SCOTTISH NATIONAL BLOOD TRANSFUSION SERVICE

ANNUAL REPORT, 1 APRIL 1975 – 31 MARCH 1976

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INTRODUCTION

1. General The aim of the Scottish National Blood Transfusion Service (SNBTS), the provision of safe blood and blood products to meet patient needs in the prevention, diagnosis and treatment of disease and injury, has many facets. The dominant feature in modern transfusion practice is the provision of component therapy so that the patient receives only those components of blood which he lacks, thus enhancing safety in transfusion procedures and enabling the optimum use to be made of blood donations.

2. The voluntary donor organisation Although the voluntary nature of blood donation in this country is universally accepted and admired, the implications do not appear to be sufficiently realised. The main implications are two in number.

Firstly, the goodwill of the donor population is essential and the utmost care is necessary to ensure that no individual nor collective causes for dissatisfaction arise. To a large extent this depends on a high state of morale and dedication on the part of all the members of the SNBTS, including voluntary workers, and it is essential that this be kept to the forefront in any discussions on transfusion policy and its implementation; far too often this vital aspect is ignored.

Secondly, the financial aspects are to a large extent disregarded in management decisions. In commercial terms the raw material on which the Service is based, blood donations, would cost at least £5 million per year if a paid donor system existed and in countries where there is no free National Health Service, the provision of blood and blood products would cost the patient population at least twice this amount. These financial aspects, and the savings accruing to both the NHS and the patient, are unique to a voluntary blood transfusion service and surely must have a major influence in any budgetary allocations including staffing, equipment, vehicle and accommodation requirements for routine service and research and development projects. This, unfortunately, does not appear to be so.

3. The Regional Transfusion Centre (RTC) as a team Of fundamental importance in obtaining maximum efficiency and job-satisfaction in an RTC is the realisation that every member, doctors, nurses, donor organisers and attendants, scientists where appointed, technicians, administrative and clinical staff and ancillary grades are all parts of a team organised, under the Regional Director, to achieve the Centre's aims. This calls for flexibility so that staff can be deployed to meet changing situations and emphasis; there is no place in any professional organisation for rigid demarcation lines such as bedevil many modern industrial concerns. It is essential that this team concept be appreciated by management. Lowering of morale, and hence loss of efficiency, can often be attributed to this lack of appreciation.

4. Present objectives After some 35 years of vital contribution to patient care, the main objective of the SNBTS at present is to obtain self-sufficiency in the supply of blood and blood products to a standard acceptable to clinicians and patients. This entails attention to supply and demand and constant vigilance to maintain and enhance quality control. The main effort of this Report will be to record progress along these lines, to analyse areas of weakness and discuss how these may be overcome.

1.
PART 1. PROFESSIONAL ASPECTS

5. General  Appendix 1 (Annotated Statistical Tables) records the main activities in RTCs in relation to the supply of blood and blood products prepared at centres and contributions to the Protein Fractionation Centre (PFC) for fractionation. Appendix 2 shows PFC activities concerning production of plasma fractions and ancillaries. Appendix 4 is a plasma balance sheet indicating the relationship between supply and demand for fractionated blood products. From these appendices the extent to which self-sufficiency has been achieved can be determined. Self-sufficiency should include one year's supply of each product in final issue or powder form (i.e. partially processed), depending on the shelf life of the final product.

6. Donor Response (Appendix 1, Table 1)  The total donation rate increased in all centres in 1975-6 compared with the previous year, the total increase being 13.4%. This indicates not only increased effort by the donor organisation, but the value of development money allocated for the year commencing 1 April 1975. Increases of this order cannot be maintained unless facilities are made available.

The rejection rate showed a slight decrease. Rejection of a donor as unfit depends on many factors; some (chronic disease states) may render a donor permanently unsuitable, others (short-term illnesses such as upper respiratory tract infections) only exclude donation temporarily and decisions as to the suitability or otherwise must depend on the clinical judgment of the medical officer supervising a donation session. Full implementation of the Second Report of the Advisory Group on Hepatitis (the Maycock Report) will include easing of restrictions on obtaining donations from those with a history of jaundice, but to what extent rejection is due to this single factor is unknown; a detailed return on causes of rejections as a continued exercise would not justify the time and effort required from donor organisation staffs, but a one-time study for a short period in the summer and winter months might be of value in formulating guidelines for the benefit of doctors supervising sessions as it might indicate the reasons for the disparity in rejection rates (from a low of 3.27% in Aberdeen to the high of 10.6% in Edinburgh).

There is a considerable turn-over in the donor population as indicated by the percentage (18.42) of new donors attending sessions.

Nearly 80% of donations are obtained at sessions outwith the transfusion centre, emphasising the need for vehicles and ancillary equipment.

The donation rate per thousand population per year has increased overall by 6%. This donation rate is to a certain extent misleading as it is based on total population. As the age limits for donation are 18-65 years, a more accurate indication of donor response would be to base it on eligible (by age) population. Information available on population by age (Table 1,3 of Scottish Health Statistics, 1974, published by the Information Services Division of the Common Services Agency) is in groups which, in the lower age groups, include those up to 19 years so that the age groups 18-65 cannot be accurately assessed; an approximate figure would appear to be 3 millions, giving a donation rate of 86 per thousand per year of the eligible population.

7. The use of whole blood (WB) and concentrated red cells (CRC) (Appendix 1, Table II). Where stocks of blood in either form are mainly issued to peripheral blood banks (as in the West of Scotland), any duplication of issues and returns is confined to such banks and RTC issues and returns represent the actual figures. Where, however, in Centres where blood is cross-matched for a particular patient and recorded as "issued", but not used, it may be recorded as "returned" and
cross-matched for another patient, or in succession for a number of
patients. This leads to duplication of figures, particularly noticeable
in Aberdeen where total "issues" exceed the total donation rate. It seems
reasonable to assess the use of WB and CRC as total issues minus total
returns and the notes in Table II have been calculated on this basis.
Although breakdown of use between WB and CRC is not available for Edinburgh
for 1974-5, the general trend is a fall in the use of WB. There is an
increasing use of CRC, which now account for an overall use of this product
as 45.46% of all transfusions which include red cells. An extension of this
use will not only be good transfusion practice in a large proportion of patients,
but will provide fresh plasma rather than that from time-expired blood, a vital
requirement for the production of Factor VIII concentrates.

Frozen red cell banks are established in Glasgow, Edinburgh and Inverness;
equipment is available in Aberdeen and can be put into use when accommodation
facilities are provided; at present the small requirements for Dundee are met
by the Glasgow centre.

The use of frozen red cells is limited by the cost and the time required for
processing, but, as they represent the purest form of CRC, it is hoped that
advances in cryobiology may overcome these adverse factors. The demand
at present comes mainly from renal units involved in transplantation programmes.

The use of WB and CRC is some 60% of total donations so that the transfusion
service is self-sufficient in this respect. Difficulties may arise in the
supply of compatible blood for patients who have been sensitised to one or more
of the minor blood group antigens, either during pregnancy or after multiple
transfusions, but the Centres are well equipped to identify these and a propor-
tion of the donor population is grouped for the more common antigens outwith the
ABC-Rh system so that, in general, suitable donors can be readily found.

8. The use of plasma and its albuminoid fractions (Appendix 1, Table III and
Appendix 2).

a. General comments. There is still uncertainty as to the eventual use
of blood volume preparations such as fresh dried plasma (FDP), dried plasma
(DP, from, principally, time expired blood) and stable plasma protein solution
(SPPS). Apart from such conditions as primary resuscitation, burns, etc.,
for which plasma has long been used, the development of cell separator machines
has added a substantial and ever-increasing requirement for plasma replacement
therapy. Although these machines were primarily designed for use on donors,
to collect leucocytes and platelets, their main application nowadays is on
patients requiring extensive plasma exchange, for which there are numerous
indications and this entails large and repeated quantities of replacement fluids.
Theoretically it would appear logical to replace removed plasma by fresh plasma
(fluid or dried) to maintain levels of coagulation factors in the recipient, but,
in practice, although more information is required on this, the use of SPPS,
despite its lack of labile coagulation factors, does not appear to give rise to
coagulation defects. Recently a patient suffering from Goodpasture's syndrome
received a total of 350 units of SPPS; his haemostatic mechanism was carefully
monitored, but there was no laboratory nor clinical evidence of any haemorrhagic
tendency. SPPS is a safer preparation than whole plasma as the pasteurisation
carried out during processing destroys viruses of infective hepatitis, although
recent publications indicate that this is not infallible.

The type of replacement fluid required during extensive plasma exchange has not
been resolved. The Advisory Group on Blood Transfusion has appointed a small
group to report on this subject.

The importance of this lies in the relative safety of SPPS and the contribution
which decreased use of FDP will make to the supply of concentrated Factor VIII.
b. Fresh frozen plasma (FFP) is much the same as FDP, but contains more labile coagulation factors. When SPPS is freely available it may well be that demands for fresh plasma will be such that FFP can replace FDP, thus obviating the time-consuming and expensive procedures involved in drying plasma. FFP will be indicated where it is essential to provide labile coagulation factors as well as volume expansion. If demand is relatively small (3000 units of 400 ml per year is the estimated requirement), the comparatively short shelf-life (six months) will not be a contra-indication to using it instead of FDP (shelf life some 8 years depending on methods of storage).

c. Salt poor albumin. Preparations in 45g amounts have a place, sometimes controversial, in the treatment of severe protein deficiency states such as occur in the nephrotic syndrome, protein-losing enteropathies and in some forms of liver disease. The PPC have been concentrating their production of albuminoid fractions on SPPS and are far from meeting the estimated requirements (a somewhat arbitrary figure) of 2500 units per year. This will require close attention in 1976-77.

Preparations in 1g amounts are required for some paediatric cases, some radioactive isotope techniques and the preparation of intravenous insulin injections. Quantities used in 1975-6 (256) and 1974-5 (232) were much the same and the stock of 440 doses in Regions and the PPC indicate that this product does not create any difficulties.

d. The future role of fresh dried plasma has been discussed in subpara a above. It, in common with dried plasma, is prepared by the Glasgow centre for issue as required to any region. An outstanding feature is the greatly increased demand for this product by the West of Scotland hospitals. The Director has already taken steps to draw the attention of Consultant Haematologists in his region to the use of FDP and the future role of the drying plant at Law is being discussed at present in the Directors' meetings.

e. It is probable that the use of dried plasma, mainly from out-dated blood, will be superseded, when the supply situation permits, by SPPS, being a purer and safer preparation.

f. Stable plasma protein solution. Production of SPPS by the PPC is a major factor in influencing requirements of FDP and DFP and in the supply of fresh plasma for Factor VIII concentrates. Likely demands are still uncertain, depending upon a number of factors including the type of replacement fluids required in extensive plasma exchange regimes and the extent to which the present use of volume expanders such as dextran and crystalloids are replaced by SPPS. The Working Group of the Advisory Group on Blood Transfusion, in addition to considering replacement fluids (para 8a above) has also been asked to produce a paper on guidelines for the use of SPPS for the benefit of clinicians.

Present figures of the amounts used reflect only the supply situations, not the demand, but the PPC is increasing issues. The amounts produced in 1974-5 (2624 units) increased to 3668 in 1975-6 and 1976-7 should show a marked improvement; in the first quarter of the latter year 3229 units were produced as the final product and the PPC is now working on a target of processing 1000 litres of plasma weekly (1500 units of SPPS). As processing from the raw material to the final product takes some months, there is a time lag before the benefits of this production level will be apparent in the Centres.

In the short term, supplies of plasma for processing into albuminoid fractions (32056 litres in stock on 31 March 1976), accumulated during the period of the pilot plant in the Royal Infirmary, Edinburgh, plus present contributions from regions, would enable high production figures to be maintained, but in the long term regional contributions will be the only source of plasma for this purpose and supply and demand figures will require constant attention.
Self-sufficiency in SPPS will depend on this.

Receipts of plasma of all types by the PFC in 1975–6 were 37% higher than in the previous year. Allowing for losses (estimated at 10%), including failure to meet quality control, and plasma requirements for SP albumin (2500 units as a provisional figure), material should be available from the 1975–6 intake of plasma to give 20986 units of SPPS, representing 4 units per 1000 population. This can be temporarily augmented by plasma stocks held by the PFC and by gradual release, to a large extent, of the 7745 litres of plasma used by centres as FDP/DP. With this latter addition, yearly plasma intake at PFC should rise to sufficient for 42000 units of SPPS, representing 8 units per 1000 population. Demands higher than this will require increased regional effort.

