Staff Meeting Bulletin
Hospitals of the » » »
University of Minnesota

Blood Substitutes

Volume XIII | Friday, May 15, 1942 | Number 25

STAFF MEETING BULLETIN
HOSPITALS OF THE . . .
UNIVERSITY OF MINNESOTA

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INDEX

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William A. O'Brien, M.D.

I. LAST WEEK

Date: May 8, 1942

Place: Recreation Room
Powell Hall

Time: 12:15 to 1:30 p.m.

Program: "First Aid Teaching Technic"
C. J. Potthoff

Movie: "Fighting Fire Bombs"

Present: 124

Gertrude Gunn,
Record Librarian

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II. MEETINGS

1. ANATOMY SEMINAR

Saturday, May 16, at 11:30 a.m. in room 226, Institute of Anatomy.

"Inflammation in leukemic mice"
Jean Hay Dougherty

"Cell and fiber counts in the geniculate ganglion of the dog"
Charles Van Buskirk

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2. PHYSIOLOGY-PHARMACOLOGY SEMINAR

Tuesday, May 19, at 12:30 p.m. in room 214, Millard Hall.

"Factors in edema formation"
George E. Fahr

- - -

3. SEMINAR IN PATHOLOGY

Monday, May 18, at 12:30 p.m., 104 Institute of Anatomy.

"Maternal pulmonary embolism with amniotic fluid and meconium.
Dr. T. E. Bratrud

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III. NOTICES

1. TO GRADUATE FACULTY

Members of the graduate teaching faculty who wish to apply for research grants for the coming year should submit the request to the Dean of the Graduate School, 234 Administration building, no later than Wednesday, May 20. Each request should explain carefully the proposed project of research and state the amount of money needed.

Theodore C. Blegen,
Dean

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IV. BABIES

Dr. and Mrs. Leonard A. Lang, Tuesday, May 12. A girl.

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V. BLOOD SUBSTITUTES

Paul Dwan
Robert Hoyt

Interest in blood substitutes has been awakened by the recent investigations of Scudder, Boon, Levinson, Blalock and others on the physiology of shock. Further research is needed to clarify the exact nature of the underlying mechanism which results in the imbalance between intravascular and extravascular fluids. A histamine-like action has been observed, and Scudder has suggested hyperpotassemia as a contributing factor in the pathogenesis of shock. At any rate, something happens to increase cellular permeability, allowing the development of hemo-concentration, reduced blood volume, reduced volume flow, with the resultant tissue anoxia and damage. This series of changes becomes cyclic, and the condition known as "shock" develops, which rapidly reaches an irreversible state.

The choice of a blood substitute is based upon our knowledge of the problems presented and an understanding of the means of correcting the irregularities. If we use two simple laboratory findings, namely, the hematocrit reading and the specific gravity of the blood plasma as our indices of abnormal physiology we can rapidly discover the nature of each problem presented. These tests are far more accurate in the early diagnosis of impending shock than the fall in blood pressure. The latter is a late sign and signifies real trouble.

Although the exact nature of the mechanism is yet to be solved, the dissemination, understanding and practical application of the knowledge available is most important at this time. We are an industrial nation with numerous hazards besetting our daily lives. The present national emergency makes it necessary for the practicing physician to have a working knowledge of the means at his disposal for combatting this problem.

If we review the changes which occur in 6 common medical and surgical conditions, we will understand more clearly the factors which will influence our choice of a blood substitute.

1. Simple fluid loss as seen in vomiting and diarrhea should be treated first by replacement of the lost fluids with saline, Hartman's solution, or glucose. The hematocrit reading and plasma specific gravity are high, and dilution is the desired result. If the condition is not corrected, primary shock may develop and more sustaining fluids such as serum, plasma, or whole blood will be required.

2. Acute hemorrhage results in loss of red cells and plasma proteins so that a low hematocrit and plasma specific gravity result. Crystalline solutions are inadequate in meeting this emergency as they do not remain in the vascular system for a sufficiently long period. Serum, plasma, or whole blood must be used. Erythrocyte loss may be sufficiently severe to require the use of whole blood, but in most cases this factor is not of great importance.

