGERY FOR CONGENITAL DEFECTS The pediatric surgeon must question the value of investing large expenditures of skilled medical nursing time, and monetary expense, to save newborn infants who have severe congenital defects. Physically malformed infants are classified as follows: 1) infants likely to be completely cured by surgery; 2) infants who after treatment will be handicapped to some extent but still may be able to lead relatively normal lives; 3) infants who after treatment will have severe physical handicaps and will have to lead more or less sheltered lives; 4) infants in classes 1 to 2 who, in addition, are of subnormal intelligence but can be trained to a point; 5) infants in classes 1 to 3 who, in addition, will be idiots leading vegetable existences. Theoretically, all but Class 5 are operated upon. In practice, ordinary or obligatory means of preserving life are distinguished from the extraordinary or unobligatory. Ordinary treatment is treatment carried out with a reasonable degree of success and for which satisfactory aftercare exists. In localities where it is clearly impossible to operate on all neonates and to give them satisfactory aftercare, priority should be given to the infants in the highest classification. If the operation is denied, infants should be given all natural means of preserving life (food, diet, etc., good nursery care, and appropriate means to relieve pain). The author prefers not to use antibiotics. Contrary to popular belief, there are not great differences of opinion on these matters among men of different religious denominations. (*Rickham, P. P.: The Ethics of Surgery in Newborn Infants, Clin. Pediat. 8: 251 (May) 1969.*)