9. The use of platelet concentrates (Appendix 1, Table IV). Issues of platelet concentrates increased in 1975–6 by 11% compared with the previous year; increases of this order have been the trend for a number of years. Present supplies are prepared by regional centres from fresh plasma; the residual plasma can be processed by the PFC in the same way as fresh plasma, the yield for fractionation per donation being smaller.

Two developments may influence future platelet supply. At present the yield from 4–6 donations is pooled to provide an effective therapeutic number; very large quantities of platelets can be obtained from a single donor by the use of a cell separator machine and, as the use of these machines becomes more common, the number of donations required for platelet preparation will be decreased. Platelet concentrates have a very short life and attempts are being made in a number of centres (not in Scotland) to prolong their life by freezing techniques. Should these be successful, the present wastage of platelet concentrates (24%) inherent in maintaining an "on demand" service will be obviated.

Only 6.9% of donations are used at present for the preparation of platelet concentrates so that self-sufficiency is no problem.

10. Issues of cryoprecipitate (Appendix 1, Table V) Despite increasing supplies of intermediate Factor VIII, cryoprecipitate issues increased by 13% in 1975–6. Issues as a percentage of donations averaged 15, so that if cryoprecipitate was the preparation of choice in the treatment of every case of classical haemophilia, self-sufficiency could be achieved.

Its use, however, is intimately bound up with that of fractionated concentrates of Factor VIII and will be discussed when coagulation factors are considered (para 12b below).

11. The use of immunoglobulins (IgG) (Appendix 1, Tables VI and X1; appendices II and IV)

a. Normal IgG. This preparation is at present mainly used in the prevention of measles in the very young or debilitated patients and as a prophylactic measure against infectious (Type A) hepatitis in travellers abroad or in institutional outbreaks.

Much remains to be done in the characterisation and assay of the numerous bacterial and viral antibodies in normal plasma with a view to obtaining specific IgG against a variety of diseases. Dr. R.G. Sommerville of the Virology Section of the Department of Bacteriology at Belvidere Hospital, Glasgow, with the assistance of a biochemist seconded from the PFC,
has been of great help in assaying convalescent sera and random samples of plasma submitted by the Glasgow and Edinburgh centres, but the characterisation of antibodies in normal plasma requires considerably more effort if any major contributions to specific IgG therapy are to be made.

This effort must await the provision of a microbiological laboratory at the PFC (See para 25 b1(a)).

The potential supply of normal IgG for present indications vastly exceeds requirements and most goes to waste. SHHD have undertaken to explore the possibility of surplus material being made available to developing countries where, in particular, infectious hepatitis is a problem.

b. Anti-Rhesus D positive cells (Anti-D) The use of anti-D in the prevention of haemolytic disease of the newborn has been an outstanding success and a major advance in preventive paediatrics. It is hence essential that adequate supplies of this IgG be available. Sources of plasma with sufficient content of Anti-D for fractionation are Rh-negative multiparous women sensitised by red cells from an Rh-positive foetus or deliberate immunisation of Rh negative volunteers with Rh positive cells. The former source is gradually becoming less available as the prevention programme decreases the number of sensitised mothers and, increasingly, reliance on suitable plasma supplies will depend on the latter source.

Contributions from regions fell in 1975-6 by 21% from the previous year, but as plasma with a high Anti-D content rose from 3 to 10%, actual production figures (Appendix 2) increased. The fall in contributions, affecting the Glasgow and Edinburgh centres, can be attributed to the decrease in the number of sensitised women.

As this decrease will continue, it is essential to plan now for an increased contribution from immunised volunteers. Inverness has long been the mainstay in this field and the Edinburgh centre has started a programme. Major factors in the progress of any immunisation schedule are the variability in the response of individuals and the time taken from the initial dose to sufficient booster doses to achieve a worthwhile response. Inverness and Edinburgh are collaborating in a study of the response to varying immunisation regimes. The present state of the work in production of Anti-D in these two regions is summarised in Appendix 3. The Inverness experience highlights the varying response. The ability to determine likely immunisation response early in any programme would be of great value in decreasing the work involved. If the Inverness programme goes according to plans, the final yield would supply some half of requirements; the Edinburgh group, in time, could supply the remainder.

In the meantime Directors have undertaken to try to identify and to obtain plasma from sensitised women. In the long term these two centres might be able to supply the needs for Anti-D plasma; if necessary a further centre can be invited to participate.

Production figures in 1975-6 meet target figures, but allow no reserve to meet varying demands and self-sufficiency can only be deemed to have been achieved when a one year's stock of Anti-D is on the shelf.
c. **Anti-Tetanus Toxin** (Anti-T)  
Active immunisation with tetanus toxoid, the province of community medicine specialists, is the most reliable immunological approach to the prevention of tetanus, but on occasion the administration of antitoxin is indicated in those receiving a tetanus-prone wound who have not been immunised or are being treated with immunosuppressive drugs; it is also required for those who have developed the disease. Human Anti-T is the product of choice, being free from the severe sensitivity reactions which can follow Anti-T produced from horses.

The main difficulty in supply planning is the question of demand. Formerly equine Anti-T was frequently given to those with the most trivial wounds because of fiscal censure if a case arose and at that time some 20,000 doses of Anti-T were given annually in Scotland. Gradually the approach to the prevention of tetanus has been much more realistic, adequate wound debridement and antibiotics becoming the main methods. An Advisory Group of the Joint Committee on Vaccination and Immunisation has now produced recommendations on this subject which include guidelines for the use of human Anti-T. If these are followed, present supplies of Anti-T should be adequate. If they are not followed, too much publicity concerning the availability of this product could result in an explosive increase in use, which the BTS could not immediately meet; on the other hand too little publicity may result in perpetuation of reliance on commercial sources.

SHHD have circulated the Advisory Group's recommendations, drawing attention to the availability of human Anti-T from the BTS, and its use is likely to rise, but no firm forecasts can be made at present.

Suitable plasma is obtained by centres from donors actively immunised, and given a booster dose in some cases, whose plasma has been assayed for Anti-T content. The Inverness centre has been particularly active in this field. For treatment purposes, present stocks of 51 packs of 5000 I.U. are ample—only one case presented in 1975-6. For prophylactic purposes 2668 doses are immediately available plus a potential in the form of plasma of 2115. Whether the present level of intake of plasma (411 litres) constitutes self-sufficiency remains to be seen.

d. **Anti-vaccinia virus 1gG** (Anti-V)  
As SHHD policy is that this product should not be used as an adjunct to primary smallpox vaccination in adults, the indications for its use are the prevention of smallpox in contacts of a case and in treating complications of smallpox vaccination. Although World Health Organisation programmes for the world-wide eradication of smallpox have eliminated the disease in many countries, a few pockets of infection remain and there is still a possibility, with modern high speed travel, of a case being imported in the incubation stage. Smallpox virus, too, might escape from a laboratory despite the stringent precautions now being taken to contain it. It is felt prudent to have a reserve of 500 doses to meet these eventualities.

Appropriate plasma is obtained from vaccinated donors, e.g. students and members of the Armed Forces, with useful levels of vaccinal antibody. 61 doses were used in 1975-6, a slight increase over the previous year, but contributions of Anti-V plasma to the PFC fell by 50%. Actual or potential production on 31 March '76 was 358 doses.

Self-sufficiency for present requirements has been achieved, but the target for the reserve stock has not yet been reached; if present levels of use and contributions are maintained, this reserve stock should be built up during 1976-77.
e. Anti Hepatitis B surface antigen (Anti-HBsAg) This product is used for passive immunisation of those exposed to the agent by contamination of minor injuries such as needle-pricks; its value in protecting infants born to HBsAg positive mothers is under investigation. Definite requirements have not yet been established, but a target figure of 500 doses being available has been suggested initially.

Plasma is obtained by screening a proportion of donations and setting aside those with a high antibody titre. 120 doses were used in 1975-6, about double that in 1974-5, the largest user being the PFC where minor accidents in handling large quantities of plasma increase the risk.

Intake of plasma dropped by 25% in 1975-6, but actual and potential production at 31 March '76 was 850 doses so that if present contribution levels can be maintained, self-sufficiency, based on experience to date, has been achieved.

f. Anti-herpes zoster and varicella virus (Anti-Z/Var) These conditions have a common aetiology and antibody from one will protect against the other. Anti-Z/Var has a place in the passive immunisation of debilitated or immuno-suppressed patients who may react severely to herpes zoster or in infants with severe chickenpox. Requirements are not as yet established, but there could well be a considerable and sustained demand for this product; the use in 1975-6 when small supplies became available was 80 doses, actual and potential yield on 31 March '76 was 159 doses.

Suitable plasma is only available from convalescent patients and identifying suitable donors is a considerable task. Directors approach general practitioners periodically for information concerning such patients and this is also a field in which specialists in community medicine could offer assistance.

It will be some years before supply and demand figures can be established.

g. Anti-rubella virus (Anti-R) The indications for the use of Anti-R in the early months of pregnancy have not as yet been established; SHHD are obtaining expert advice on this subject.

Actual or potential yield at present is 225 doses. Suitable plasma can be obtained from convalescent patients, with the attendant problems in detecting suitable donors. As in the case of Anti-Z/Var, specialists in community medicine could be of great value in informing Directors of epidemics if the need for this IgG be established.

h. Other specific IgG

(1) A small quantity of anti-mumps plasma is available at the PFC; this IgG could be of value in the same categories as in the Anti-Z/Var groups (subpara f above)

(2) A rabies IgG of human origin would be much preferable to one of animal origin to supplement active immunisation in a person at risk of contracting rabies. The source is limited to those actively immunised (such as some veterinary surgeons). A small quantity of plasma containing rabies antibody was collected in Scotland in 1975-6 and, to economise effort, sent to augment the pool for fractionation at the Blood Products Laboratory at Elstree.

(3) The Directors agreed in 1975 that there were no indications at present for an anti-brucellosis IgG and the small quantities of plasma collected for this purpose have been added to the common plasma pool at the PFC.
A start has been made by the Glasgow centre in collecting plasma containing antibody against cytomegalovirus identified by the screening programme at the Belvidere Hospital.

Development of specific IgG against other infective agents must await appropriate facilities, particularly the establishment of a microbiological laboratory at the FPC. Very worthwhile contributions to patient care could be made if such facilities existed, examples are IgG against the respiratory syncytial virus which is a major cause of mortality and morbidity in infants and against species of pyogenic which are frequently encountered in the colonisation of burns by antibiotic-resistant organisms. While no guarantee can be given that research and development of these would be successful, the effort should be made.

12. The use of coagulation factors (Appendix 1, Tables V and VII)

a. Fibrinogen, which is used in the treatment of des fibrinoid syndromes, can be fractionated from a variety of plasmas. Fresh plasma or cryoprecipitate may be used by haematologists for the supply of fibrinogen, but were the concentrate used on all occasions, the potential available exceeds requirements.

53 doses were used in 1975-6, processed stocks amount to 309. Self-sufficiency has been achieved and maintenance of this presents no problem.

b. Factor VIII

(1) General. Of all the blood products available, the only one which has aroused an emotive response in the UK (Scotland is less vociferous) is the supply of Factor VIII and its use in the treatment of haemophilia. Parliamentary questions, newspapers, wireless and television have all been used to publicise the demands of pressure groups, mainly from lay sources. Propaganda has been along two main lines - a demand for immediate implementation of home therapy regimes (the administration of Factor VIII in the home by the patient, relatives or the general practitioner when a bleeding episode occurs) and the philosophy that the haemophilia patient should lead a perfectly normal life.

Home therapy holds out the undoubted advantages of early treatment, hence lessening the risk of sequelae such as ankylosing joints, and of convenience to the patient. Intermediate factor VIII, being less bulky than cryoprecipitate and remaining potent in a domestic refrigerator as opposed to deep-freeze requirements for the latter, is certainly the product of choice and the BTH must endeavour to meet demands as soon as possible. Cryoprecipitate, however, has proved a most valuable preparation and a gradual changeover to intermediate factor VIII can be achieved without recourse to commercial preparations.