3. Severe burns result in tremendous hemo-concentration, as shown by the hematocrit, and there is a loss of plasma protein as evidenced by the decreased specific gravity of the plasma. The burned area weeps plasma and the red cell and hemoglobin readings rise to high levels. Administration of water by mouth and crystalline solutions parenterally aggravate the situation by adding peripheral edema and cerebral edema to the picture. The immediate demand is for restoration of serum proteins by intravenous serum or plasma. Whole blood is contra-indicated, due to the existing polycythemia and the trapping of the red cells in the capillaries. First aid use of 4 times concentrated pooled serum given in the field would prevent the severe loss of intravascular fluid by raising the osmotic pressure.

4. Chronic illness, as carcinoma, results in a rise in plasma specific gravity and a fall in the hematocrit when anemia is present. The rise in plasma specific gravity should be counteracted first by crystalline solutions but later

held at a normal level by serum, plasma, or transfusions. The anemia is of course best treated by transfusion.

5. Nutritional anemia and edema result from starvation on a low protein diet. This situation is rare in this country but will be all too common in Europe this winter. The so-called "war edema" shows a low hematocrit and a very low plasma specific gravity. The latter may drop far below the edema level. Therapy should be directed towards restoration of this level by serum or plasma and subsequent transfusion.

6. Increased intracranial pressure does not show the marked changes in the hematocrit and plasma specific gravity. The condition is local and correction depends on re-absorption of the excess cerebral fluid by increasing the osmotic pressure of the vascular fluid by hypertonic solutions.

Hughes, Mudd, and Strecker report a small series of cases in which concentrated serum was used for the reduction of increased intracranial pressure. They point out that concentrated blood serum approximates the theoretically ideal hypertonic solution for reducing intracranial pressure, in that it is essentially a solution which has a high osmotic pressure and contains solutes which will remain in the blood vessels after injection to exert a continued osmotic effect.

Their cases include 5 with cerebral neoplasm, 1 with subdural hematoma, and 1 with concussion. Intracranial pressures ranged from 220 and 440 mm. of water. Administration of from 40 to 100 cc. of serum concentrated 4 times in 50% glucose, was followed by pressure reduction varying from 95 to 275 mm., occurring over a period of 1 to 18 hours. Elevation of blood pressure and transitory increase in pulse rate was noted in all cases. No serum reactions were observed in this series.

A control series with normal intracranial pressure, receiving at weekly intervals 100 cc. each of serum regenerated in one-fourth its original volume of distilled water, and in one regenerated to the original volume using 50% glucose, and in a third using glucose alone, showed lowering of intracranial pressure (25 to 70 mm.) following administration of the first two solutions, but no definite results from the use of glucose alone. They conclud that concentrated serum is effective in reducing intracranial pressure for relatively long periods of time, especially in those cases where the pressure is elevated above normal. This type of therapy is not recommended when any elevation of blood pressure may be dangerous.

A parallel series of experiments on dogs was conducted by Wrights and Bond in which cisternal puncture was done to obtain continuous readings of intracranial pressure. Their results indicate that a single administration of concentrated serum may produce lowering of increased intracranial pressure for as long as 20 hours.

The restoration of serum protein values and elevation of the osmotic pressure of blood serum for its dehydrating effect on localized or generalized collections of intracellular fluid has been attempted in nephrosis by using concentrated serum. In 1938, Aldrich, et al, reported that this type of serum in doses of 80 to 315 cc. was given to nine patients with lipoid nephrosis and edema. Some diuretic effect resulted from its use, but the method was not entirely satisfactory since this type of treatment failed in three of the nine cases. In the remaining 6 cases, complete and immediate diuresis took place and 4 of this group not only lost their edema but had normal urine within a few weeks. Patients with favorable response lost weight in a manner similar to that in which weight is lost in a spontaneous renal crisis. This may mean that in some way such a process is initiated by this type of treatment. Intravenous administration of lyophile serum has occasionally been associated with severe reactions in nephrotic children.

We have referred inter-changeably to

serum and plasma. Both of these substances have the same value where a safe, physiological solution of serum proteins is indicated. Plasma has the disadvantage of containing a fibrin veil which must be removed by filtration before use. The presence of unprecipitated fibrinogen is always a source of potential trouble in the form of further fibrin veil formation. Plasma also contains citrate and saline solutions which dilute the effective therapeutic agent and may in themselves cause reactions. Serum has none of these drawbacks and is rapidly gaining favor as an infusion fluid. This has been especially true in war-time England where the high incidence of bacterial contamination and the necessity of filtration has thrown the use of plasma into disfavor. It is especially urged that great care be taken in hospitals where plasma is redeemed as a by-product of a blood bank. In this instance, the lack of proper checks on sterility, the excessive hemoglobin content due to hemolysis, the absence of proper pooling, the increased potassium level due to hemolysis, and the dangers from improper filtration have already led to catastrophies as reported in the medical literature.

