HHG/LM

490

18th October, 1983

Dr. E.D. Acheson,
Chief Medical Officer Designate,
Department of Health & Social Security,
Alexander Fleming House,
Elephant and Castle,
LONDON,
SE1 6BY.

Dear Dr. Acheson,

I enclose my account of the advances in the last five and those anticipated in the next five years in blood transfusion. I hope you find this useful and if there are any further points or areas of clarification I hope you will let me know.

I apologise for the delay.

Yours sincerely,

H.H. GUNSON,
Director

Enc.

DEPARTMENT OF HEALTH AND SOCIAL SECURITY

Alexander Fleming House, Elephant & Castle, London SE1 6BY

Telephone 01-407 5522 ext. GRO-C

From the Chief Medical Officer - Designate

Dr H H Gunson MD MB ChB FRCPath
Regional Transfusion Centre
Roby Street
MANCHESTER
M1 3BP

14 October 1983

Dear Dr Gunson

You will remember that at the meeting of the Consultant Advisers in the summer, Sir Henry Yellowlees asked whether you would be kind enough to send a brief account of the advances in your specialty that have occurred in the past five years and the problems and opportunities which you can anticipate in the next five years.

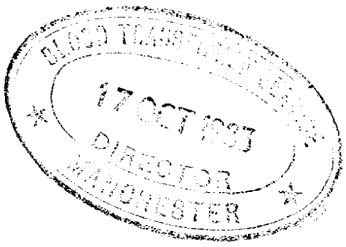
I look forward very much to receiving this as it will be an essential part of my briefing for my new post. The replies which I have already received from colleagues on this matter have been extraordinarily interesting and have reminded me how little it is possible for one person to know about the advance of medical science!

I look forward eagerly to your letter.

Yours sincerely

GRO-C

E D ACHESON
DM FRCP FFCM MFOM
Chief Medical Officer Designate



NATIONAL BLOOD TRANSFUSION SERVICE

DEPARTMENTAL MEMORANDUM

From Dr. H.H. Gunson,

To Dr. E.D. Acheson,
Chief Medical Officer Designate, D.H.S.S.

Subject SPECIALITY : BLOOD TRANSFUSION

Date 18th October, 1983

Ref. HHG/LM

FIVE YEARS BACK AND FIVE YEARS FORWARD

INTRODUCTION

As you are probably aware the blood transfusion service responds to clinical demands from many specialities. Although we have been traditionally linked to Haematology, our work overlaps with all the major specialities and we are particularly concerned with Immunological and Microbiological aspects of blood derivatives.

There are two divisions within the subject. Blood transfusion itself is a term usually used to denote the clinical aspects of replacement and supportive therapy by the administration of whole blood and its many products. Inter-related, however, is immunohaematology which comprises the serological tests applied to the cellular components of blood and serum or plasma of donors and patients.

The past five years

Blood component therapy. It is during the past fifteen years or so that there has been an increasing realisation that specific component therapy by using the appropriate blood product could greatly increase the clinical effectiveness of replacement therapy. During the past five years this philosophy has found application in many branches of medicine.

The basic unit is the donation of whole blood which can be subjected to centrifugation to yield plasma, initially rich in platelets which can be concentrated. Subsequently the plasma can be pooled and subjected to a sequential fractionation process to yield, firstly, the coagulation factors, then immunoglobulin and albumin products. Where the donor has a high level of specific antibodies, e.g. anti-tetanus, anti-Rh(D), the immunoglobulin preparation will be rich in these factors. Removal of the plasma inevitably leaves a red cell concentrate.

It would be useful to review the developments which have taken place in the use of these products.

Red cell concentrates. Clinical acceptance of this product has been subjected to some controversy since in order to provide sufficient plasma for fractionation, the red cell concentrates have to be administered to certain patients suffering from blood loss. Experience has shown that protein replacement is often not required until the blood loss has exceeded 30-40 per cent of the blood volume. However, the flow properties of the concentrates are variable and to improve this, additive systems are now becoming available and are undergoing trials at present. The principle involved is to remove as much plasma from the donation as possible and replace part of this with a solution of saline, adenine, glucose and mannitol or sorbital. The resultant red cells can be stored for up to 35 days and their administration is facilitated. This approach also has the benefit that from an individual donation of whole blood, 50 per cent more plasma can be obtained.

Contd./over

Platelet concentrates. The use of an increasing pharmacopoeia of chemotherapeutic agents has resulted in patients suffering from leukaemia and certain other malignancies requiring supportive therapy for longer periods. One problem with this product is that it has had a shelf-life of only three days and with variable demand it has been difficult to either avoid wastage or meet demands. During the past two years new plastics have been developed which allow the storage period to be extended to five days. Whilst this will be a benefit, the increasing demand for this product is causing problems at present and alternative methods for the preparation of platelet concentrates will have to be considered, particularly with the increase in such procedures as bone-marrow transplantation.

Plasma products. Although Factor VIII concentrate, used in the treatment of haemophilia A is the plasma product which receives the most publicity, it is only one of many products now regarded as essential for clinical practice. A brief comment will be made on the major ones.

With regard to Factor VIII concentrate there has been an increasing production of this material at the Blood Products Laboratory from plasma collected at the Regional Transfusion Centres during the past five years. At present approximately 40 per cent of the Factor VIII used is derived from this source; the remainder is purchased from commercial firms and their products are imported largely from the U.S.A.

Factor IX concentrate is used in the treatment of Haemophilia B (Christmas disease). The country is self-sufficient in this product.

Normal immunoglobulin. Again the country is self-sufficient in the intramuscular preparation. More recently an intravenous preparation is being made available which will be of considerable benefit to those patients with congenital, or acquired immunoglobulin deficiencies. This product is under development at the Blood Products Laboratory.

