

institution of treatment than with delayed treatment."

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BOOTHBY, W. M., MAYO, C. W., AND LOVELACE, W. R.: *One Hundred Per Cent. Oxygen. Indications for its Use and Methods of Administration.* J. A. M. A. 113: 477-481 (Aug. 5) 1939.

Rationale of and Indications for Administration of 100 per cent. Oxygen. Basic physiologic principles and factors are:

1. Blood transports oxygen from lungs to tissue and carbon dioxide from tissue to lung.

2. The partial pressure of oxygen is a factor in the degree of saturation of the blood. One hundred per cent. oxygen increases the tension 10-15 per cent.

3. Ten or 15 per cent. increase in oxygen may appear to be very little, but its importance is greater in conditions which slow up circulation as an 80 per cent. desaturation occurs rather than the usual 40 per cent.

4. The gradual expiration of the tissue nitrogen will lead to removal of intestinal nitrogen. This in conjunction with a Miller-Abbot tube will greatly relieve distention.

5. Indefinitely defined types of severe headache may be relieved by 100 per cent. oxygen. This is also true of headache after encephalography. Alcoholic morning-after headache may be relieved.

6. Reduction of pathogenicity of bacteria is little explored, but in cases of anaerobic infection, the increased oxygen tension is directly antagonistic, and in addition, quickly removes the emphysema.

7. Massive atelectasis may be symptomatically improved until bronchoscopy or other therapy can be instituted. Pulmonary edema may be benefited by the increased aeration and

also by some drying effect on lungs if 5 mm. of water pressure is used.

8. The pain of some types of heart disease may be relieved.

Lack of Pulmonary Irritation from Inhalation of One Hundred Per Cent. Oxygen

The authors have never observed a case of pulmonary irritation attributable to 100 per cent. oxygen, but they never use it longer than 48 hours at a time. They have administered it intermittently for several days.

Apparatus for Inhalation of Oxygen

The familiar B.L.B. mask is described.

L. O.

TUOHY, E. B., AND LUNDY, J. S.: *Intravenous Administration of Blood and other Substances for Surgical Purposes.* S. Clin. North America 20: 1093-1106 (Aug.) 1940.

"In general, intravenous therapy is usually considered for the following purposes: (1) to replace lost fluid or circulating blood, (2) to combat dehydration of tissues, (3) to reduce dehydration of tissues in certain instances, and (4) to promote specific types of chemotherapy. . . . The anesthetist must recognize the purpose for which a certain type of fluid is administered and use the agent carefully. For the most part, solutions of physiologic salt and dextrose are most frequently administered intravenously preoperatively and postoperatively. The salt content of the blood is an important governing factor in the interchange of fluids between the cellular tissues of the body and the blood stream. Whenever carbohydrate cannot be taken orally, dextrose is commonly administered in a solution of 5 or 10 per cent. In the presence of a diminished protein content in the plasma, the use of acacia or a trans-

fusion of blood or blood plasma may be more efficacious than solutions of salt or dextrose in the maintenance of proper osmotic tension in the circulating blood. . . . During surgical procedures intravenous therapy is usually initiated to thwart or prevent the occurrence of surgical shock. Solution of acacia (6 per cent. in physiologic salt solution) or citrated blood is most commonly employed. . . .

"Because of the flexibility of the indirect method of transfusion (citrate or other anticoagulant), it is usually preferred in our experience to the direct method. The relative incidence of reaction when the direct method is used may be slightly less than when indirect methods are employed, but the practicability of the direct method is not sufficient to warrant its routine use, especially when a large number of transfusions are to be performed. Likewise, now that the storage of blood is rapidly becoming an important development in transfusion work, the direct method is less attractive than it was. A refrigerator of reasonable size, of which the temperature can be controlled so that freezing can be prevented, is satisfactory for storing blood. The optimal temperature is about 40 F. Refrigerated blood three to four weeks old has been administered to patients without occurrence of untoward results, but the optimal time for the utilization of stored blood is two weeks or less after the blood has been put in storage. If the stored blood shows any evidence (grossly) of hemolysis or clotting, it should be discarded. . . . Donors of blood are classified as 'professional' and 'non-professional,' and in each instance the donors are classified as to blood groups according to both the Moss and Landsteiner classifications. Crossmatching between donors and recipients is performed in certain cases, but not as a routine procedure. Group IV (O) blood (universal donor) is used for the