Haemophilia patients have a permanent disability and, as in all physical handicaps, should live within it. Encouragement to lead a perfectly normal life involving increased hazards of traumatic haemorrhage not only increases the chances of ankylosing complications, but involves considerable additional quantities of a valuable therapeutic agent, human Factor VIII. The importance of this can be gauged by the fact that some 90,000 donations are required to meet Factor VIII requirements for some 400 patients in Scotland annually.
(2) There are a number of situations in which Factor VIII is used,
(a) The treatment of patients with frank bleeding episodes in hospital, usually as out-patients, occasionally in-patient treatment is required,
(b) "On demand" therapy in a haemophilia centre, where suitable by the patient himself, if he thinks a haemorrhage is starting,
(c) Similar on demand treatment in the patient's home,
(d) The preparation and after care in operative procedures, minor such as teeth extractions or major as in surgical operations,
(e) The treatment of patients who have developed Factor VIII inhibitors,
(f) The treatment of von Willebrand's disease in which there are differences in the mechanisms leading to haemorrhage to that of classical haemophilia,
(g) Prophylactic therapy (the regular administration of Factor VIII regardless of whether bleeding is present or not) in severe cases of haemophilia.

(3) Preparations available in Scotland to meet these situations are:
(a) Fresh plasma. In view of the low Factor VIII content in relation to volume, the use of FP for this purpose is virtually obsolete.
(b) Cryoprecipitate. The mainstay in treatment at present. This product is suitable for haemophilia centre treatment of bleeding episodes or "on demand" programmes. The main drawback is the unpredictable Factor VIII activity which may lead to failure to achieve a haemostatic effect, and so require repetition, or to overtreatment with waste of valuable material.
(c) Intermediate Factor VIII, fractionated from fresh plasma by the PFC. This is available in vials of freeze-dried material containing an average of 250 units or in bottles containing 600 units. The vials are particularly suitable for home therapy as the volume on reconstitution is 15ml and the material can be stored in a domestic refrigerator; deep freeze is not required for short term storage.
(d) An experimental product fractionated by the PFC from cryo-supernatant plasma. This, despite the removal of cryoprecipitate, contains appreciable quantities of Factor VIII and, while receipts of fresh frozen plasma are insufficient, can be used for therapy in haemophilia centres.
(e) Commercial preparations, the use of which are to be deprecated on ethical and financial grounds.

(4) Requirements of Factor VIII are at present based on an estimated average use of 10,000 units per patient annually, i.e. some 4 million units for the known haemophilia population in Scotland (418). Data from directors of haemophilia centres indicate that 14 children and 51 adults (10% of registered sufferers) are judged suitable for home therapy. In 1974, 55 patients (15%) required operative procedures, the majority for teeth extraction.
(5) Future requirements. As supplies of Factor VIII increase, a major factor which requires urgent study is the optimum dose for the average case of spontaneous haemorrhage in a haemophilia patient. The use of cryoprecipitate reveals very wide differences in the amount judged necessary, varying from 6-60 units of cryoprecipitate (in this context a unit is the material from one donation). This problem required concerted study by the directors of haemophilia centres; such an effort was agreed by Directors of Regional Transfusion and Haemophilia Centres and detailed arrangements accepted at an ad hoc meeting between representatives of the major centres, Glasgow and Edinburgh, in December 1975. Until dosage is resolved, future requirements must remain conjectural.

It is envisaged that the future will require:

(a) Continued production of small quantities of cryoprecipitate for special cases, such as von Willebrand's disease where the clinical impression is that this is a more efficacious remedy than the fractionated product. Production could be confined to one Centre supplying others as required.

(b) A major change-over to intermediate factor VIII as the mainstay of treatment. Priority should be given to those suitable for home therapy.

(c) The development of a more concentrated Factor VIII preparation for use in major surgical procedures and those with Factor VIII inhibitors (other approaches to the latter problem may be developed).

(d) Agreement on a standard range of products in close liaison with the NBTS in England and Wales, including the provision of reconstituting fluid and the desirability of ancillaries such as syringes.

(6) Present supply and demand situation. Issues of cryoprecipitate in 1975-6 were 39,736, an increase of 13% over the previous year. This issue represents, at the average yield claimed by centres, 2.38 million units of FVIII. Issues of intermediate factor (for this purpose no distinction has been made between various vial and bottle content, 250 units has been taken as the average) were 3279, representing 0.82 million units, making a total of 3.2 million. The effect of issues of concentrated factor are slowly appearing: issues of cryoprecipitate for the first quarter of 1976-77 showed a decrease of 6.1% over the previous quarter and of 26% over the first quarter of 1975-76. This has not been reflected as yet in any material increase of fresh frozen plasma received by the PFC whose production capacity for fractionating Factor VIII is limited solely by the FFP intake. The crucial point which should be a main target in the future for the Directors is that, by increasing issues of concentrated red cells instead of whole blood, and by releasing plasma which would be used for cryoprecipitate production to the PFC as concentrated Factor VIII becomes available in increasing quantities (which depends on these two major factors), at least half of the plasma sent to the PFC is in the form of FFP.

As regards self-sufficiency, Factor VIII is available to treat adequately the known haemophilia population in Scotland. The form in which it is available does not as yet meet the major demand for home therapy. Present policy is to issue intermediate factor to centres, with only a very small national reserve at the PFC; Directors of haemophilia and regional transfusion centres are expected to maintain their own reserves and patients should be
introduced to home therapy only when an adequate reserve - three months' anticipated use - is available for each individual in case the PFC meets manufacturing difficulties.

A most important factor in the future requirements of fresh plasma for fractionation of Factor VIII is the loss of activity which occurs at each stage, both in Centres and the PFC. A study group, consisting of scientists and senior laboratory technicians, has been convened to study this problem in depth.

c. Factor XI complexes

(1) Factors II, IX and X, fractionated from plasma obtained from blood when acid citrate dextrose (ACD) or citrate phosphate dextrose (CPD) have been used as the anti-coagulant, is used in the treatment of Christmas disease (haemophilia B) or experimentally in neonatal coagulation problems. 3279 doses were issued in 1975–6, about twice that used in the previous year. Preliminary target figures (2000), based on usage in previous years now require revision and a figure of 5000 is suggested. This should require 2500 litres of fresh frozen plasma, but as Factor VIII can be fractionated from the same material, it should present no problem. Present stocks amount to 475, but production can be raised to the limit of FFP intake and self-sufficiency can be achieved by appropriate effort on the part of the PFC.

(2) Factors II, VII, IX and X, fractionated from plasma when ethylene diamino-tetra-acetic acid has been the anti-coagulant, is mainly used for haemorrhages complicating liver disease and the rapid reversal of oral anti-coagulant therapy. Small quantities of 2ml vials are prepared for Edinburgh for a special study; the main dose used is 10ml. 223 vials were issued in 1975–6, a marginal increase over the previous year. The target of 500 doses, involving some 550 litres of FFP can be met if this amount of plasma is supplied with EDTA as the anti-coagulant. Directors responded to an appeal in this connection and 685 litres of such plasma were sent to the PFC in 1975–6; Factor VIII can be fractionated from the same plasma. Apart from provision of a year's reserve, self-sufficiency has been obtained.

(3) These preparations, by virtue mainly of the Factor X component, are potentially capable of causing complications in the recipient of disseminated intravascular coagulation. The Edinburgh centre have been heavily committed to investigation of this problem, both locally and on an international scale.

13. The production of laboratory reagents (Appendix 1, Table VIII) Laboratory reagents derived from blood are obtainable by local Centre activities, the Blood Group Reference Laboratory (BGRL) of the Lister Institute, the National Tissue-Typing Reference Laboratory (WTTRL) at Bristol and from commercial sources. At present they consist of antigens and antibodies to the cellular elements of the blood; the future may include those to plasma proteins.

Tissue typing reagents will be discussed under that heading (para 15b). Commercial preparations are very costly, some are not available and some are of dubious quality. Local production has much to commend it. Most doctors would assume that only cell suspensions and antisera of the ABO-Rh group are necessary, but this is very wide of the mark. In 1974–5 one centre produced antisera to 34 red cell antigens, 22 of which were outwith the ABO-Rh systems. Most suspensions and sera are produced locally, for use in the Centre or associated hospital laboratories, a few are sent to or received from the BGRL.
Cells and antisera are obtained from normal blood donations or by plasmapheresis; 1960 donations were used for this purpose in 1975-6, but the proportion of plasmapheresis operations to obtain these reagents is not detailed.

The NHB has the subject of use of blood grouping reagents noted for discussion at a Directors' meeting with the view of instituting a national policy to meet Regional centre requirements, but more pressing problems have to date been given priority.

There is no doubt that the present "do-it-yourself" production of reagents, rather than reliance on commercial sources, saves the NHS many hundreds of thousands of pounds per annum.

The attainment of self-sufficiency must await detailed consideration by the Directors; it could well be that the optimum solution would entail a central production, for example in laboratory extensions recommended for the PFC.

14. The use of plasmapheresis (Appendix I, Tables II and IX) At present this technique, in which red cells are returned to the donor and the plasma conserved, is used mainly when the donor's plasma has some special quality, such as rare blood group and HLA antibodies or specific immunoglobulin in high titre. Not having lost any appreciable number of red cells, the process can be repeated fairly frequently as plasma protein loss is rapidly made up by synthesis in the body.

One of the problems facing the BTS at present, and this may assume even greater problems in the future, is the inability to make use of the red cell content of blood to the full, the requirements for plasma being greater. At present the red cells from 40% donations are not used. Some loss is inevitable in maintaining banks with sufficient blood to meet possible emergencies, but this need not be as high as 40%. There are three possible ways to cut down this loss:

a. Offer the surplus, as frozen red cell concentrates (frozen because of the short life of conventionally stored blood) to less fortunate countries. This would raise formidable problems in transport and processing of frozen cells for which the recipient country may lack facilities.

b. Development of using surplus red cells for purposes other than the restoration of the oxygen-carrying power of the blood; the Glasgow centre has undertaken to study this.

c. Obtain a percentage of plasma requirements by plasmapheresis rather than whole blood donation. This has been discussed by the Directors who have concluded that this approach would be premature at this time, but should be kept under review.

15. Major Laboratory Investigations (Appendix I, Table XII) Regional differences exist in clinical practice and in transfusion centres, depending to some extent on geographical considerations, which affect the volume of work undertaken in many laboratory investigations. Much effort is expended in ensuring that blood and blood products are as safe as possible, which involves complex red cell serology, safeguards against endogenous or exogenous infections. Blood banking and processing entails integral laboratory support in most of the pathology disciplines; microbiology, biochemistry, haematology and administrative control. Reference work and liaison with national and international bodies all play their part in quality control. Table XII indicates the volume of work in some of the major investigations undertaken.

a. Grouping and cross-matching and tests in relation to pregnancy. In practically every sphere the work load is increasing. Tests in relation to pregnancy include red cell grouping, the search for antibodies in maternal serum and tests on Rh negative mothers immediately post-partum to detect unusually large foeto-maternal bleeding which indicates the necessity to increase the prophylactic dose of Anti-D to prevent maternal sensitisation. An extension of the Anti-D programme may be
required to prevent female Rh negative infants being sensitised by materno–foetal bleeding from an Rh positive mother; this matter is at present under investigation by the SHHD.

b. Tissue typing. The SNBTS is involved in three major aspects of this.

(1) The requirements for organ transplantation programmes are fulfilled by the RTU in Edinburgh and in Aberdeen for the recently established renal transplant unit there. In Glasgow a different system has evolved because of geographical limitations, an immunology department of the University Department of Bacteriology dealing with this aspect. At present transplantation is virtually confined to kidneys; bone-marrow transplantation may become an important feature in the future.

(2) HLA identical leucocytes and platelets may become an essential, not only for bone marrow transplantation, but for patients who require frequent transfusion of these cells; Glasgow and Edinburgh centres are engaged in forming panels of HLA tested potential donors.