Properly prepared serum should be made under the regulations of the United States Public Health Service which demand 3 separate sterility tests on the single sample, the pool, and random samples of the finished product. Pools of 8 or more specimens are required to insure dilution and neutralization of iso-agglutinins and finally filtration of the pooled material through a bacterial filter to insure the sterility of the material before intravenous use is required.

Wherever properly prepared pooled human serum is available it is probably wise to rely on this source. In isolated communities where such serum is not available, it is laudable to fall back on small scale methods for immediate use if proper precautions are taken. However, rail, air, and bus transportation has largely eliminated this condition.

Pooled human serum can be frozen in dry ice and stored in commercial deep freezing units for long periods of time without alteration of the electrophoretic pattern as shown by Scudder. It can be reactivated rapidly by emersion in warm water at 37°C.

Desiccation in vacuum from the frozen state can be carried on resulting in a readily soluble crystalline powder which can be kept up to 5 years when properly sealed in a glass container. This can readily be returned to the liquid state by addition of sterile double distilled water. It has the advantage of instant availability without the delays necessary for blood typing and cross matching and should be kept in reserve in all well equipped hospitals for emergency use. Desiccated material is especially valuable because of its availability for use in concentrated form. This four or five times concentrated material has been shown by Scudder to be far superior to dilute serum in the treatment of shock and burns. It may also be used in cases of hypo-proteinemis as described by Aldrich.

Four times concentrated serum can be rapidly prepared by the use of an apparatus consisting mainly of a bell jar funnel and a cellophane bag. It has been shown that commercial sausage casing is an excellent inexpensive dializing membrane. The serum is introduced into the apparatus by a closed technique and the apparatus is suspended so that warm dry air may be blown over the cellophane bag by a fan. Depending upon atmospheric conditions, from 3 to 6 hours are necessary to evaporate this serum to one-fourth or one-fifth of its original volume. The cellophane bag is then inverted and the concentrated serum allowed to run into a sterile 100-cc. bottle. This bottle is removed in the sterile room and re-stoppered. This material can then be administered immediately or stored for indefinite periods in the frozen state or desiccated. This syringe package is available for emergency use at the scene of an accident or on the battlefield. The military value of this method of administration of serum

proteins in the prevention and treatment of shock is obvious. An ambulance equipped with a supply of these units could rapidly get to the scene of trouble and transfusions given at the rate of about one every ten or fifteen minutes. Victims of bombing or sabotage could be infused on the spot in an attempt to save life which was endangered by multiple fractures, hemorrhage, or severe burns. Infusions could be given at the scene of an accident even if an individual were pinned underneath a mass of steel girders, as the usual equipment necessary for transfusions in a hospital would not be required. Injured persons treated in this way would be in better shape when they were finally removed to a dressing station or hospital. This inexpensive method of preparing a four to five times concentrated infusion fluid is especially adapted to serum, inasmuch as the serum can be readily administered through a needle. Concentrated plasma, on the other hand, because of its fibrinogen content, is much thicker and almost impossible to deliver through a needle. This one property of serum gives it a great advantage over plasma for emergency work.

We would like to stress the importance of familiarity with the problem of blood substitutes. The necessity of having a hematocrit and a specific gravity apparatus on the surgical ward are of paramount importance in determining the need for use of any of these products. Until laboratory investigators can ascertain the answers to the problem of the cause of shock, our duty as practitioners lies in knowledge of the available means of diagnosis and therapy. This knowledge, and sound judgment, backed by the presence of serum on our hospital shelves would go far towards attaining our goal.

