HERSHENSON, B. B.: *Some Observations on Anesthesia for Neurosurgery.* New York State J. Med. 42: 2111–2117 (Nov. 15) 1942.

"Our procedure of choice is to induce anesthesia in a lightly premedicated patient with a gaseous agent, using a closed inhalation system. When unconsciousness is reached, and to permit anesthesia to progress to the desired plane (the second plane of the third stage) without oxygen want, potentiation of the mixture may be had by the addition of a small increment of ether vapor. Cyclopropane has been employed as the agent of choice when indications for its use are present. Having accomplished the desired objectives—i.e., sufficient muscle relaxation and cord abduction—an attempt at direct intubation with a fairly large airway carrying an inflatable cuff is made. Should an adductor spasm or need for suctioning arise, the mask is reapplied and the depth of anesthesia readjusted for intubation. In the case presenting a bullneck and in other special problems an attempt at blind nasal intubation may be more practicable. . . . In the operating room the patient is placed in the position required by the neurosurgeon. A system of mirrors is so arranged that the surgeon can see the anesthetist and the anesthetist can see the field of operation. The anesthetic unit is placed next to the anesthetist but away from the surgeons. The anesthetist may now be so stationed that the patient's chest and at least one arm are available for observation and opportunity exists for observing and recording essential data. The closed absorption system is now smoothly conducted in the lightest possible planes of anesthesia. This system is supplied with air to which oxygen is constantly supplied at such a rate as is required to meet the metabolic needs of the particular patient. . . . The inhalation anesthetic agent is added at such increments to the enclosed air as is necessary to maintain the desired plane for the conduct of smooth anesthesia. . . . Provided such a closed system as we have described is used, of all known and available gaseous agents cyclopropane possesses certain fundamental physiologic and pharmacologic advantages for the modern neurosurgical team." 10 references.

J. C. M. C.

MORGAN, A. D.: *Shock and Anaesthesia in Relation Thereto.* M. J. Australia 2: 193–198 (Sept. 5) 1942.

"Treatment of shock is no longer the responsibility of a single person, but is jointly undertaken by the surgeon, the anaesthetist and often quite a team of assistants. For the best results it is important that this teamwork and team spirit should be developed to a high degree. . . . General therapeutic measures are all well understood, universally accepted, and should be applied without delay in all cases of shock. They are as follows. The causative factors producing shock should be removed or controlled . . . so far as these are possible without an anaesthetic. . . . The importance of rest cannot be too strongly stressed. . . . The administration of adequate morphine for the relief of pain is an essential measure of treatment. . . . Morphine dosage should never be empirical in cases of shock. . . . Promotion of warmth, or rather the minimization of heat loss, can be assisted by the use of warm blankets, radiant heat and hot air; but by far the most satisfactory method is a special room in which both heat and humidity can be controlled. Whatever differences of opinion may exist about many aspects of shock, there is universal agreement that its end result is diminished tissue respiration — anoxia. Oxygen in adequate dosage, then, is always necessary in the treatment and prophylaxis of shock. . . . In blast injury, in which the al-

veoli of the lung are filled with blood and exudate, there is lessening of the exchange of oxygen from the alveolar air to the blood. In these cases, the subcutaneous and intravenous routes for the administration of oxygen may have a useful place. The oral administration of warm, sweetened drinks provides an excellent means of giving fluids to conscious patients who are not vomiting. Continuous rectal drip administration of water can be quite efficient if details of technique are carefully observed. . . . It is well to recall that fluids administered by the rectum enter the blood stream via the portal circulation, where they collect plasma proteins. Consequently, they do not lessen the concentration of plasma proteins. It is my experience that glucose and salt solutions are not absorbed so readily from the rectum, and that if they are used they will lessen both the volume absorbed and the time for which the catheter will be tolerated. . . .