(3) A necessary adjunct to any tissue-typing programme is the supply of HLA antibodies and all centres now participate in this. Maternal sensitisation to HLA antigens derived from the foetus is the most important source of these antibodies and it has been found convenient to test antenatal serum, primarily submitted for other purposes (red cell serology and screening for red cell antibodies). If any contain worthwhile quantities of the many HLA antibodies the mother is requested to donate blood. Material is generally sent to the NTTRL as part of the national pool. It is of interest to note that of the 366 sera listed in the 1976 catalogue of the NTTRL, 93 (25.4%) were from Scottish centres, the main contributors being Aberdeen (14%) and Dundee (8.5%). The figures in the NTTRL do not include certain rarer sera which are in very short supply.

Table XII of Appendix 1 shows the number of tests carried out, an increase overall of 37%. Most were for identification of antisera, but antigenic typing was also carried out in a number of centres, particularly in Edinburgh in connection with the organ transplantation programme there and the development of HLA typed cell panels.

c. Hepatitis testing. The recommendations of the 2nd Report of the Joint Advisory Group on Hepatitis concerning methods of testing for the hepatitis B surface antigen (HBsAg) were accepted and put into practice during 1975 in Scotland. Three methods were deemed acceptable; radio-immune assay (RIA), reversed passive haemagglutination (RPH) and haemagglutination inhibition (HI). Glasgow adopted the RIA method for one year because favourable terms were obtained for the commercial kits available. Aberdeen adopted the RPH method and Edinburgh (who developed their own HI technique), Dundee and Inverness use this HI method, supplemented by other methods, in cases which do not give clear-cut results. The smaller regions use Glasgow or Edinburgh as reference centres, the latter regions have reference facilities available in virology departments or in London, when further investigation or confirmation is required.

Figures in Table XII of Appendix 1 show an overall increase of 7%, less than the overall increase in blood donations because Glasgow were using the RIA method for most of the year and this test does not lead to as many false positives as RPH, so that fewer confirmatory investigations need be made.
16. **Special activities** The Glasgow centre carry out three activities on a national basis.

a. Drying of plasma. In 1975-6 time-expired plasma (DP) from 13554 donations (representing 6777 units of 400ml each) and fresh plasma (FDP) from 26931 donations (representing 12119 units) were dried. Rejections reduced these amounts to 6141 units of DP and 11030 of FDP, a total of 17180 units. All the plasma came from Glasgow resources, but 6160 units were distributed to other centres.

The drying of plasma represents 7558 litres of plasma which could be made available to the FPC if sufficient SPPS had been available to replace all types of plasma.

b. Pyrogen testing. A service is provided for NHS hospitals in addition to the SNBTS, the latter being given priority if necessary, although at present demand levels the centre can cope with all requests.

Work performed in 1975-6 was:

<table>
<thead>
<tr>
<th>Total Tests</th>
<th>SNBTS FPC, Edinburgh and Glasgow BTS</th>
<th>NHS Hospitals</th>
<th>Others</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protein</td>
<td>Non-Protein</td>
<td></td>
<td></td>
</tr>
<tr>
<td>FPC</td>
<td>FPC</td>
<td>819</td>
<td>6</td>
</tr>
<tr>
<td>1933</td>
<td>317</td>
<td>387</td>
<td>404</td>
</tr>
</tbody>
</table>

The test involves measuring temperature rises in three rabbits injected with the fluid under investigation. Standards for non-protein fluids (mainly distilled water, crystalloid solutions and fluids associated with blood freezing techniques) are laid down in the British Pharmacopoeia and proteinaceous fluids have accepted the same standards. Such fluids, however, often exceed the BP limits, particularly those containing Factor IX complexes. Revision of these standards is at present under consideration by European Pharmacopoeia Committees.

c. Scottish Antibody Production Unit (SAPU) There is a growing need for antisera against a variety of protein and steroid hormones. Some of these are available commercially, at a very high cost, and quality varies. In 1973 it was suggested that the NHS develop an antibody production unit; this was agreed in principle by SHMD in 1974 and a pilot plant, under the aegis of the Glasgow BTS, the Department of Animal Husbandry of the University of Glasgow and the Radioimmunoassay Laboratory at Stobhill Hospital, was established in 1975.

These antibodies are raised in animals and are required for diagnostic and research purposes. As they have nothing to do with human blood products, their production has, strictly speaking, nothing to do with the BTS, but as techniques involve immunisation and bleeding of animals, the assay, processing, storage and distribution of reagents, it is only logical that the expertise obtained by the BTS in producing human blood reagents should be made use of in this connection.
Progress of the pilot scheme has been encouraging and extension should be possible in 1977-78 if funds are made available. The Glasgow NHS has been slightly augmented for this project, but find their commitments to it steadily increasing.

Such further extension, with eventual supply of a wide variety of antisera to Scottish laboratories should increase facilities for patient care and the SNBTS contribution will entail considerable savings financially to the NHS if relieved of much of the supply from commercial sources.

17. The Protein Fractionation Centre Commissioning of the PFC is now virtually complete and production figures are rising for all products where plasma supply is adequate. Full production to meet Scottish needs is now in sight (provided appropriate plasma is forthcoming from regional centres). The major addition during the year was the installation of the second half of the computer programme.

Two major problems are as yet unsolved:

a. Many meetings have been held, and much correspondence engendered, over the provision of a microbiology laboratory. Extension of quality control, the characterisation, assessment and clinical use of a number of specific immunoglobulins which could add materially to patient care, research and development into improved and specific coagulation factors and improvement in component yields, are some of the activities of the PFC which can only be done superficially, or not at all, without this extension.

b. The PFC was planned to fractionate plasma for part of England's needs and staff have been recruited and trained on the accepted principle that, in due course, small evening and night shifts be instituted. The time for this has now come, but unacceptable trade union proposals have prevented this. The PFC can cope with Scottish needs on a day staff only basis, but the absence of the other shifts decreases cost-effectiveness and precludes acceptance of plasma from furth of Scotland.

The PFC have now been granted a manufacturer's licence under the Safety of Medicines Act and applications for product licences for each individual preparation are prepared or in draft.

Despite rigid quality control by both regional centres and the PFC, an occasional batch of coagulation factors have produced hepatitis B in recipients, although routine radioimmune assays for this agent have been negative. As overt infection in many microbiological infections depends, in part, on infective dose, this is difficult to understand. A special centrifuge method of removing virus particles from fluids is available, at a cost of some £50,000 which would remove this hazard as well as other potential causes of transfusion-induced hepatitis such as hepatitis A or cytomegalovirus. A case for this provision has been submitted to SHHD.

Plasma stocks, accumulated during the pilot plant stage at the Royal Infirmary, amounted on 31 March '76 to 32056 litres. Deducting 10% for possible process losses, some 29000 litres are available to augment regional intake. At figures of 25000 litres from regions, a requirement for 2500 units of SP albumin annually and 10 units of SPPS per 1000 population, the reserve would last some 2 years. Planning action, which involves staff and equipment, should therefore be taken now to increase regional production of plasma for the PFC.

18. Continuous Flow Cell Separators These machines were designed primarily for the collection of leucocytes and platelets from donors and, with a Code of Practice governing their use (which is at present being drawn up by the NBTS with representatives from the SNBTS) few problems should arise.
However, it is now abundantly clear that there is potentially a wide application in the use of cell separators in extensive plasma exchange. Much of this work is still of an experimental nature, and articles are appearing in the medical literature describing results in a variety of clinical situations. Extensive plasmapheresis, manually or by a separator, appears to carry real benefit in severe rhesus isoimmunisation (Fraser et al (1976), Lancet i, 6) but in many other studies in various conditions results are still equivocal as insufficient cases have been studied. The main replacement fluid is likely to be SPPS alone or with a proportion of fresh plasma and the provision of these materially alters planning figures. Close cooperation between the regional Directors and clinicians is essential to ensure that provision can be made within the limits of present and contemplated production. Clinicians must understand that the supply of these human blood products is by no means inexhaustable as they come from voluntary donations and cannot be synthesised.

At present three of these machines are located in hospitals in Glasgow under direct clinical control. One is located in the BTS in Edinburgh, under collaborative BTS/clinical control. It is likely that cell separators will be necessary in the smaller regions within 2-3 years.

The whole question of the supply and use of these machines requires early, detailed study. If used for their original purpose—the supply of leucocytes and platelets, they are primarily an SNBTS responsibility; if used mainly for patient care, the responsibility for provision of staff and equipment should rest with Health Boards.

19. **Plasma Balance Sheet (Appendix 4)** This Appendix indicates plasma intake into the PFC compared with 1974-5, target figures and stocks, potential or actual, available and so the overall progress towards self-sufficiency. Plasma holdings by PFC have been reduced by 10% to allow for processing loss.

With few exceptions, principally in the field of specific immunoglobulins, intake has improved and considerable progress has been made.

Potential stocks at the PFC have been translated according to present yields; improvement in fractionation techniques may increase these, of particular importance in the production of Factor VIII and SPPS. Taking into account fresh plasma requirements in regions, 10% processing loss and the provision of salt-poor albumin, plasma available at present intake could supply 32000 units of SPPS (at 1.5 units per litre), equivalent to 6.1 units per 1000 population compared with 22820 (4.4 per 1000) in the previous year.

The question of specific immunoglobulins has already been discussed (para 11).

20. **Summary concerning state of self-sufficiency** (+ = attained; - = not yet achieved; NA = not applicable because of product shelf-life)

<table>
<thead>
<tr>
<th>Product</th>
<th>Paragraph</th>
<th>Target</th>
<th>Self-sufficiency</th>
<th>One year’s reserve</th>
</tr>
</thead>
<tbody>
<tr>
<td>Whole Blood</td>
<td>7</td>
<td>40%</td>
<td>+</td>
<td>NA</td>
</tr>
<tr>
<td>Concentrated red cells</td>
<td>7</td>
<td>60%</td>
<td>+ in some centres</td>
<td>NA</td>
</tr>
<tr>
<td>Fresh frozen plasma</td>
<td>8</td>
<td>3000 units</td>
<td>+</td>
<td>NA</td>
</tr>
<tr>
<td>S.P. Albumin</td>
<td>8c</td>
<td>2500 units</td>
<td>Could be achieved at expense of SPPS</td>
<td>-</td>
</tr>
<tr>
<td>SPPS</td>
<td>8f</td>
<td>10u/1000</td>
<td>+</td>
<td>NA at present</td>
</tr>
<tr>
<td>Platelets</td>
<td>9</td>
<td>20000 d</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Cryoprecipitate</td>
<td>10</td>
<td>10% present use</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Product</td>
<td>Paragraph</td>
<td>Target</td>
<td>Day-to-Day</td>
<td>Self-sufficiency</td>
</tr>
<tr>
<td>--------------</td>
<td>-----------</td>
<td>--------------</td>
<td>------------</td>
<td>------------------</td>
</tr>
<tr>
<td>Normal 1gG</td>
<td>11a</td>
<td>5000</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Anti-D</td>
<td>11b</td>
<td>Equivalent of 8500 x 100μg</td>
<td>+</td>
<td>Maintenance depends on volunteer programmes</td>
</tr>
<tr>
<td>Anti-T</td>
<td>11c</td>
<td>5000</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Anti-HBsAg</td>
<td>11d</td>
<td>500</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>Anti-Z/Var</td>
<td>11f</td>
<td>Not established</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Anti-H</td>
<td>11g</td>
<td>Not established</td>
<td>?</td>
<td></td>
</tr>
<tr>
<td>Fibrinogen</td>
<td>12a</td>
<td>300</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>IFVIII</td>
<td>12b</td>
<td>90% of VIII</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>PIII,IX,X</td>
<td>12c(1)</td>
<td>5000</td>
<td>+</td>
<td></td>
</tr>
<tr>
<td>PIII,IX,X</td>
<td>12c(2)</td>
<td>500</td>
<td>+</td>
<td></td>
</tr>
</tbody>
</table>

(Note * capable of achievement with present PFC stocks)

On the whole, day-to-day sufficiency has been achieved except in the important fields of albuminoid fractions and Factor VIII, both of which have at present substitutes (except SP albumin) produced by Centres. PFC production capacity could gradually achieve self-sufficiency in FVIII if issues were accompanied by a corresponding decrease in cryoprecipitate production and hence release of PFP; SPFS targets could be achieved in the remaining months of 1976.

With few exceptions (normal 1gG and fibrinogen) a year's supply of products with a shelf-life of over this time has not been met.