Antibody specific immunoglobulins. Demand is gradually increasing for these products in line with the greater number of patients receiving immunosuppressive therapy.

Albumin products. There is a shortage of these products at present, particularly of the 4 per cent solution, and an unknown quantity are being purchased from the commercial companies.

With the increase in the use of these products, attention has been given to the provision of products, prepared either at the Regional Transfusion Centres or at the Blood Products Laboratory, which can be administered to patients with the maximum safety and clinical effectiveness. Quality control has, therefore, become a prominent activity. This can be sub-divided into various areas; e.g.

(1) Disease transmission. Certain products have always carried the danger of transmission of hepatitis. With the introduction of sensitive screening tests on all donations, e.g. by radio-immune assay, the incidence of hepatitis B has been reduced, although not eliminated. The administration of the vaccine to high risk groups may also assist in this regard. However, the problem of non-A, non-B hepatitis remains and there is now the potential transmission of AIDS, about which I spoke at the last Consultant Advisers' Meeting.

    Other diseases, however, require careful monitoring, e.g. malaria, and cytomegalovirus which is assuming significance in transplantation, both renal and marrow.

(2) Computerisation and automation. The increasing complexity of blood transfusion practices has led to difficulties in maintaining manual clerical procedures designed to ensure that each product has been adequately tested and is properly labelled. Computers can assist in this regard and systems are now being introduced into many Regional Transfusion Centres. A U.K. Working Party of the Regional Transfusion Directors' Committee co-ordinates the data capture methods which are based on bar-codes.

(3) Blood grouping and antibody testing (immunohaematology). The basic procedures have been established for many years but it is necessary to continually strive to produce better reagents for testing not only the blood of the donor but also of the patient, since with respect to the transfusion of red cells, this is the last test which is undertaken before administration. Reagent production is partly within the N.H.S. (at the Blood Group Reference Laboratory and within the Regional Transfusion Centres and this is at present being rationalised), and partly from commercial sources.

The development of monoclonal antibodies which have application in many fields of medicine, may well be of assistance in developing blood grouping reagents. Some antibody preparations for grouping red cells and white cells are already available.

The next five years

Whilst I think there will be several developments occurring in the field of blood transfusion, some of which will be referred to below, I think the major advance that can be made is to achieve self-sufficiency in blood products for the U.K. This aim has implications throughout the service, thus:

(1) The new Blood Products Laboratory is presently being constructed at Elstree and is scheduled for completion and commissioning by the end of 1985. Clearly there will be a considerable effort required to gear up the processing of plasma by some threefold which is required to achieve self-sufficiency at the estimated levels required by that time.

(2) In order for this laboratory to function at a level of self-sufficiency it will require source plasma from the Regional Transfusion Centres, who also will have to increase their production of plasma by 300 per cent.

In order to achieve this goal, investment will be required, but it is important that advantages are taken of recent developments to minimise this. Thus:

2.1. The use of the additive solution to resuspend red cells after plasma removal, in which the yield of the plasma per donation is increased. It has been estimated that, despite the increased cost of the collection pack system, such plasma costs less per litre than that currently obtained from whole blood donations.

Such a change in procedure, will require acceptance in the clinical departments of hospitals of red cells suspended in the additive solutions instead of their own plasma, and education about the use of these preparations will be essential.

2.2. The use of plasmapheresis. Although this is used in the Transfusion Service at present on a small scale, largely for donors whose plasma contains a high titre of specific antibodies, it is my view that in order to obtain sufficient plasma for self-sufficiency in

fractionated products, without excessive blood collection and wastage of red cells, plasmapheresis will be needed.

The cost of establishing units for this purpose has been a disadvantage in the past, but new technology is currently being evaluated which may lead not only to better quality plasma but also material which is cost-effective.

Also, equipment is being devised at present in which a satisfactory platelet concentrate can be obtained together with a quantity of plasma for fractionation during a single procedure. Many donors are willing to give the 45 minutes or so which is required and as I think that the need for platelets will continually increase during the next five years, it seems logical to investigate this possibility. Current trials are promising.

It will be an advantage when all blood products can be derived from the U.K. donor population. Nevertheless, the transmission of non-A, non-B hepatitis, particularly from the products derived from pooled plasma will still be a problem in groups of patients, such as haemophiliacs, who receive these products regularly. I expect from the work which is now being carried out, that by the time five years has elapsed, a diagnostic test may be available. However, in the meantime, we must examine ways in which in certain groups of patients exposure to the minimum number of donors can be effected. With respect to AIDS, it is too early to anticipate the effects in the U.K., but it is important that every opportunity is taken to investigate possible ways in which the blood donor population can be screened.

On the organisational level, there has been a noticeable degree of collaboration between the Regional Transfusion Centres in recent years and there are now an increasing number of functions which are nationally based rather than regionally. The supply of plasma, referred to above, is one; others include the development of national panels of tissue-typed donors, the rationalisation of blood group reagent production, the establishment of frozen blood banks, which are not required in each region. It will be necessary to examine, within the next five years, how best such national activities can be managed.

Finally, it is important that the Transfusion Service does not become divorced from the new technology available. In particular, I refer to Genetic Engineering, which as I have commented above has already led to the development of some grouping reagents. There is the possibility, although I think that this is further than five years hence, that certain blood products, now obtained from human plasma, may be obtained by these methods. Developments on these lines are already taking place and the expertise in manufacturing products from source plasma, highly developed at the Blood Products Laboratory, may well have a part to play in the future development of the products. Also, the technical expertise in blood grouping and antibody detection within the Transfusion Service could be invaluable in the assessment of the value of new reagents produced by this means.

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