

fatal pulmonary embolism following any type of operation is only 0.77 per cent. The actual differences between the incidence in various types of operations are comparatively small. Any program for preventive treatment of postoperative thrombosis and embolism must take into consideration the fact that the incidence of these complications is small even in operations such as splenectomy, hysterectomy and resections of the stomach or bowel, and of necessity such a program must be used in several thousand consecutive cases before its effectiveness can be truly evaluated."

J. C. M. C.

RIPPY, E. L.: *Perforating Gunshot Wounds of the Abdomen; an Analytic Study and Statistical Review of Two Hundred and Ninety-two Cases*. J. A. M. A. 115: 1760-1765 (Nov. 23) 1940.

"This paper is based on a study of 292 cases of gunshot wounds of the abdomen with visceral perforations which occurred in Nashville, Tenn., during the period of 1923-1939. Of the 24 cases in which exploration was not done there were 23 deaths, or a mortality of 95.8 per cent. However, of 268 cases in which exploration was done there were 166 deaths, or a mortality of 61.9 per cent. . . . This study shows convincingly that the amount of hemorrhage is the greatest individual factor in the mortality irrespective of the organ damaged. . . . Ninety-nine (30.4 per cent.) of the 292 patients were given transfusions for from one to ten times, which affords a sufficient number of cases to study the value of this procedure. . . . In the total it was found that of the 99 given transfusions the mortality was 63.5 per cent.; in the 123 not given transfusions the mortality was 71.5 per cent. Thus in those who received blood the mortality was

8 per cent. lower than in those not receiving blood. . . .

"Ether was the anesthetic of choice as it gave the required relaxation not associated with very much shock. Spinal anesthesia was only occasionally used, as it causes too much drop in the blood pressure, which is often already at a dangerously low level. Another practical objection to spinal anesthesia is the fact that it may cause contraction of the intestine, forcing more of the intestinal contents out into the abdominal cavity. Local and gas anesthesia did not give the proper relaxation and made it necessary for the operator to fight the intestine, causing further shock and squeezing more material out into the peritoneal cavity. Ether was used in 244 cases, with a mortality of 61 per cent.; in the remaining 24 cases in which local, gas or spinal anesthesia was used the clinical notes were insufficient for accurate statistical analysis. Paradoxical as it may seem, the mortality decreased in inverse proportion to the length of the operation." Bibliography—6 references.

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RAVITCH, M. M.: *The Blood Bank of the Johns Hopkins Hospital*. J. A. M. A. 115: 171-178 (July 20) 1940.

"In the early part of 1939 the work of the Cook County Hospital in Chicago led to the establishment here of a blood bank suited to our purposes, and the bank was opened in March. After a period of several months a combination of circumstances, some to be detailed later, led to the necessity for the adoption of new rules and for a reorganization. The difficulties which arose and the measures taken to obviate them are of some interest. The horizontal disposition of the hospital units (built on the old 'pavilion' plan instead of the modern, vertical, skyscraper plan) presented physical diffi-

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culties, and the strict division of personnel into the several hospital services complicated the problem of organization. The considerable proportion of Negro patients also constituted one of the primary problems. Although there is, of course, no valid objection on biologic or physiologic grounds to the transfusion of patients of one race with blood from donors of another, it has been deemed best to avoid the issue. . . .

"The bank is housed in a small room adjoining the laboratories of the Biological Division of the Medical Clinic. The room is furnished with the technician's desk and microscope, a table for centrifuge and shaking machine, a long table for wrapping the transfusion sets, and a two burner gas range for boiling and processing tubing and glassware. There is also a large sink equipped with several spigots to which tubing may be directly attached. The sink is lined with sheet sponge rubber to minimize breakage of glassware. A drainage rack for bottles and a cabinet for supplies and the storage of sets complete the equipment. The transfusion sets are sterilized in the autoclaves of the central sterile supply room of the hospital. The blood is stored in one compartment of the refrigerator of the Biological Division, in which the temperature is kept constantly at 35 F. The compartment contains two shelves, one for blood from white donors and one for blood from Negro donors. . . .