21. Targets for 1977-78 (Appendix 5) An effort in 1975 on the part of the Edinburgh Centre to agreement on targets for fresh frozen plasma intake into the PFC for production of Factor VIII concentrate was not successful as many other Directors felt it was premature at that time to commit themselves to specific figures. As the PFC increases production it should be possible in the coming year to be more positive concerning maintenance of supply and the date (at the latest) of 31 March '78 has been chosen in compiling targets which could be attained.

The notes to Appendix 5 give the details on which these targets are based, the most important features being:

a. A 60% use of CRC when transfusions containing red cells are required. This has already been achieved in Edinburgh (69%) and virtually in Inverness (57%). The original request to clinicians to use CRC was based on requirements of plasma; CRC in many conditions are preferable to whole blood, but the feeling that plasma supply is the important part still remains with some clinicians and they are reluctant to increase CRC use until more blood products are available. With the increasing production figures from the PFC, the time has now come for other Centres to mount schemes for the greater use of CRC.

b. It is envisaged that at least 90% of cryoprecipitate is replaced by concentrated factor VIII.

c. SPFS will largely replace dried plasma, fresh or time-expired. The residual demands for fresh plasma can be met by regions according to their own requirements and the necessity for drying plasma will cease.

d. Yields from the various plasmas may be increased, either by regions adopting measures to decrease loss of activity in the case of factor VIII or selecting only those with high titres of immunoglobulins or by improvement in processing techniques at the PFC.
22. **Literary contributions, committee involvement etc. (Appendix 6)**

Part 1 shows published works by members of the SNBTS, often in collaboration with their clinical colleagues, which is an indication of the close liaison maintained. The contribution of 55 articles to the medical literature is no mean feat and indicates the degree of research and development being pursued. They all add to the sum of human knowledge in the sphere of blood transfusion. It is noteworthy that of the 13 chapters in the volume on blood transfusion published by the London, American and Canadian firm of W.B. Saunders, no less than 8 were provided by members of the SNBTS, and the book was under the supervision of the guest editor, Dr. J.D. Cash.

Part 2 lists the papers delivered at conferences and symposia, at home and abroad, a total of 48, some of which were published later, as such or as extracts, in the Proceedings of these bodies. They also indicate a wide field of interests. The contributions to Committee meetings are not included.

Part 3 shows the involvement of SNBTS in various Committees. Such committee work entails considerable preparation beforehand in writing or studying supporting papers.

Part 4 lists honorary appointments held by SNBTS staff and it will be noted that the Sudan, Iran and Canada benefit from advice from Scotland.

23. **Advisory Group** An Advisory Group on Blood Transfusion under the chairmanship of Dr. A.E. Ritchie and with members representing many clinical disciplines, was formed as a replacement to the Central Consultative Committee.

Its function is to advise the SHHD and, if necessary, the Planning Council for the National Health Service in Scotland on any professional matters pertaining to blood and blood products.
PART 2. ADMINISTRATIVE ASPECTS

24. General

Reorganisation of the management structure of the SNBTS was incorporated into reorganisation of the NHS as a whole, with the inclusion of the BTS in the newly-formed Common Services Agency.

It has become apparent that if the purpose of reorganisation was to improve efficiency, it has been an abysmal failure; on the other hand if the purpose was to decrease unemployment by creating large numbers of new, mainly unproductive, administrative posts, it can be looked upon as an outstanding success.

As regards the SNBTS, the effect of reorganisation has led to:

a. Delay in decisions
b. Unproductive interference with well established and, on the whole, efficient administrative systems
c. Lack of collaboration
d. Lack, or disregard of, adequate professional advice to the Management Committee and its sub-committees.

At present the future of the SNBTS, from the point of view both of the management structure and professional training, is the subject of discussion by the Coordinating Group of Transfusion Directors; a paper will be prepared on "The Way Ahead" so that present deficiencies need not be elaborated in this Report.

25. Accommodation

a. Progress in 1975-76

(1) Headquarters

Erection and occupation (November 1975) of a prefabricated temporary building for BTS Headquarters on the site of PFC.

(2) Glasgow

Programme of minor building work carried out, the main items being:

(a) improvements to the donor centre comprising a new central heating system, reflooring the laboratory there and complete interior repainting.

(b) erecting a flammable chemicals store at BTS Law

(c) fitting out a special laboratory within BTS Law for the testing of blood donations for hepatitis.

(3) Edinburgh

Work began in February 1976 on a programme of alteration and modernisation of BTS premises within the Royal Infirmary. The programme, expected to take 18 months to complete, includes preparation for use by BTS of the floor vacated in 1974 by PFC and rearrangement of existing accommodation for greater efficiency of working.

(4) Dundee

Unallocated space in Ninewells Hospital was developed as a donor centre to be occupied early in financial year 1976-77 when it was intended to convert the existing inadequate donor accommodation to laboratories.
(5) **Aberdeen**
Application made through CSA Management Committee for funds to extend HTS premises as part of a long-standing scheme intended to take effect as departments of Aberdeen Royal Infirmary vacated space adjacent to HTS.

(6) **Inverness**
Minor alterations were made to accommodate the red cell freezing equipment, including an external liquid nitrogen storage tank.

(7) **P.P.C.**
Minor alterations only.

b. **Future requirements**

(1) **Short term**
(a) Provision of a microbiological laboratory at the PFC
(b) A series of minor alterations, including a covered way between laboratories have been proposed for Glasgow.
(c) Provision of further accommodation (other than the present pharmacy floor) is under discussion in Aberdeen.

(2) **Long term**
(a) A permanent building for Headquarters.
(b) Provision of regional transfusion centre(s) in Glasgow itself rather than at Law Hospital.
(c) Provision of a transfusion centre in the rebuild of the Royal Infirmary, Edinburgh.
(d) Extension of production and storage capacity at the PFC.

26. **Staffing** Establishments on 31 March '76 are shown in Appendix 7. On the whole these are adequate for present operational needs, but requirements of plasma for SPPS over 8.5 units per 1000 population (Appendix 5, para 5c, note 14), and the overall yearly increase in commitments of regional centres by some 20%, if it continues, will require further additions. Recruitment is satisfactory. The main criticism of staffing levels is in the grading structure, which in many cases is not in accord with the responsibilities undertaken by individuals, particularly in the technician and administrative field.

27. **Medical equipment and supplies** The provision of these is satisfactory, but two points should be emphasised

a. Changes in policy may occur at any time which have not been foreseen and for which financial provision has not been made. A contingency fund should be added to allocations, on a regional or national basis, to be used in such circumstances.

b. Delivery times from manufacturers can be many months. To deal with this it is suggested that financial allocations for any one year can be brought forward into the succeeding year.
28. **Vehicles** Vehicles in use at 31 March '76 are shown in Appendix 8. Proposals for capital expenditure on additional vehicles or replacements have been agreed to date, and if this continues, no major problems should arise. The provision of a mobile donating centre for Inverness has been discussed in 1975-6, but no firm decision has yet been taken.
PART 3. SUMMARY OF AREAS REQUIRING ATTENTION

29. Many of the areas under the heading of professional aspects are being, or will be, studied at Directors' meetings and need not be recapitulated here. There are a number of areas in which management help (CSA or SHHD) is required, the chief of these being:

a. A deeper understanding of the unique position of the SNBTS in that valuable raw materials are freely given by a large number of voluntary blood donors

b. A realisation of the essential team concept of a transfusion centre

c. Advice on replacement fluids and guide lines for the use of SPPS (from the Advisory Group)

d. Provision of a microbiology laboratory for the PFC

e. The future of the Scottish Antibody Production Unit

f. The supply and use of cell separator machines (by interested clinicians)

g. Reappraisal of the role of SHHD - CSA - SNBTS

h. Grading structures for SNBTS staff, not specifically included in Whitley Council Regulations

i. Provision of contingency funds either regionally or nationally

j. Provision of a special centrifuge to PFC to eliminate viruses from products

k. In the long term -
   (1) location of regional centre(s) in Glasgow instead of at Law
   (2) Extension of productive capacity of the PFC
   (3) A permanent building for HQ, SNBTS.
ANNOTATED STATISTICAL TABLES

TABLE I Donor response and donation rates
II Use of Whole blood and Concentrated Red Cells
III Use of plasma and its albuminoid fractions
IV Use of Platelet Concentrates
V Issues of cryoprecipitate
VI Use of immunoglobulins
VII Use of Coagulation Factors (less platelets and cryoprecipitate)
VIII Use of donations for cell grouping reagents
IX Plasmapheresis
X Receipt of plasma by PFC for production of coagulation factors and albuminoid fractions
XI Receipt of plasma by PFC for production of specific immunoglobulins
XII Major laboratory investigations
<table>
<thead>
<tr>
<th></th>
<th>1974-5</th>
<th>1975-6</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Glasgow</td>
<td>Edinburgh</td>
<td>Dundee</td>
</tr>
<tr>
<td>Donor attendances</td>
<td>258445</td>
<td>138765</td>
<td>78245</td>
</tr>
<tr>
<td>Rejected</td>
<td>21648</td>
<td>11251</td>
<td>8367</td>
</tr>
<tr>
<td>Bled</td>
<td>236788</td>
<td>127512</td>
<td>69878</td>
</tr>
<tr>
<td>New donors bled</td>
<td>43141</td>
<td>25537</td>
<td>12608</td>
</tr>
<tr>
<td>TOTAL DONATIONS</td>
<td>231432</td>
<td>125751</td>
<td>69878</td>
</tr>
<tr>
<td>At centre</td>
<td>48969</td>
<td>19796</td>
<td>16413</td>
</tr>
<tr>
<td>Elsewhere</td>
<td>182469</td>
<td>105955</td>
<td>53465</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TABLE 1. Donor response and Donation rates**

**NOTES**

1. Donor attendances 1975-6 compared with 1974-5
   
   \[
   \begin{array}{c|c|c|c|c|c}
   & +11.59 & +9.35 & +19.00 & +16.70 & +9.40 \\
   \hline
   & \text{Total} & \text{Glasgow} & \text{Edinburgh} & \text{Dundee} & \text{Aberdeen} & \text{Inverness} \\
   \end{array}
   \]

   \[
   \frac{+12.18}{12.18}
   \]

2. Rejection (% rates)
   a. Donor Rejection (Due to unfitness, previous history, etc.)
      
      \[
      \begin{array}{c|c|c|c|c|c|c}
      \hline
      1974-5 & 8.10 & 12.97 & 3.48 & 2.76 & 6.17 & 8.37 & 1.38 & 0 & 4.39 & 5.58 & 0.6 & 2.50 \\
      \end{array}
      \]

   b. Donation Rejection (Incomplete bags etc.) (1974-5, 2.3%)
      
      \[
      \begin{array}{c|c|c|c|c|c|c}
      \hline
      1974-5 & 1.38 & 0 & 4.39 & 5.58 & 0.6 & 2.50 & 9.75 & 10.69 & 8.66 & 8.63 & 6.11 & 9.45 \\
      \end{array}
      \]

3. Donations 1975-6 compared with 1974-5
   
   \[
   \begin{array}{c|c|c|c|c|c|c}
   \hline
   \end{array}
   \]

4. New donors as percentage of attendances (1974-5, 16.69%)
   
   \[
   \begin{array}{c|c|c|c|c|c}
   & 20.56 & 16.21 & 18.31 & 14.07 & 18.57 & 18.42 \\
   \hline
   \end{array}
   \]

