

Tips for Blood Transfusion

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BLOOD transfusion means the transference of blood from a healthy individual to one suffering from a grave degree of anaemia due to either haemorrhage or disease. It is referred to in the writing of ancient Egyptians and is said to have been carried out in the time of Columbus. Attempts to transfuse the blood of animals into humans resulted in disaster to both patient and physician. Similarly, severe reactions and death followed after transfusion of blood from one human being to another.

Blood Transfusion had to await the discovery of blood groups by Landsteiner in 1900 who found that there were four main types of human red cells, namely A, B, O and AB. He published his paper in 1902 for which he got the Nobel Prize in Medicine in 1930. Group AB are those who may receive blood from any other group and are called "Universal recipients". Group 'A' may receive blood from Groups 'A' and 'O'. Group 'B' may receive blood from Groups 'B' and 'O'. Group 'O' may receive only from Group 'O'. But Group 'O' can give blood to all other groups and, therefore, is a universal donor.

Later, another safety factor was discovered by Wiener known as Rh factor. It has been shown 85 per cent of human beings of most races possess this agglutinin in their red cells and so are termed 'Rh Positive'. The remaining 15 per cent, 'Rh Negative' are liable to form an antibody (agglutinin) against the agglutinin, if it is introduced into their circulation. There are, in fact, six factors of which anti-D is responsible for incompatibility and haemolysis. In practice only anti-D is tested for.

Incompatibility many occur in an 'Rh Negative' woman if she becomes pregnant with a foetus whose blood cells are 'Rh Positive' or if an 'Rh Negative' person is transfused with 'Rh Positive' blood. Clarke and others have shown that production of Rh anti-bodies in 'Rh-Negative' mothers by 'Rh Positive' babies may be prevented by injection of 5 ml of gamma globulin containing high titres of anti-bodies active against the 'Rh Positive' antigen of the foetus.

Personally, prior to the introduction of citrate to prevent the clotting of blood, all transfusions were given by the so called direct method. In this method, a needle in a vein of the donor is connected to a cannula in a vein of a recipient by means of rubber tubing and then the blood is milked along the tubing to the recipient by means of pump on the rubber tubing. This method

gives the patient unaltered blood but it is more liable to complications.

It was Agote and Lewisohn who provided a rational method for the utilisation of an anticoagulant that is sodium citrate, which gives safe means of preventing the clotting of blood for long periods after collection. This was made possible by an indirect method by which blood could be collected from donors over a wide area. The safe transfusion must contain not less than 70 per cent of viable red cells which remain in the blood stream and do their job.

Citrated blood is not safe to use after five days of storage. Therefore, Loutit and Mollison developed a solution known as Acid-Citrate-Dextrose (ACD) Solution in which red cells remain viable for longer periods so that the whole blood can be safely transferred upto 21 days after collection provided it is kept under constant refrigeration at 4° to 6°C.

Selection of a Donor

Normally, we get 3 types of donors—professional donors, voluntary donors and relative donors. Among them, selection of a donor is the most important technique while collecting and preserving blood for transfusion. On the day of the blood donation, we should make an identification and registration of the donor and an assessment of the physical fitness of the donor by asking his medical history, simple clinical examination, and determination of haemoglobin level of the donor as follows.

In the donor's medical history we have to touch the items such as whether he has taken any vaccination such as Cholera, Diphtheria, Influenza, Pertussis Tetanus, Typhoid, BCG, Polio, Small-pox, Rabies, ATS, AVS, AGGS, etc. Here, we have to accept the donor after 3-7 days if he is vaccinated by dead virus or Bacteria and accept a donor after 3-4 weeks if he is vaccinated by live-virus or Bacteria and serum. And we have to ask the donor whether he is taking any medication such as antibiotics, anticoagulants anti-convulsants, cortico-steroids, digitalis, hypotensive, diuretic drugs for treatment of malignant diseases, sedatives in high doses and whether he had undergone any major surgery. The persons who have suffered from any diseases can be accepted if properly treated and cured after the prescribed interval made by the physician. And we should note that the persons who have been suffering from severe allergies, Asthma, Broncheactasis, cerebro-vascular diseases, Embolism, Emphysema, Epilepsy, Hepatitis, Thyrotoxicosis, Polychthemia Vera, Rheumatic

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fever are permanently unfit to donate the blood. It is always better that selection of the donor should be made by the physician. It is also most important that all nurses and nurses who are having such responsibilities of blood transfusion technique and who are managing the Blood Bank should always be in touch with recent knowledge on blood transfusion.