Table of Comparisons

	Fresh Plasma	"Reclaimed" Plasma	Serum
Complement	Normal	None	None
Prothrombin	Normal	Negligible	None
Potassium	Normal	Increased	Normal
Hemoglobin	Variable	Variable	Trace
Electrophoretic Pattern	Normal	Abnormal	Normal
Fibrin Clot	Variable	Usually present unless freshly filtered	Absent
Unprecipitated fibrinogen	Present	Present	Absent
Citrate	Present	Present	Absent
Dilution	10-20%	10-20%	None
Filtration	Difficult	Difficult	Easy

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This table shows in detail the comparison between human serum, freshly prepared serum, and plasma which has been redeemed from stored blood. It will be noted that the elements for the process of coagulation are still present in plasma, while they are absent from serum. The coagulation of plasma consists largely in the formation of a fibrin veil which must be removed before this material can be safely administered intravenously. Inasmuch as human serum does not contain either fibrinogen or fibrin, such filtration is not necessary if the serum is properly prepared. It will be noted also that plasma contains some prothrombin and thrombin. The percentage of normal for these two elements which is contained in the plasma in question will be determined by the time interval consumed in the preparation of the plasma. Plasma freshly prepared and

rapidly brought to the desiccated state does contain a reasonable percentage of its original thrombin content. Wherever this factor is of importance in the choice of an infusion fluid, plasma or whole blood would, of necessity, be indicated. However, where this factor is not of consequence, serum and plasma have been found to be of equal value as an infusion fluid. Johnson has recently suggested the use of freshly prepared desiccated plasma in the treatment of hemophilia. Following the claims of Patek, Taylor and Howell that a coagulant was present in the globulin fraction of freshly prepared plasma, he investigated this use in five cases of hemophilia with good results. He found that plasma stored for seven days at 5° centigrade had lost the greater part of its ability to decrease the coagulation time. This suggests that plasma for use in the management of hemophilia should be obtained within a few hours after drawing the blood from a suitable donor.

We are enclosing in this discussion copies of the regulations of the United States Public Health Service governing the processing of the human serum and plasma. Compliance with these regulations is required in all licensed laboratories engaged in the production of serum and plasma and they should be observed by any institution or hospital engaged in preparing these products.

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"National Institute of Health
February 25, 1941.

Minimum Requirements for Filtered Normal Human Plasma or Serum

Part I - Liquid Plasma or Serum
Part II - Desiccated Plasma or Serum

Part I

1. Only those persons may serve as a source for normal human plasma or serum who are certified by a licensed doctor of medicine as being free of disease transmissible by blood transfusion,* as far as can be determined from the donor's personal history and from such physical examination and clinical tests as appear necessary for each donor on the day upon which the material is obtained from the individual. The following form shall be used:

"I certify that the above named donor(3) appear(s) to be free of diseases transmissible by blood transfusion on this date which is also the day of removing the blood from the donor(s).

"(Date) (Name of Physician)"

2. The method employed for the removal of blood from the donor shall conform to the accepted standards of aseptic surgery.

3. The apparatus used for the removal of the blood and the receiving unit shall be chemically clean and sterile. The receiving unit for plasma production shall contain as an anticoagulant (sodium citrate - Auth.) of U.S.P. quality dissolved in pyrogen-free distilled water.

4. An acceptable serological test for syphilis shall be made in a qualified laboratory on a specimen of blood taken from the donor at the time of bleeding and the blood shall not be used for the production of normal human plasma or serum unless the result of the test is negative.

5. Drawing blood from the donor shall be performed under the immediate supervision of a qualified doctor of medicine with the assistance of the necessary trained attendants. The drawing may be performed in a suitable bleeding room located in the licensed laboratory, or at some other place having equally suitable space and equipment. Irrespective of the place of bleeding, the personnel engaged in drawing the blood and the space and equipment involved must be sufficiently under the control of the licensed laboratory so that the latter may enforce the minimum requirements for the

*Particularly malaria, other protozoal diseases, syphilis, and acute upper respiratory diseases.

production of human blood products which are required of all laboratories holding a federal biologic license for these products.

6. Each bleeding shall be drawn into its own receiving bottle and pooling of the different bleedings shall not be made until after separation from the cells or the clot. The temperature at which the separation steps are carried out shall be as low as practicable and without unnecessary delay. For plasma the temperature shall be 2° to 5° C. and the separation from the cells shall be within 3 days of the time of drawing the blood from the donor. For serum the blood shall be clotted in a satisfactory manner and then placed at 2° to 5° C. until the serum is removed, which shall be within 24 hours of the time of bleeding.