purpose of emergency transfusions or when patients whose blood is in group IV (O) require transfusion. Individuals of other blood groups are usually transfused with blood of donors of homologous groups. Group I (AB) is the type of blood which is compatible with all other blood groups and is therefore recognized as blood of the universal recipient. A flocculation test for syphilis is done on blood of all donors, and all professional donors should receive an annual physical examination which includes leukocyte and erythrocyte counts and hemoglobin estimations. Professional donors may be used every four to six weeks if needed, but once every eight weeks is the frequency preferred. Each time a professional donor is called for transfusion, he or she should be required to present a card on which are listed such data as the result of the Wassermann test, blood group, certification of physical fitness and the donor's signature. . . .

"Only those people whose veins are of medium to large size should be used as professional donors. After the vein to be used has been identified, the skin over the site of puncture is surgically prepared and anesthetized with a solution of 1 per cent. procaine. . . . A needle of large caliber, the size of which depends on the size of the vein, is attached to a rubber tube, 15 inches (38 cm.) long and of relatively small lumen, and the needle is inserted into the vein. A 13 gage Lewisohn needle is recommended for the larger veins, and a 15 gage needle for veins of medium size. It is difficult to overemphasize the importance of using phlebotomy needles of adequate size and rubber tubing of which the lumen is of proper size, because most difficulties which arise in withdrawal of blood are caused by the fact that too small needles are introduced into the vein, and the inside diameter of the tubing

which leads to the bottle that is to hold the blood is either too large or too small; under such circumstances the blood frequently clots. The tubing should be made of pure para rubber and the inside diameter of the tubing should approximate the diameter of the hub of the needle as closely as possible. . . . The donor should alternately open and close his hand while blood is being withdrawn, to hasten the flow. . . . When the needle tends to occupy almost all the lumen of the vein, the needle should be introduced so that it points in the opposite direction to the flow of venous blood. When the veins are large, the needle may be introduced into the vein with or against the venous stream. The blood is collected in a graduated glass bottle of a capacity of 500 cc., into which has been poured 50 cc. of physiologic salt solution containing 18 grains (1.16 gm.) of sodium citrate. . . .

"The free end of the rubber tubing leading away from the phlebotomy needle is held in one hand and the bottle is gently oscillated to insure thorough mixing of the anticoagulant with the blood. Stirring rods are not used. The bottles in which the blood is collected are capped with rubber stoppers and metal collars are screwed securely on the necks of the bottles, holding the rubber stoppers in place. There are two holes in each rubber stopper, one to allow a glass 'breather' tube to extend practically to the bottom of the bottle, and the other to permit a glass vacodrip adapter to be inserted when blood is administered; this latter device makes it possible to utilize the vacuum principle on which the bottle is designed. . . . The technic of administering blood does not vary particularly from that of administering physiologic salt solution or solutions of dextrose, except that someone should time the rate of flow of blood and limit it to 15 cc. or less per minute. If the

patient complains of any discomfort such as dyspnea, chills, or itching, administration of the blood should be stopped, for at least such a time until the patient's condition has improved. If administration is started again under the same circumstances, the rate must be slower than it was previously. Urticaria usually can be treated satisfactorily by means of the hypodermic injection of epinephrine. Application of hot water bottles and warm blankets will usually suffice to alleviate distress associated with chills."

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KARTASHEVSKIY, N. G.: *Blood Transfusion Technique*. Report from Military and Marine Hospital and Station of Blood Transfusion. *Khirurgiya (Surgery)* No. 1, 1939, pp. 170-172.

The author expressed his opinion about the necessity of applying a special method of so-called "prolongated, slow drop blood transfusion." This method has particular value in very anemic patients, and when repeated large quantities of blood are desired. One of the very important factors emphasized in this method is: Maintenance of temperature of the blood between 36°-38°, and special construction of the apparatus.

The techniques of warming the blood described by different authors are not adequate enough; as for example, one of them is placing a hot water bottle on the flask of blood. This does not maintain the temperature, the blood cooling off while passing through the rubber tube. It is well known that transfusions of cool blood cause reactions (chills and elevation of temperature) which are undesirable and in most cases call for discontinuation of the blood transfusion.

Description of Apparatus.—A spiral glass tube is connected with a system of rubber tubes through which blood