5. Percentage of donations obtained at transfusion centres (1974-5, 21.16%)
   
   \[
   \begin{array}{c|c|c|c|c|c}
   & 15.74 & 23.48 & 31.52 & 23.78 & 12.85 & 20.32 \\
   \hline
   \end{array}
   \]
6. Response according to population (rates per thousand)
   a. Donor attendance
      | Glasgow | Edinburgh | Dundee | Aberdeen | Inverness | Total |
      |---------|-----------|--------|----------|-----------|-------|
      | 1974-5  | 42        | 61     | 67       | 51        | 54    | 50    |
      | 1975-6  | 47        | 66     | 80       | 59        | 59    | **56**|

   b. Total donations
<pre><code>  | Glasgow | Edinburgh | Dundee | Aberdeen | Inverness | Total |
  |---------|-----------|--------|----------|-----------|-------|
  | 1974-5  | 38        | 53     | 63       | 47        | 50    | 44    |
  | 1975-6  | 43        | 59     | 73       | 54        | 55    | **50**|
</code></pre>
<table>
<thead>
<tr>
<th></th>
<th>Glasgow</th>
<th>Edinburgh</th>
<th>Dundee</th>
<th>Aberdeen</th>
<th>Inverness</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Total donations</strong></td>
<td>125751</td>
<td>69873</td>
<td>30779</td>
<td>25612</td>
<td>10482</td>
<td>262502</td>
</tr>
<tr>
<td><strong>Whole blood issued</strong></td>
<td>69752</td>
<td>25199</td>
<td>15141</td>
<td>27849</td>
<td>5370</td>
<td>143301</td>
</tr>
<tr>
<td>Returned</td>
<td>21108</td>
<td>11498</td>
<td>2608</td>
<td>19096</td>
<td>2356</td>
<td>56666</td>
</tr>
<tr>
<td>Used</td>
<td>48644</td>
<td>13691</td>
<td>12533</td>
<td>8753</td>
<td>3014</td>
<td>86635</td>
</tr>
<tr>
<td><strong>CRC(fresh) issued</strong></td>
<td>39654</td>
<td>39972</td>
<td>3178</td>
<td>3509</td>
<td>6963</td>
<td>91276</td>
</tr>
<tr>
<td>Returned</td>
<td>3471</td>
<td>14674</td>
<td>-</td>
<td>384</td>
<td>2924</td>
<td>21453</td>
</tr>
<tr>
<td>Used</td>
<td>35283</td>
<td>24298</td>
<td>3137</td>
<td>3125</td>
<td>4093</td>
<td>69823</td>
</tr>
<tr>
<td><strong>CRC(frozen) issued</strong></td>
<td>1535</td>
<td>877</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2414</td>
</tr>
<tr>
<td>Returned</td>
<td>6</td>
<td>11</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>Used</td>
<td>1529</td>
<td>866</td>
<td>-</td>
<td>-</td>
<td>2</td>
<td>2397</td>
</tr>
<tr>
<td><strong>WB+CRC(all) issued</strong></td>
<td>109941</td>
<td>65038</td>
<td>16319</td>
<td>31359</td>
<td>12335</td>
<td>237053</td>
</tr>
<tr>
<td>Returned</td>
<td>24595</td>
<td>26183</td>
<td>2605</td>
<td>19480</td>
<td>5280</td>
<td>78136</td>
</tr>
<tr>
<td>Used</td>
<td>85356</td>
<td>39855</td>
<td>15711</td>
<td>11878</td>
<td>7055</td>
<td>158855</td>
</tr>
</tbody>
</table>

**TABLE II**  
Use of Whole Blood (WB) and Concentrated Red Cells (CRC) 1975-6

**NOTES**

1. Units, particularly of whole blood, may be documented as "issued" more than once, if not used for the patient for whom it was originally crossmatched and returned to the blood bank for re-issue. Similarly "returns" may be thus duplicated. The amount of blood used (issues minus returns) has been used as the basis for most of the following calculations.

2. For 1974-5 distinction was not always made between returns of WB and CRC; this is indicated by NK (not known).

3. Percentage of total donations used as whole blood

<table>
<thead>
<tr>
<th>Year</th>
<th>Whole Blood</th>
<th>NK</th>
<th>CRC(fresh)</th>
<th>CRC(frozen)</th>
<th>NK</th>
<th>CRC(all)</th>
<th>NK</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974-5</td>
<td>42.92</td>
<td>NK</td>
<td>32.21</td>
<td>43.66</td>
<td>40.16</td>
<td>NK</td>
<td></td>
</tr>
<tr>
<td>1975-6</td>
<td>38.68</td>
<td>19.59</td>
<td>40.72</td>
<td>34.18</td>
<td>28.75</td>
<td>33.00</td>
<td></td>
</tr>
</tbody>
</table>

4. Percentage of total donations used as CRC (fresh or frozen)

<table>
<thead>
<tr>
<th>Year</th>
<th>Whole Blood</th>
<th>NK</th>
<th>CRC(fresh)</th>
<th>CRC(frozen)</th>
<th>NK</th>
<th>CRC(all)</th>
<th>NK</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974-5</td>
<td>28.66</td>
<td>NK</td>
<td>7.51</td>
<td>12.03</td>
<td>21.51</td>
<td>NK</td>
<td></td>
</tr>
<tr>
<td>1975-6</td>
<td>29.18</td>
<td>36.01</td>
<td>10.32</td>
<td>12.20</td>
<td>38.55</td>
<td>27.50</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Glasgow</td>
<td>Edinburgh</td>
<td>Dundee</td>
<td>Aberdeen</td>
<td>Inverness</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>----------</td>
<td>---------</td>
<td>-----------</td>
<td>-------</td>
<td>----------</td>
<td>-----------</td>
<td>-------</td>
<td></td>
</tr>
<tr>
<td><strong>5.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used as CRC (fresh or frozen) as percentage of use of WB and CRC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1974-5</td>
<td>40.04</td>
<td>NK</td>
<td>18.90</td>
<td>21.68</td>
<td>34.88</td>
<td>NK</td>
<td></td>
</tr>
<tr>
<td>1975-6</td>
<td>43.01</td>
<td>64.76</td>
<td>20.22</td>
<td>26.31</td>
<td>57.28</td>
<td>45.46</td>
<td></td>
</tr>
<tr>
<td><strong>6.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Returned whole blood as percentage of issues</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1974-5</td>
<td>27.95</td>
<td>NK</td>
<td>27.95</td>
<td>60.35</td>
<td>55.64</td>
<td>NK</td>
<td></td>
</tr>
<tr>
<td>1975-6</td>
<td>30.26</td>
<td>45.64</td>
<td>17.22</td>
<td>68.57</td>
<td>43.87</td>
<td>39.54</td>
<td></td>
</tr>
<tr>
<td><strong>7.</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Returned CRC as percentage of issues</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1974-5</td>
<td>9.23</td>
<td>NK</td>
<td>0</td>
<td>3.6</td>
<td>15.82</td>
<td>NK</td>
<td></td>
</tr>
<tr>
<td>1975-6</td>
<td>8.65</td>
<td>36.85</td>
<td>0</td>
<td>10.94</td>
<td>41.88</td>
<td>22.91</td>
<td></td>
</tr>
<tr>
<td>Product</td>
<td>1974-5</td>
<td>1975-6</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------</td>
<td>--------</td>
<td>--------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Glasgow</td>
<td>Edinburgh</td>
<td>Dundee</td>
<td>Aberdeen</td>
<td>Inverness</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>FF</td>
<td>1526</td>
<td>1188</td>
<td>421</td>
<td>266</td>
<td>20</td>
<td>40</td>
<td>1955</td>
</tr>
<tr>
<td>P.Alb.</td>
<td>239</td>
<td>125</td>
<td>102</td>
<td>21</td>
<td>-</td>
<td>8</td>
<td>256</td>
</tr>
<tr>
<td>1g</td>
<td>925</td>
<td>201</td>
<td>114</td>
<td>12</td>
<td>50</td>
<td>54</td>
<td>431</td>
</tr>
<tr>
<td>45g</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>DP</td>
<td>5574</td>
<td>10822</td>
<td>-</td>
<td>144</td>
<td>195</td>
<td>-</td>
<td>11161</td>
</tr>
<tr>
<td>P</td>
<td>11614</td>
<td>2777</td>
<td>3435</td>
<td>826</td>
<td>744</td>
<td>420</td>
<td>8202</td>
</tr>
<tr>
<td>PPS</td>
<td>2624</td>
<td>2223</td>
<td>864</td>
<td>100</td>
<td>239</td>
<td>242</td>
<td>3668</td>
</tr>
<tr>
<td>Vol.Exp.</td>
<td>19812</td>
<td>15822</td>
<td>4299</td>
<td>1070</td>
<td>1178</td>
<td>662</td>
<td>2301</td>
</tr>
</tbody>
</table>

TABLE III. Use of plasma and its albuminoid fractions

1. FFP = Fresh Frozen Plasma
   S.P.Alb. = Salt Poor Albumin
   FDP = Fresh Dried Plasma
   DP = Other (older) Dried Plasma, frequently from time-expired blood
   SPFS = Stable Plasma Protein Solution (Synonym previously in use FFP = plasma protein fraction or purified protein fraction)
   Vol.Exp. = Volume Expanders (FDP + DP + SPFS)

2. The use of FFP and S.P.Alb. is discussed in the text of this Report.

3. The use of volume expanders in 1975-6 compared with 1974-5 as percentage increase or decrease.

<table>
<thead>
<tr>
<th></th>
<th>Glasgow</th>
<th>Edinburgh</th>
<th>Dundee</th>
<th>Aberdeen</th>
<th>Inverness</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDP</td>
<td>+ 97</td>
<td>- or + 00</td>
<td></td>
<td></td>
<td></td>
<td>+ 100</td>
</tr>
<tr>
<td>DP</td>
<td>-191</td>
<td>+ 68</td>
<td>+ 29</td>
<td>+ 16</td>
<td>+ 109</td>
<td>- 42</td>
</tr>
<tr>
<td>SPFS</td>
<td>+ 80</td>
<td>+ 59</td>
<td>-128</td>
<td>- 46</td>
<td>- 10</td>
<td>+ 40</td>
</tr>
<tr>
<td>Vol. Exp.</td>
<td>+ 7</td>
<td>+ 61</td>
<td>+ 23</td>
<td>+ 19</td>
<td>+ 41</td>
<td>+ 16</td>
</tr>
</tbody>
</table>

4. The use of volume expanders per 1000 population

<table>
<thead>
<tr>
<th></th>
<th>1974-5</th>
<th>1975-6</th>
</tr>
</thead>
<tbody>
<tr>
<td>FDP</td>
<td>5.04</td>
<td>5.38</td>
</tr>
<tr>
<td>DP</td>
<td>2.26</td>
<td>3.64</td>
</tr>
<tr>
<td>SPFS</td>
<td>2.69</td>
<td>2.54</td>
</tr>
<tr>
<td>Inverness</td>
<td>2.10</td>
<td>2.50</td>
</tr>
<tr>
<td>Total</td>
<td>2.46</td>
<td>3.48</td>
</tr>
<tr>
<td>Vi</td>
<td>3.8</td>
<td>4.42</td>
</tr>
</tbody>
</table>
TABLE IV. The use of platelet concentrates

<table>
<thead>
<tr>
<th></th>
<th>Glasgow</th>
<th>Edinburgh</th>
<th>Dundee</th>
<th>Aberdeen</th>
<th>Inverness</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1974-5</td>
<td>4377</td>
<td>10954</td>
<td>218</td>
<td>395</td>
<td>34</td>
<td>15918</td>
</tr>
<tr>
<td>1975-6</td>
<td>6599</td>
<td>13490</td>
<td>497</td>
<td>553</td>
<td>38</td>
<td>23277</td>
</tr>
<tr>
<td>1975-6</td>
<td>5617</td>
<td>11094</td>
<td>411</td>
<td>519</td>
<td>38</td>
<td>17679</td>
</tr>
</tbody>
</table>

NOTES
1. Figures for preparation of platelets not available for 1974-5
2. Issue of platelets in 1975-6 compared with 1974-5 as percentage increase -
   | 28 | 2 | 84 | 31 | 12 | 11 |
3. Percentage of donations used for the preparation of platelets, 1975-6 -
   | 7  | 19 | 2  | 2  | 4  | 6.9 |
4. Percentage of platelet concentrates not used, 1975-6 -
   | 35 | 18 | 17 | 6  | -  | 24 |

TABLE V. Issues of cryoprecipitate

<p>| | | | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1974-5</td>
<td>22271</td>
<td>9232</td>
<td>833</td>
<td>1124</td>
<td>1588</td>
<td>35048</td>
</tr>
<tr>
<td>1975-6</td>
<td>24515</td>
<td>11112</td>
<td>1049</td>
<td>1976</td>
<td>1093</td>
<td>39736</td>
</tr>
</tbody>
</table>