7. Only pooled human plasma or serum shall be placed in the final container and for this purpose a minimum of 8 individual plasmas or serums shall constitute a pool. If the plasma or serum is to be diluted, or other ingredients added, these shall be added to the pool before filtration is carried out or if it is more convenient such diluent and other ingredients shall be sterilized separately and the proper amount added to each final container. Any diluent used shall be pyrogen-free, sterile, and otherwise suitable, and any other substance added, such as dextrose, must be of U.S.P. quality. The completed pooled plasma or serum shall contain not more than 25 mgm. of hemoglobin per 100 cc.

Pooling of the plasma or serum shall be made at the time of separation from the red cells or the clot (may hold for sterility tests - Auth.). The necessary amount of a suitable preservative shall be added immediately after pooling has been accomplished (phenol or a similar compound shall not be considered a suitable preservative). (1-10,000 merthiolate - Auth.) The product shall be stored at 2° to 5° C. until filtration is undertaken.

Filtration shall be made through a filter of such degree of fineness and quality that will prevent the passage of all bacteria commonly designated as non-filtrable. The filtrate shall be received in a suitable sterile clear glass container and so stoppered and covered as to adequately prevent contamination. Entrance into this pool-reservoir of plasma or serum shall be made only for (a) the removal of a sample for the sterility test, and (b) filling the final containers, at which time the entire pool shall be filled into the final containers. Filling of the final containers shall be made in a closed system with a suitable filter provided through which the replacement air must pass. The filtered plasma or serum shall be stored at 2° to 5° C. in the pool-reservoir and after filling into the individual containers.

8. A sterility test shall be made on the bulk pool of filtered plasma or serum as soon after filtration as practicable and also on the final containers (2 tests - Auth.).

a. Sterility test on the bulk: For this test 0.5 cc. shall be withdrawn and planted from the bulk pool for each bleeding contained in the pool. The dilution of the plasma or serum in the culture medium shall be such that the preservative contained in the plasma or serum will no longer prevent bacterial growth. The number of tubes of culture medium planted shall be one or more. If contamination appears in the first bulk test it may be repeated, but no bulk pool shall be passed until such test shows no growth, and if the same contaminating organism appears in more than one test the entire bulk pool shall be discarded or refiltered.

b. Sterility test on the final containers: For this test a sample shall be withdrawn from the bulk pool at the time of filling the final container and through the closed system set up for the filling. This sample shall be a pool made up of the first 25 cc. flowing from the plasma or serum pool and the last 25 cc., provided not more than 25 final containers are involved. If the bulk pool is of larger volume, then additional samples shall be prepared in the

basis of 1 additional sample for each 25 final containers or fraction, the sample to be withdrawn from the bulk pool just prior to and immediately following each group of 25 final containers. The sample shall be drawn directly into a separate, empty, final container which has been selected at random from the stock of empty sterile containers.

After allowing the sample to come in contact with the entire inside surface of the container a 5 cc. portion shall be withdrawn for planting for the sterility test. The dilution of the plasma in the culture medium shall be such that the preservative contained in the plasma will no longer prevent bacterial growth. In case contamination appears in any tube planted, the test may be repated from the unused portion of the sample but no lot shall be passed until the final test shows no growth.

However, if the lot fails because of growth in the above tests, a retest may be made by selecting at random one of the filled final containers represented by the original sample tested and by carrying out similar sterility tests. The absence of growth on this retest shall negate the previous unsatisfactory sterility tests and the final containers filled between the two portions of the sample showing contaminations shall be released as satisfactory.

9. In the processing of liquid plasma or serum the final container shall be filled directly from the pool-reservoir. The final container shall be of good quality clear glass, hermetically sealed after filling and shall be so constructed that it can withstand all ordinary handling and shipping hazards without danger of breaking or otherwise impairing the original aseptic state. The container shall be equipped so that the necessary connections for the injection of the plasma or serum into the recipient may be attached easily, directly and aseptically to the closure of the plasma or serum container. It is recommended that the final container be graduated by markings in the glass as an aid in the administration of the plasma or serum.

10. No statement in these minimum requirements for filtered normal human plasma or serum shall prohibit the ampuling and dispensing of either of these two products in small volumes such as are commonly used for prophylactic purposes wherein the product is intended for administration because of its antibody content rather than as a replacement of the blood volume. When plasma or serum is intended for the above purpose the method of ampuling, testing for sterility, and handling shall be the same as for other biologics prepared in corresponding volumes.