"In all cases of severe shock the intravenous route is necessary for the administration of fluid. . . . Whereas only a few years ago normal saline solution and blood were used, there are now available many fluids which can be employed. . . . The employment of some special fluid for intravenous therapy in shock requires an understanding of the exact condition of the patient. In the diagnosis of the type and degree of shock present, ordinary clinical methods are of little use. Some information can be obtained from the history, the general appearance and an ordinary clinical examination. The nail bed reflex can give information about the degree of stasis present in the capillary bed. A falling blood pressure and a rising pulse rate indicate rapid deterioration of the patient's condition. Conversely, a rising blood pressure and a falling pulse rate indicate improvement. The compensatory constriction of the vessels and of the spleen keeps the blood pressure within normal limits, long after permeability of the capillary endothelium and haemoconcentration prove the existence of shock. Therefore, little reliance can be placed on a normal blood pressure reading when the presence of shock is suspected. . . . Haemoconcentration is measured by the haematocrit, and a sufficiently accurate reading can be obtained in ten minutes. A blood count and a haemoglobin estimation also give an indication of the haemoconcentration, but are less reliable. The plasma protein content is calculated by a formula from the specific gravity. So far, we have not been able to make this estimation quickly enough for it to be of value in diagnosis. . . .

"In acute blood loss we have a definite clinical picture of shock, a low cell concentration and a plasma protein content within normal limits. . . . A blood transfusion is required, and the amount given should be sufficient to raise the haemoglobin value to 10 grammes per 100 cubic centimetres of blood (about 60%). Each 500 cubic centimetres of blood can be expected to raise the haemoglobin value by 10%. . . . In burns, peritonitis from ruptured ulcers, or infection resulting in the pouring into the peritoneal cavity of large quantities of fluid rich in protein, increased cell volume and great protein loss are present. . . . Treatment is by plasma or serum given in large amounts, as much as four litres being necessary in as many hours. Saline solution should not be used intravenously in these cases, as it further increases fluid loss from the seriously damaged capillary bed to the tissues and decreases the protein content in the plasma to the level at which oedema follows. Blood raises the plasma protein concentration, but also increases the cell concentration and the viscosity of the blood. If serum or plasma is not available, blood is next best. . . .

"Acute water loss occurs in dehydration from lessened intake or excessive loss of fluid (diarrhoea, vomiting, sweating) or in shock of traumatic or post-operative origin. There is an increase in cell volume, together with an increase in the plasma protein content. The condition may be sufficiently severe to cause acute shock, but is more frequently in existence as a pre-operative condition, and is not recognized till the added strain of surgical measures and anaesthesia have increased its severity. Treatment is by the intravenous administration of saline solution, with or without the addition of glucose. The use of blood, plasma or serum is contraindicated, as each of them would tend to make the condition worse by increasing the cell concentration and the plasma protein content. The amount will vary according to the severity of the condition. . . . Anaemia and dehydration are seen together in such conditions as pyloric stenosis with vomiting and malignant disease of the colon with diarrhoea. . . . From the point of view of treatment, the low cell concentration produced by anaemia is the important factor, and blood must be given before operation in quantities sufficient to raise the haemoglobin value and number of cells to normal limits. . . .

"There are other conditions about which our knowledge is still far from complete. In this group will be considered such injuries as crushing injuries, multiple wounds or fractures of the limbs, or both in conjunction, and head and chest injuries. In such cases shock of the utmost severity may be present. . . . In this connexion the tests already referred to will prove of the utmost value in diagnosis. The present state of our knowledge would suggest that four conditions are present: (i) decreased circulating volume of blood. (ii) constriction of arterioles and venules, (iii) capillary stasis, (iv) loss of fluid into the tissues (haemoconcentration). Treatment must be directed towards the correction of each of these. There is no substance known which will specifically release the spasm of small vessels. However, it is known that in these cases there is a loss in the plasma content of sodium, in spite of the increased cell volume. It would, therefore, seem reasonable to commence treatment by the intravenous injection of normal saline solution. . . . Suprarenal cortical extract, . . . when used in sufficient dosage, has a pronounced effect in restoring capillary tone and governing the distribution of electrolytes. . . . It now remains to maintain in the circulation the fluids which have been added and restored. This will be best achieved by the introduction into the blood stream of a substance with an osmotic tension sufficient to prevent further loss to the tissues—namely, blood, plasma or serum. In most cases plasma or serum will prove superior to blood. . . . The time factor in the treatment of shock is recognized as being of the greatest importance. . . .