Collection and Preservation

Blood is collected from healthy donors. The whole blood is withdrawn aseptically through a closed system of sterile tubing into a sterile container (bottle) in which the 100 ml of acid citrate dextrose solution has been added. The blood is taken from the median basilic or other suitable vein of the arm. A needle is inserted into a vein at the elbow after the application of a sphygmo-manometer to the arm. Blood is allowed to flow from the needle in the arm along a piece of short tubing into a vacuum bottle containing ACD solution; all needles and tubings have previously been run through with citrate solution and 300 ml of blood are withdrawn to make a total unit of 400 ml. When the withdrawal is complete, the bottle is immediately sealed and labelled properly and cooled 4° to 6° C and, thereafter, opened only when withdrawing a sample of blood for direct matching with recipient serum and when the blood is administered. In some cases 'packed cells' are given. These consist of cellular elements left after siphoning off the supernatant plasma. It is used in cases of chronic anaemia where volume of blood is substantially diminished.

Blood Grouping and Gross Matching

All humans fall into one of the four main blood groups A, B, AB or O according to the nature of blood group antigen which is carried on the red cells. The Group 'A' persons have A-antigen, Group 'B' B-antigens and Group 'AB' both A and B-antigens and Group 'O' neither A nor B-Antigens. There are two popular methods of ABO grouping: 1. Tube method, and 2. Slide method.

In Tube Method, prepare approximately 2-4% suspension of RBCS in normal saline and add two drops into each of the three test tubes (8 mm x 50 mm) labelled A, B and AB respectively and add two drops of corresponding serum in Anti-A, Anti-B and Anti-AB to each of three tubes respectively and mix well and keep the tubes at room temperature for one hour or allow them to stand for five minutes and then centrifuge at 100 rpm for one minute. Then examine the tubes for evidence of Microscopic Agglutination. Read the control and test.

In Slide Method, prepare approximately 10 per cent suspension of RBCS in normal saline or used oxalated blood. Mark out three areas on a glass slide and label them as A, B or AB

and add one drop of corresponding serum respectively on these areas, add one drop of cell suspension or oxalated blood to each of these drops of serum. Mix well by using separate glass stick for each mixing and tilt the slide back and forth and examine for microscopic agglutination. Do not observe beyond two minutes. The disadvantage for Slide Test is that drying occurs rapidly so that only limited time is available for reading the reaction. This can be overcome by leaving the reaction in moist atmosphere. If slide tests are used for rapid determination of blood groups it is essential to use very potent anti-serum capable of producing visible agglutination within one minute.

Before administering a blood, cross matching should be done by the serum of the recipient against the corpuscles of the donor and presence or absence of agglutination is noted to determine compatibility. To achieve a high degree of necessary safety, it must be checked under microscope. It is always advisable to transfuse patients with blood of the same A, B, O, AB and Rh blood groups on their own, because of the presence of antibodies in the donor's plasma.

Indications

- (1) Acute haemorrhages,
- (2) Prophylactic use in major surgery,
- (3) All major operations to prevent circulatory failure where blood loss is considerable—Ex. arterial surgery, colon resection, hysterectomy, etc.,
- (4) Severe anaemia,
- (5) Severe infection—ex. septicaemia, gangrene, etc.,
- (6) Severe burns to make up blood loss, can be transfused only after plasma and electrolytes have been replaced.

Nursing Management

The blood is injected into the patient by the closed method through a thick hollow needle into the vein of the arm or the leg. The arm is the usual site for transfusion.

The Nurse must be satisfied that the information on the label of the bottle of blood compare exactly with the blood groupings of the patient's blood and check whether the blood is outdated or haemolysed. Another important point is that blood should not be taken out of the refrigerator more than half an hour before use and blood must never be heated unless this is specially requested by the doctor. Overheating blood leads to haemolysis which may be fatal.