11. All transfers of plasma or serum from one container to another shall be made in a closed system. A closed system is defined as such an apparatus which will permit nothing to be drawn into the system at any point except the liquid under transfer and the air required for replacement when negative or positive pressure is applied at the proper place. All air for replacement must first pass through a suitable antibacterial filter.

12. A permanent record shall be kept of the name, sex, age, and address of each donor and a similar record shall be kept of each pool indicating its lot number and the names of the individual donors comprising the pool. Each final container shall bear a label showing the lot number, the amount of the original plasma or serum present, the amount of diluent added with its composition, and the amount and kind of preservative present.

13. a. It is recommended that either the label or an accompanying circular of instructions contain a statement warning against the danger of overheating the plasma or serum before administration and that when safe warming facilities are not available or when an emergency exists it is safe to administer the plasma or serum without preliminary warming.

b. It is recommended that either the label or an accompanying circular of instructions contain a warning as to the danger of injecting the plasma intra-

venously without the use of a filter in the lumen of the tube leading from the plasma reservoir to the recipient. This filter shall be adequate for the removal of all particles of such coarseness as to be dangerous for intravenous administration.

c. It is recommended that a sterile and suitable apparatus for injecting the plasma or serum into the recipient accompany each final container of plasma or serum.

14. All requirements for methods of manufacture and distribution, including sterility and safety tests, labeling, dating, and records of distribution required for other biologic products by the National Institute of Health shall apply to human plasma or serum except where such requirements are in disagreement with the foregoing minimum requirements for the production of human blood products.

Part II

1. Sections 1, 2, 3, 4, 5, 6, 10, 11, 13 and 14 of the above requirements for liquid plasma or serum shall apply to the desiccated products whereas sections 7, 8, 9, and 12 are applicable only in part, or not at all, as indicated in the following sections:

2. The provisions in section 7 above shall apply for the desiccated product except

a. No diluent or other substance except the preservative, shall be added to the pool;

b. Pooling and filtration of the plasma or serum shall be accomplished as expeditiously as the various steps will permit;

c. Immediately after filtration is completed, the pool shall be filled into the final containers and brought to the frozen state without delay;

d. Desiccation of the frozen plasma or serum may be begun at once or it may be stored at a sufficiently low temperature to satisfactorily hold it in the frozen state to await the outcome of the sterility test or to await a more convenient time for carrying out the desiccation process. In either event the final disposition of the entire lot shall depend upon the results of the sterility tests.

e. Desiccation shall be accomplished by a method which is not deleterious to the plasma or serum constituents and which will result in a readily soluble product.

3. The sterility tests shall be carried out as described under section 8 above except that after collecting the samples as directed under item 8(b) it shall be carried through the remaining processing steps along with the filled containers which it represents. The desiccated sample shall then be restored to its original volume with diluent taken from a complete container of diluent, described under section 5 below.

4. The final container shall be of good quality clear glass, and shall be so constructed that it can withstand all ordinary handling and shipping hazards without danger of breaking or otherwise impairing the original aseptic state. The container shall be equipped so that the necessary connections for the introduction of the diluent into the desiccated plasma or serum container may be attached easily, directly, and aseptically. It is recommended that the final container be graduated by markings in the glass as an aid in the administration of the plasma or serum.

The final desiccated product shall not contain more than 1 per cent of moisture and the glass container shall be flame-sealed after drawing a vacuum of 5 mm. of mercury or after filling with nitrogen under sterile precautions simultaneously with the release of the vacuum in the desiccating apparatus, which in turn shall be followed by drawing a vacuum of 5 mm. of mercury before flame-sealing. However, this shall not preclude the consideration of any other method of closing the container provided it is

shown that the proposed method will maintain a moisture content of not over 1 per cent for the full dating period and is otherwise satisfactory.

The desiccated plasma or serum container shall bear a label indicating the lot number, the amount of diluent needed to restore it to its original volume, the amount and kind of preservative present, and a statement recommending that the plasma or serum should be used promptly after restoration.

The label or an accompanying circular shall give full directions for redissolving the desiccated plasma or serum as applicable to the particular type of container used and full directions for getting the restored plasma or serum from the container into the recipient in an aseptic manner.

5. A hermetically sealed container holding the necessary amount of pyrogen-free, sterile, and otherwise suitable diluent shall accompany each container of desiccated plasma or serum. The container shall be equipped so that the necessary connections for the transfer of the diluent to the desiccated plasma or serum may be attached easily, directly, and aseptically.