"Blood obtained from the bank for private patients must be repaid with blood and may not be bought directly from the bank for cash. The blood for replacement must be obtained either from a family donor or from a professional donor paid by the patient. . . . We have established a quota system. The original quota was, for each race, five flasks of O blood, four flasks of A blood, three flasks of B

blood and no flasks of AB blood. We have since revised these quotas to five, four and two for the white and six, four and two for the Negro race. . . . When donors present themselves, the house officer in the ward questions them with regard to syphilis and antisyphilitic treatment and performs macroscopic groupings, equipment for which purpose, supplied with high titer grouping serums, is present in every ward. The bank is then offered its choice of blood in the available groups. Our quota restrictions are not rigid and we permit an excess of one or even two flasks in the O or A group. . . . In the trial period of the bank, from March through July, blood was kept for only seven days. We have increased the period of maximum permissible storage to ten days, but for the past six months the average age of blood when used has ranged from month to month between three and one-half and four and one-half days. . . .

"The house officer takes to the ward the donor set, a blood bottle in which there is already 50 cc. of 5 per cent sodium citrate for the 500 cc. of blood usually drawn, a numbered transfusion card to which is attached a tag with the same serial number and a small cloth sack. . . . It is not necessary for the operator to wash, to scrub or to wear sterile gloves. It is far safer for him to remember that his hands are not sterile and to observe the elementary precaution of avoiding contact with the needle, the prepared skin or the portion of the vent tube which enters the bottle. The bottle is inverted once so that citrate will moisten the metal plunger, which in turn as the metal cap is withdrawn, moistens the sides of the hole in the rubber bushing for easier subsequent insertion of the vent tube. The metal cap is removed from the bottle with the cloth cover in place so that the cap may be freely handled without fear of

contaminating the rubber bushing, cap and cover being removed together. The vent tube is held between the fingers at its junction with the rubber tubing, the muslin shield protecting the portion which must remain sterile. The vent tube is inserted through the rubber bushing and the shield held in place by the rubber band. . . . While the blood is being drawn, the flask is tilted so that its rotation will produce an eccentric motion of the blood. . . . The needle is withdrawn, the vent tube removed from the bottle and the bottle capped with the separately wrapped metal cap. . . . The blood in the tubing is permitted to flow into three tubes, all contained in the set. . . . When blood is needed for a transfusion there are sent to the banks two tubes, one containing the patient's clotted blood, and the other two drops of his blood suspended in 8 cc. of 0.85 per cent. saline solution. We require each tube to be labeled with adhesive tape. The request slip accompanies the samples. The patient's blood group is determined and his blood cross matched with the oldest available blood of the same group and race. If the same group is not available, or a good matching is difficult to achieve, we use group O blood. . . .

"The house officer takes to the ward the recipient set, the bottle of blood, the transfusion card and the attached matching report after making an entry in the service book. The small tubes with cells and serum are left behind for recheck in the event of a reaction. We have followed the lead of other blood banks and administer our blood unwarmed except for exposure to room temperature during preparation for the transfusion. . . . Numbers, names and groups having been checked as required, the bottle is inverted several times and the metal cap is removed. Because the blood is drawn warm, hermetically sealed, and then placed in a refrigerator, there is

formed a partial vacuum and the inrush of air during removal of the metal cap is audible. The long vent tube is now inserted, the bottle inverted and air driven from the system. It is necessary to hold the inverted bottle down and the tubing up, these positions being slowly reversed in order that the bead filter chamber may fill slowly and not trap air. If the vein is not large, house officers are advised to use a syringe and needle for the venipuncture to twist off the syringe and replace it with the glass adapter of the transfusion set. . . . A transfusion of 500 cc. is expected to take at least half an hour. By stripping the tubing this quantity of blood may be forced into the vein of a patient in collapse in ten minutes. . . . Blood which passes the expiration date or which is found to be serologically unsuited is not wasted. It is used in various laboratories for culture mediums and for experimental work in which human blood or plasma is required. . . .

"The realization that in all stored blood there is invariably found, within a few hours, a considerable quantity of fibrin shreds and clots, regardless of the freedom from clots of the blood when first drawn, led us to consider the use of filters. . . . The use of beads was suggested by Boland and his co-workers. . . . The glass beads . . . are less expensive than . . . metal ones and filter as well. The beads . . . form a layer an inch or more thick above the outlet holes and through this maze clots must find their way in order to descend through the tubing. Large clots are caught on the surface of the beads, small clots are trapped in the columns of beads. . . . The apparatus should be so cleansed and cared for that no transfusion reactions may be attributable to it. . . . The principal advantage of the bank is, of course, the increased availability of blood." Bibliography—4 references.

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