"It will be seen from the foregoing remarks that the response to treatment is the only guide to the important question of when to operate. . . . The important point for consideration is whether the causative factor is still active or whether it can be controlled. In cases in which it cannot be removed or controlled without operation the necessary operation must be undertaken as early as the condition of the patient will permit. But if the cause can be removed or its effect controlled, then operation should be delayed till the maximum improvement in the patient's condition has been achieved by treatment. . . . The end result of shock, whatever the cause may have been, is diminished tissue respiration—anoxia. The first requirement for an anaesthetic agent to be given to a patient in even a slight degree of shock is oxygen. Thus, generally speaking, the

anaesthetic agent which permits the use of the greatest amount of oxygen will prove the safest. . . .

"Every anaesthetist will have his own preference, and it is well to remember that well-given ether and oxygen are safer than badly given nitrous oxide or cyclopropane. I would therefore suggest that, providing sufficient oxygen can be given and the airway kept open, a safe rule is to employ the anaesthetic agent you know best for use in shock. In my own experience I have had excellent results from the use of 'pentothal sodium' with the addition of oxygen. In some cases a Magill tube has been employed to maintain a good airway. When necessary this is introduced under local anaesthesia before the intravenous injection is begun. . . . Local infiltration and field block in expert hands have a wide range of usefulness, ether alone or combined with general anaesthesia. . . . 'Avertin,' chloroform and spinal analgesia are contraindicated for patients suffering from shock. . . . The anaesthetic technique in war injuries of the chest is the same as that frequently used for lung surgery in civil practice. It is called controlled respiration. In connexion with acute intestinal obstruction there are two problems for the anaesthetist: vomiting and distention. . . . If the amounts of vomitus are small, it is wiser to omit the wash-out and rely for induction on a rapidly acting agent, such as 'pentothal sodium,' then deepen the anaesthetic level and pass an endotracheal tube fitted with an inflatable cuff. Once this is in place, the administration of the anaesthetic agents, such as nitrous oxide, oxygen and ether, may proceed with safety. . . . If distention is the predominant feature, it may be well to consider employing spinal analgesia, this being the one exception that proves the rule about not using spinal analgesia in shock."

J. C. M. C.

LAHEY, F. H.: *Participation in the War Effort*. Lahey Clin. Bull. 3: 66–68 (Jan.) 1943.

"Soon after the declaration of war this Clinic arranged to provide opportunities for the training of commissioned and enlisted personnel of the armed forces. It seemed obvious that in a clinic with such an ample supply of clinical material, special training could be provided along lines valuable to the medical personnel of the armed forces, particularly in such fields as anesthesia, roentgenology and laboratory and x-ray technic. A request was made to Admiral McIntire, Surgeon General of the Navy, and General Magee, Surgeon General of the Army, that men be assigned to this Clinic for such training, and promptly commissioned officers from the Navy were assigned in anesthesia and roentgenology, and Naval corps men were assigned for training in x-ray and laboratory technic.

"It has proved possible to turn out quite well trained anesthetists in a six months' period in the Department of Anesthesia under the direction of Dr. U. H. Eversole and his staff. This course consists of the administration of anesthetics, instruction in the operating room and during the regular meetings of the anesthesia staff, with a review of articles, the presentation of papers and the discussion of problems. Each man personally gives approximately 500 anesthetics of various types, with less and less guidance as he demonstrates his ability to work independently. Experience is obtained in anesthesia for neurosurgery, ear, nose and throat surgery, urologic surgery, bone and joint surgery, and all types of general surgery. A great many spinal anesthesias with pontocaine, nupercaine, and fractional spinal anesthesia are administered for procedures below the diaphragm. Experience is obtained in the use of pentothal