However, the above requirement shall not be effective if specific requests for the desiccated plasma or serum without diluent are made by hospitals, clinics, etc. When desiccated plasma or serum are dispensed in this manner, the accompanying circular shall give, in addition to other directions, explicit directions and warnings as to the kind of diluent required, the quantity to be used, and any other essential information in order to safeguard the recipient.

6. Permanent records of donors and pool shall be kept for the desiccated plasma or serum as is directed under section 12 of the minimum requirements for liquid plasma or serum."

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VI. GOSSIP

As the school year draws to a close there are many demands for annual meetings, deferred speaking engagements, and other extra-curricular activities. The group is a church gathering of husbands and wives for discussion purposes. There is a light Sunday supper after which everyone arranges himself hopefully. It is not long before child-behavior comes up and with it the inevitable question about thumbsucking. This disturbs most parents, although students of the question insist that most children stop of their own accord without permanent damage to the mouth...

The Hennepin County Medical Society is sponsoring an industrial program. Although Minnesota is surprisingly high in the list of states in industrial activity, local physicians have not felt the impact of the public health program as it relates to industry. Our Minnesota Department of Health has just been granted permanent support for an industrial hygiene unit. (The American Medical Association prefers to call it industrial health.) To those exclusively interested in the surgical care of the injured the modern industrial program sounds strange and apparently uninteresting. It consists essentially of the student health service program

applied to industry, with practically no emphasis on treatment except for minor disturbances. Dr. Bristow, once a St. Paul practitioner, later a member of the department of preventive medicine and public health here, one-time member of the North Dakota State Department of Health, and for many years medical director of A.T.& T., is the Hennepin County speaker. He gives a clear exposition of the industrial health program, emphasizing the importance of those phases which have not been considered of importance by industrial surgeons....It is Father's night in the course for expectant parents. Each group seems to get a little better. Now most of the candi dates are members of the intelligentsia. The biologic aspects of pregnancy still fail to interest. An article in the April issue of Coronet directed to the husbands of pregnant ladies entitled "A message to pregnant husbands" is the type of psychologic approach which most men should know about. Other considerations are the physical preparations for child birth and some of the problems which relate to readjustment in family routine. It is the impression of the public health group that early interest by the parents in pre-natal care is a good sign of future parental interest...The bus is taking us to Grand Rapids, Minnesota. Since the tire shortage, bus schedules have become familiar. I am met at the station by Dr. Gordon Erskine who escorts me to his lovely new home, presided over by none-other than the former instructor of the course in medical technology. Mrs. Erskine has a youngster to look after now and a handsome boy at that. She is most domestic and interested in community enterprises. From long experience in knowing physicians and their problems she has proved an invaluable asset to the medical profession in her community. She can step in at a moment's notice and take over the laboratory. Her voice in community affairs has been most helpful. Her many friends will be glad to know that she is just as successful in her new capacity as she was in her old. It is early in the morning but the farm boys are up. The band is pumping away, grinding out tunes..,Last night was banquet night and they are a trifle slow in getting into their places--I refer to the school representatives of practically every school in Minnesota with vocational courses in agriculture. I am telling them of their health problems, but particularly of their safety problems. Last year more farmers were hurt or killed than men engaged in any other occupation. The average farm breeds accidents. Falls, injuries by animals, and crushing accidents in machines head the list. Farm boys are difficult to tell from city boys. They show a certain amount of reticence, but otherwise there is little difference...The nurses are filing up again to be graduated. It seems many years since I first saw them do this. They look clean and neat. Most nursing schools now train high types of students. Admission is denied to those below the upper fourth of the class. More women with college training are entering nursing. The nursing curriculum is gradually changing. Father James Moynihan, President of St. Thomas College, is doing a better job of telling nurses about nursing than anyone I have heard. Women know that there are certain things that they can do better than the so-called sterner sex. They wish to be told about how well they are doing from time to time. They differ from men in this respect only in that they admit it,,.Persons who run restaurants have always seemed to be mysterious characters. Sometimes one suspects that the cashier is the owner of the place. Here they are before me, and I would not recognize them as such. Many people scoff at our newfangled ideas in nutrition. I am trying to present the thesis that all of our fundamental ideas are old but our explanations are new, thanks to scientific discoveries...And so another week has passed, with a little time for necessary duties, but not much.....