NOTES
1. Cryoprecipitate issues are approximately equal to preparation depending on stocks at the end of the year and have not been shown separately.
2. Cryoprecipitate issues as percentage of donations 1975-6
   | 19 | 16 | 3 | 8 | 10 | 15 |
3. Cryoprecipitate issues in 1975-6 compared with those of 1974-5 as percentage increase or decrease
<p>| +10 | +20 | +26 | +75 | -31 | +13 |</p>
<table>
<thead>
<tr>
<th>Normal (750 µg)</th>
<th>3362</th>
<th>1387</th>
<th>1225</th>
<th>137</th>
<th>131</th>
<th>75</th>
<th>2955</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-D&lt;br&gt;50µg</td>
<td>1559</td>
<td>963</td>
<td>486</td>
<td>267</td>
<td>198</td>
<td>48</td>
<td>1972</td>
</tr>
<tr>
<td>100µg</td>
<td>7428</td>
<td>4129</td>
<td>1386</td>
<td>650</td>
<td>570</td>
<td>333</td>
<td>7068</td>
</tr>
<tr>
<td>1000µg</td>
<td>15</td>
<td>-</td>
<td>2</td>
<td>-</td>
<td>6</td>
<td>-</td>
<td>8</td>
</tr>
<tr>
<td>Anti-T&lt;br&gt;250 units</td>
<td>371</td>
<td>40</td>
<td>200</td>
<td>4</td>
<td>12</td>
<td>19</td>
<td>275</td>
</tr>
<tr>
<td>1000 units</td>
<td>1</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Anti-V</td>
<td>46</td>
<td>38</td>
<td>15</td>
<td>6</td>
<td>-</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>Anti HBsAg</td>
<td>55</td>
<td>19</td>
<td>62</td>
<td>12</td>
<td>21</td>
<td>6</td>
<td>120</td>
</tr>
<tr>
<td>Anti Z/Var</td>
<td>4</td>
<td>56</td>
<td>17</td>
<td>6</td>
<td>-</td>
<td>1</td>
<td>80</td>
</tr>
</tbody>
</table>

Table VI. Use of immunoglobulins (1gG)

Notes
1. Anti D = Anti-Rhesus D positive cells
   Anti T = Anti-tetanus toxin
   Anti V = Anti-vaccinia virus
   Anti HBsAg = Anti-Hepatitis B surface antigen
   Anti Z/Var = Anti herpes zoster and varicella viruses
2. The use of normal 1gG in 15 and 30 mg doses has been discontinued and these are not included.
3. Supply of Anti Z/Var has increased, but is still restricted and no useful comparisons can be made.
4. The use of other specific 1gG in the years 1975-6 and 1974-5 is as follows in percentage increases or decreases
   a. Normal - 12
   b. Anti-D (1) 50 µg + 27
      (2) 100 µg - 5
   c. Anti-T 250 units - 26 (despite relatively ample supplies being available)
   d. Anti-V + 33%
   e. Anti HBsAg + 118

viii.
<table>
<thead>
<tr>
<th>Factor</th>
<th>1974-5</th>
<th>1975-6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Glasgow</td>
<td>Edinburgh</td>
</tr>
<tr>
<td>Fibrinogen</td>
<td>42</td>
<td>14</td>
</tr>
<tr>
<td>I.P.VIII</td>
<td>241</td>
<td>1887</td>
</tr>
<tr>
<td>II,VII,IX,X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 ml</td>
<td>22</td>
<td>-</td>
</tr>
<tr>
<td>10 ml</td>
<td>200</td>
<td>60</td>
</tr>
<tr>
<td>II,IX,X</td>
<td>1642</td>
<td>1810</td>
</tr>
</tbody>
</table>

**TABLE VII.** The use of coagulation factors, less platelets (Table IV) and cryoprecipitate (Table V).

**NOTES**

1. There has been little change in the use of Factor I (fibrinogen) and the preparation of Factors II, VII, IX and X.

2. The increased use of Intermediate Factor VIII is due to the commissioning of the PFC and hence an increased supply of this concentrated factor. Major issues are of batches in the region of 250 units per ml and no distinction has been made, for the purposes of this report, in vial content.

3. The use of the preparation of Factors II, IX and X has increased by 42%, mainly by Glasgow (+ 44%) and Dundee who used 95 vials in 1975-6 compared with only 6 in 1974-5.

---

**TABLE VIII.** The use of donations for red cell grouping reagents

**NOTES**

1. There has been an overall decrease (11%) in this activity. The percentage of donations used for this purpose amounted in 1975-6 to 0.75

---

**TABLE IX.** Number of units (of 250 ml) obtained by plasmapheresis

**NOTES**

1. There has been an apparent (see text) overall decrease of 19% in plasmapheresis donations in 1975-6 compared with the previous year.
<table>
<thead>
<tr>
<th>Type</th>
<th>Glasgow</th>
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<th>Dundee</th>
<th>Aberdeen</th>
<th>Inverness</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>FFP</td>
<td>819</td>
<td>1357</td>
<td>212</td>
<td>3</td>
<td>832</td>
<td>3223</td>
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<tr>
<td>1974-5</td>
<td>1457</td>
<td>2611</td>
<td>484</td>
<td>43</td>
<td>1271</td>
<td>5886</td>
</tr>
<tr>
<td>Difference</td>
<td>+ 638</td>
<td>+ 1254</td>
<td>+ 272</td>
<td>+ 40</td>
<td>+ 439</td>
<td>+ 2643</td>
</tr>
<tr>
<td></td>
<td>(+ 82%)</td>
<td>(+ 113%)</td>
<td>(+ 60%)</td>
<td>(+ 80%)</td>
<td>(+ 133%)</td>
<td>(+ 82%)</td>
</tr>
<tr>
<td>EDTA</td>
<td>47</td>
<td>190</td>
<td>65</td>
<td>20</td>
<td>-</td>
<td>322</td>
</tr>
<tr>
<td>1974-5</td>
<td>215</td>
<td>465</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>685</td>
</tr>
<tr>
<td>Difference</td>
<td>+ 168</td>
<td>+ 275</td>
<td>- 60</td>
<td>- 20</td>
<td>-</td>
<td>+ 363</td>
</tr>
<tr>
<td></td>
<td>(+ 113%)</td>
<td>(+ 113%)</td>
<td>(- 60%)</td>
<td>(- 20%)</td>
<td>(- 33%)</td>
<td>(+ 113%)</td>
</tr>
<tr>
<td>Cryosup.</td>
<td>1896</td>
<td>1242</td>
<td>184</td>
<td>194</td>
<td>19</td>
<td>3535</td>
</tr>
<tr>
<td>1974-5</td>
<td>253</td>
<td>2187</td>
<td>241</td>
<td>254</td>
<td>-</td>
<td>2935</td>
</tr>
<tr>
<td>Difference</td>
<td>- 1643</td>
<td>+ 945</td>
<td>+ 57</td>
<td>+ 60</td>
<td>- 19</td>
<td>- 600</td>
</tr>
<tr>
<td></td>
<td>(- 17%)</td>
<td>(+ 17%)</td>
<td>(+ 57%)</td>
<td>(+ 60%)</td>
<td>(- 17%)</td>
<td>(- 17%)</td>
</tr>
<tr>
<td>Older P.</td>
<td>1562</td>
<td>2317</td>
<td>2667</td>
<td>2050</td>
<td>295</td>
<td>8891</td>
</tr>
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<td>1974-5</td>
<td>2987</td>
<td>3423</td>
<td>3077</td>
<td>2465</td>
<td>357</td>
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<tr>
<td>Difference</td>
<td>+ 1425</td>
<td>+ 1106</td>
<td>+ 401</td>
<td>+ 415</td>
<td>+ 62</td>
<td>+ 3418</td>
</tr>
<tr>
<td></td>
<td>(+ 36%)</td>
<td>(+ 36%)</td>
<td>(+ 40%)</td>
<td>(+ 36%)</td>
<td>(+ 36%)</td>
<td>(+ 36%)</td>
</tr>
<tr>
<td>Total for</td>
<td>4324</td>
<td>5106</td>
<td>3128</td>
<td>2267</td>
<td>1146</td>
<td>15971</td>
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<tr>
<td>Alb.P.</td>
<td>4912</td>
<td>8666</td>
<td>3807</td>
<td>2762</td>
<td>1628</td>
<td>21795</td>
</tr>
<tr>
<td>1974-5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Difference</td>
<td>+ 588</td>
<td>+ 3580</td>
<td>+ 679</td>
<td>+ 495</td>
<td>+ 482</td>
<td>+ 5824</td>
</tr>
<tr>
<td></td>
<td>(+ 12%)</td>
<td>(+ 35%)</td>
<td>(+ 22%)</td>
<td>(+ 22%)</td>
<td>(+ 22%)</td>
<td>(+ 22%)</td>
</tr>
</tbody>
</table>

**TABLE X.** Receipt of plasma (in litres) by PPC for production of coagulation factors and albuminoid fractions

**NOTES**

1. **a.** FFP = Fresh Frozen Plasma (ACD or CPD as anticoagulant), suitable for production of Factors I (Fibrinogen), VIII, IX, X, normal IgG and SPPS or albumin.

2. **b.** EDTA = Plasma from blood with EDTA as anticoagulant, suitable for production of Factors I, II, VII, IX, X, normal IgG and SPPS or albumin.

3. **c.** Cryosup. = Supernatant after removal of cryoprecipitate, suitable for production of Factor I, normal IgG and SPPS or albumin.

4. **d.** Older P. = Older plasma, suitable for production of normal IgG and SPPS or albumin.

5. **e.** Total Alb.P. = Total available for albumin fractions (SPPS or S.P. albumin)

2. The figures are taken from the annual statistics of the Protein Fractionation Centre which, by weighing plasma packs on receipt, give more accurate figures than those from the quarterly reports from Centres.
<table>
<thead>
<tr>
<th>Type</th>
<th>Glasgow</th>
<th>Edinburgh</th>
<th>Dundee</th>
<th>Aberdeen</th>
<th>Inverness</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Anti-D</td>
<td>1974-5</td>
<td>426</td>
<td>240</td>
<td>94</td>
<td>-</td>
<td>56</td>
</tr>
<tr>
<td></td>
<td>1975-6</td>
<td>117</td>
<td>181</td>
<td>216</td>
<td>6</td>
<td>125</td>
</tr>
<tr>
<td></td>
<td>Difference</td>
<td>-309</td>
<td>-59</td>
<td>+122</td>
<td>+6</td>
<td>+69</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(-21%)</td>
</tr>
<tr>
<td>Anti-T</td>
<td>1974-5</td>
<td>40</td>
<td>100</td>
<td>6</td>
<td>-</td>
<td>167</td>
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<tr>
<td></td>
<td>1975-6</td>
<td>86</td>
<td>98</td>
<td>7</td>
<td>-</td>
<td>220</td>
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<tr>
<td></td>
<td>Difference</td>
<td>+46</td>
<td>-2</td>
<td>+1</td>
<td>-</td>
<td>+53</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(+31%)</td>
</tr>
<tr>
<td>Anti-V</td>
<td>1974-5</td>
<td>23</td>
<td>27</td>
<td>15</td>
<td>1</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>1975-6</td>
<td>15</td>
<td>14</td>
<td>13</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>Difference</td>
<td>-8</td>
<td>-13</td>
<td>-2</td>
<td>-1</td>
<td>-8</td>
</tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(-50%)</td>
</tr>
<tr>
<td>Anti HBeAg</td>
<td>1974-5</td>
<td>79</td>
<td>25</td>
<td>-</td>
<td>-</td>
<td>16</td>
</tr>
<tr>
<td></td>
<td>1975-6</td>
<td>63</td>
<td>12</td>
<td>5</td>
<td>-</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Difference</td>
<td>-16</td>
<td>-13</td>
<td>+5</td>
<td>-</td>
<td>-6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(-23%)</td>
</tr>
<tr>
<td>Anti Z/Var</td>
<td>1974-5</td>
<td>-</td>
<td>6</td>
<td>-</td>
<td>-</td>
<td>15</td>
</tr>
<tr>
<td></td>
<td>1975-6</td>
<td>14</td>
<td>11</td>
<td>5</td>
<td>-</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>Difference</td>
<td>+14</td>
<td>+5</td>
<td>+5</td>
<td>-</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(+219%)</td>
</tr>
</tbody>
</table>

**Table XI.** Receipt of plasma (in litres) by PFC for production of specific immunoglobulins

**NOTES**

1. As in Table X, (Note 2), figures are derived from PFC returns.

2. Type as defined in Table VI, Note 1.

3. No differentiation has been made in this Table of the various types of Anti-D plasma supplies, of low (titre 1/16), medium (titre 1/16 - 1/64) or high (titre over 1/64) Anti-D content. The proportions received were:
   - 1974-5 Low 6% Medium 91% High 3%
   - 1975-6 Low 4% Medium 89% High 10%

4. In addition to production of the specific immunoglobulin, Anti-D plasma will also provide normal IgG and SPPS or albumin (and, if necessary, Factors I and IX X); the other specific IgG plasmas will in addition supply Factor VIII.