Constant supervision is needed in the entire period of transfusion. The rate of flow should be regulated according to the instructions from the doctor. Forty drops per minute is the usual rate of transfusion which means each bottle should be transfused at least 3 to 4 hours. But

the patient suffering from haemorrhage may need to be given transfusion at much greater rate and those who are suffering from cardiac or pulmonary diseases and severe anaemias must be transfused at slow rate, normally 1 drop per minute. Patients receiving blood transfusion should be kept rather warmer than comfortable as this reduces the tendency to febrile reactions and circulatory overloading. Temperature, pulse, respiration, blood-pressure and other symptoms and reactions to be watched. As soon as severe reaction is suspected, stop the transfusion, give immediate treatment and summon the doctor. A careful record of all fluid taken and of the urinary output should always be maintained. The patient may develop renal failure. Symptoms will be observed and recorded throughout the transfusion. The renal failure is usually due to mismatched blood. If allergic reactions are found, there is no need to stop the transfusion. Injection of Antihistamin will help to continue transfusion. If rigours occur it is due to haemolysis; so we have to stop the transfusion and inform the doctor. I. V. Manitol will help to recover. If we find irregular pulse it may be due to citrate intoxication. Citrate Calcium Gluconate may help to control it. If the patient complains of chest pain it may be due to overloading of blood, rate of transfusion should be regulated accordingly. Otherwise right ventricular failure may develop.

A good transfusion set will avoid air embolism,

pyrexia and many complications. It is also usual that normally persons receiving blood transfusion may get pyrexia, so in that case rest and fluid diet may help to subside pyrexia. After 2-3 months, the patients receiving blood may develop homologous serum hepatitis. Patients may be informed about the later complications and their symptoms by the nurses. If they found it they should immediately take the aid from the medical specialities. After blood transfusion it is advisable to check the Haemoglobin level to ensure that the patient has received some benefit.

Nowadays blood transfusion has got every good reputation in medical practice to save the life of the persons who are suffering. Therefore, the blood transfusion is also one of the main responsibilities of the nurses, and nowadays the nurses have the responsibility to look after the 'mini-blood banks' in districts and taluk hospitals. So, it is very essential to know of some hints for blood transfusion for efficient Nursing care and managing Blood Banks.

Bibliography

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PSYCHIATRIC CONGRESS: 1983

THE Second International Psychiatric Nursing Congress will be held at the Imperial College, London, during September 18-22, 1983. It will be oriented to the theme, 'A Framework for Action'. The Conference is being organised jointly by **Nursing Times**, Psychiatric Nurses' Association and the Bethlem Royal and Maudsley Hospitals and is being supported by Department of Health and Social Security, Community Psychiatric Nurses' Association and Royal College of Nursing.

The speakers at the conference will be from North America, Europe and Australia. An Exhibition will be held concurrently with the Conference and a full programme of social action is also being arranged.

Nurses and others who wish to present papers are invited to submit an abstract to the Congress Planning Group. If the abstract is accepted the author

would be entitled to attend the Congress free of charge. Abstracts are particularly welcome from overseas nurses. Subjects to be covered include innovations in clinical practice, nurses' role in different specialities, the challenge of management, educational developments and ex-

Primary Health Care Conference

THE International Primary Health Care Conference will be held at the Kensington Exhibition Centre, London during November 22-25, 1983. It is being organised jointly by **Nursing Times** and the **Royal College of Nursing, London**. The Conference will be oriented to the theme, 'Tomorrow's World—Community Care'.

Community Nurses from all over the world are invited to attend the first ever international conference on Primary Care. Some of the subjects to be discussed are: Maintenance Care,

amples of successful multi-disciplinary team work. Send two copies of each set to: **Alison Dunn**, Editor, **Nursing Times**, 4 Little Essex Street, London WC 2R 3LF (England). For general details and enquiries, please write to: Sarah Selbie, Conference Administrator, **Nursing Times**, 4 Little Essex, London WC 2.

Care of the Dying. The RCN and **Nursing Times** invite nurses and others from all over the world to submit abstracts of papers for consideration of the Conference Planning Group. If an abstract is accepted, the author would be entitled to attend the Conference free of charge. Enquiries about details of papers and abstracts can be had from: **CHARLOTTE KRATZ**, Chairman, RCN Society of Primary Health Care Nursing, C/o RCN South Eastern Area Office, 85, East Street, Epsom, Surrey KT 17 1 DT (England).

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