_xi._
### A. GROUPING AND CROSS-MATCHING

<table>
<thead>
<tr>
<th></th>
<th>Glasgow</th>
<th>Edinburgh</th>
<th>Dundee</th>
<th>Aberdeen</th>
<th>Inverness</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Donations grouped</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1974-5</td>
<td>110910</td>
<td>62239</td>
<td>26436</td>
<td>23305</td>
<td>9542</td>
<td>231432</td>
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<td>1975-6</td>
<td>125751</td>
<td>69878</td>
<td>30779</td>
<td>25612</td>
<td>10482</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td>(+ 13%)</td>
</tr>
<tr>
<td><strong>Tests in relation to pregnancy</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td>1974-5</td>
<td>18863</td>
<td>40892</td>
<td>8825</td>
<td>13168</td>
<td>5765</td>
<td>87511</td>
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<td>1975-6</td>
<td>19300</td>
<td>39239</td>
<td>9957</td>
<td>12865</td>
<td>6041</td>
<td>87402</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(No change)</td>
</tr>
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<td><strong>Patients grouped</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1974-5</td>
<td>-</td>
<td>2952</td>
<td>3151</td>
<td>475</td>
<td>5418</td>
<td>10996</td>
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<tr>
<td>1975-6</td>
<td>-</td>
<td>2319</td>
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<td>402</td>
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<td>123</td>
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<td>(+ 12%)</td>
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<td><strong>Patients grouped and cross-matched</strong></td>
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</tr>
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<td>1974-5</td>
<td>1128</td>
<td>16789</td>
<td>5496</td>
<td>10026</td>
<td>3584</td>
<td>37023</td>
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<td>1975-6</td>
<td>1272</td>
<td>19790</td>
<td>5815</td>
<td>10492</td>
<td>3775</td>
<td>41144</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>(+ 11%)</td>
</tr>
<tr>
<td><strong>Units cross-matched</strong></td>
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<td></td>
</tr>
<tr>
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<td>5060</td>
<td>57810</td>
<td>14805</td>
<td>29101</td>
<td>10936</td>
<td>117712</td>
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<td>1975-6</td>
<td>5915</td>
<td>61380</td>
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<td></td>
<td></td>
<td></td>
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<td>(+ 7%)</td>
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</table>

### B. TISSUE-TYPING

<table>
<thead>
<tr>
<th></th>
<th>1974-5</th>
<th>1975-6</th>
<th>% increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glasgow</td>
<td>15975</td>
<td>17670</td>
<td>11%</td>
</tr>
<tr>
<td>Edinburgh</td>
<td>620</td>
<td>692</td>
<td>12%</td>
</tr>
<tr>
<td>Dundee</td>
<td>6322</td>
<td>8952</td>
<td>42%</td>
</tr>
<tr>
<td>Aberdeen</td>
<td>3799</td>
<td>8468</td>
<td>123%</td>
</tr>
<tr>
<td>Inverness</td>
<td>-</td>
<td>745</td>
<td>37%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>36527</td>
<td></td>
</tr>
</tbody>
</table>

### C. HEPATITIS-TESTING

<table>
<thead>
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<th>1974-5</th>
<th>1975-6</th>
<th>% increase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Glasgow</td>
<td>177755</td>
<td>179668</td>
<td>1%</td>
</tr>
<tr>
<td>Edinburgh</td>
<td>66465</td>
<td>69974</td>
<td>5%</td>
</tr>
<tr>
<td>Dundee</td>
<td>45688</td>
<td>53717</td>
<td>11%</td>
</tr>
<tr>
<td>Aberdeen</td>
<td>45162</td>
<td>50120</td>
<td>62%</td>
</tr>
<tr>
<td>Inverness</td>
<td>9842</td>
<td>15935</td>
<td>7%</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>344012</td>
<td></td>
</tr>
</tbody>
</table>

**Table XII: Major laboratory investigations**

xii.
**PRODUCT** | **1964-5** | **1975-6**
--- | --- | ---
**COAGULATION FACTORS** | | |
Fibrinogen | 98 | 345 |
IF VIII | 718 | 4276 |
II, VII, IX, X (10 ml) | 88 | 555 |
II, IX, X | 1795 | 2464 |
**IMMUNOGLOBULINS** | | |
Normal | 1630 | 1800 |
Anti-D 1000 µg | - | - |
100 µg | 5640 | 9367 |
50 µg | 1010 | 2977 |
Anti-Tetanus 5000 I.U. | 4 | 26 |
250 I.U. | 1350 | 1870 |
Anti-Vaccinial | 300 | - |
Anti-HBsAg | - | 200 |
Anti-Zoster/varicella | - | - |
Anti-Rubella | - | 160 |
**VOLUME EXPANSION** | | |
SPPS | 2761 | 4071 |
**ALBUMIN** | | |
S.P., 1g | 910 | - |
45g | 939 | 390 |
**MISCELLANEOUS** | | |
Sterile distilled water | Not recorded | 8078 |
Sterile physiological saline | " | 2692 |
Freezing Protective Agent | " | 1568 |
Frozen Blood Wash | " | 1133 |

xiii.
APPENDIX 3

ANTI-D SUPPLY FROM IMMUNISED VOLUNTEERS, 1975 - 77

1. INVERNESS

GROUP 1
16 donors - 15 males and 1 female - have just finished donating 60/64 litres.
Further pool from this Group planned from end of January to mid-April = another 60 + litres.

GROUP 2
8 males - Primary injection March 1975 - only 2 with Anti-D to date, after 3 booster injections.

GROUP 3
7 males - Primary injection end of May 1975 - none with Anti-D to date.

GROUP 4
7 males - Primary injection end of September, 1975 - Enzyme Anti-D detected in one last week.

GROUP 5
7 males - Primary injection mid-October.

Groups 2 to 5 total 29 men. If 50% respond the possible yield for 2 pools next year in April to June and September to November is 100 - 110 litres.

The possible yield from these Inverness donors by the end of 1976 is approximately 220 - 230 litres.

2. EDINBURGH

The target is 25 immunised volunteers. About half of these have been recruited and six immunised three months ago; follow-up will commence at the end of a further three months. The comparative study with the Inverness centre incorporates a different immunisation schedule which can be evaluated in due course.

The programme also includes determination of various parameters in the hope that whether a volunteer will respond satisfactorily or not can be determined at the outset, thus saving considerable effort by both the donor and the staff concerned.

xiv.
PLASMA BALANCE SHEET, 1975-76

NOTES
1. Potential stocks at PFC represent a forecast of products from stocks of plasma and material in process on 31 March 76. Yield depends on the quality of the original plasma (e.g. FVIII content etc.), processing losses and final quality control. The figures can only be an approximation, but 10% has been deducted from the potential yield expectation if all the variable factors were satisfactory.

2. Conversion of donations used for cryoprecipitate production to litres of plasma involved is based on obtaining 180ml of plasma per donation (not 200ml as in the previous year's balance sheet).

3. Specific immunoglobulins for Anti-D cannot be used for FVIII production as contamination of the FVIII product with Anti-D could cause haemolytic reaction in Rh+ haemophilia patients.

4. Requirements for fresh plasma for Fibrinogen, Factors II IX and X and II VII IX and X will be adequately met if sufficient fresh plasma (16000 litres) for 4 million units of FVIII is made available and a small proportion (500 litres) is in the form of plasma with EDTA as the anticoagulant.

5. Yield of FVIII is based at present on 250 I.U/litre. It is hoped that this yield can be improved considerably.

6. Estimated requirements of plasma for specific immunoglobulin production are based on average yields obtained by PFC.

7. Requirements for dried plasma (fresh or time-expired) are based on reaching target figures for SPPS production.

8. SPPS requirements are based on 6.5 units per 1000 population less a small proportion in the form of fresh dried or fluid plasma. Yield is based on 1.5 units (400ml) per litre of plasma. PFC hope to improve this yield.

9. Progress in achieving self-sufficiency is discussed in the text of this Report.

xv.
APPENDIX 5.

TARGET FIGURES ON OR BEFORE 31 MARCH 1978

A. USE IN CENTRES

<table>
<thead>
<tr>
<th></th>
<th>Glasgow</th>
<th>Edinburgh</th>
<th>Dundee</th>
<th>Aberdeen</th>
<th>Inverness</th>
<th>Total</th>
<th>Notes</th>
</tr>
</thead>
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<tr>
<td>Donations</td>
<td>135900</td>
<td>70000</td>
<td>30800</td>
<td>34600</td>
<td>10500</td>
<td>281800</td>
<td></td>
</tr>
<tr>
<td>Used as whole blood</td>
<td>34200</td>
<td>15600</td>
<td>6300</td>
<td>4800</td>
<td>2800</td>
<td>63700</td>
<td>4</td>
</tr>
<tr>
<td>20% blood bank</td>
<td>6800</td>
<td>3100</td>
<td>1300</td>
<td>1000</td>
<td>600</td>
<td>12800</td>
<td></td>
</tr>
<tr>
<td>maintenance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Available for</td>
<td>94900</td>
<td>51300</td>
<td>23200</td>
<td>26800</td>
<td>7100</td>
<td>20530</td>
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<tr>
<td>processing (100ml/l)</td>
<td>17100</td>
<td>9200</td>
<td>4200</td>
<td>5200</td>
<td>1300</td>
<td>37000</td>
<td>5</td>
</tr>
<tr>
<td>Used as FP at</td>
<td>720</td>
<td>240</td>
<td>200</td>
<td>80</td>
<td>80</td>
<td>1320</td>
<td></td>
</tr>
<tr>
<td>centre (litres)</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Remains (litres)</td>
<td>16400</td>
<td>9000</td>
<td>4000</td>
<td>5100</td>
<td>1200</td>
<td>35700</td>
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<tr>
<td>Used for cryoprecip-</td>
<td>350</td>
<td>170</td>
<td>40</td>
<td>30</td>
<td>10</td>
<td>600</td>
<td>5,6</td>
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<tr>
<td>itate (litres)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Used for platelets</td>
<td>896</td>
<td>1792</td>
<td>70</td>
<td>84</td>
<td>14</td>
<td>2856</td>
<td>5,7</td>
</tr>
<tr>
<td>(litres)</td>
<td></td>
<td></td>
<td></td>
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B. AVAILABLE FOR PPC (litres)

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<th>Inverness</th>
<th>Total</th>
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<tr>
<td>Time-expired plasma</td>
<td>1400</td>
<td>600</td>
<td>300</td>
<td>200</td>
<td>100</td>
<td>2600</td>
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<tr>
<td>Cryosupernatant</td>
<td>350</td>
<td>170</td>
<td>40</td>
<td>30</td>
<td>10</td>
<td>600</td>
</tr>
<tr>
<td>Platelet poor plasma</td>
<td>896</td>
<td>1792</td>
<td>70</td>
<td>84</td>
<td>14</td>
<td>2856</td>
</tr>
<tr>
<td>Fresh frozen plasma</td>
<td>15100</td>
<td>7000</td>
<td>3900</td>
<td>5000</td>
<td>1100</td>
<td>32100</td>
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C. POTENTIAL PPC YIELDS

<table>
<thead>
<tr>
<th></th>
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<th>Platelet poor plasma</th>
<th>2856</th>
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<tbody>
<tr>
<td></td>
<td>Fresh frozen plasma</td>
<td>32100</td>
<td></td>
</tr>
<tr>
<td>Specific IgG (less Anti-D)</td>
<td>700</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>35656</td>
<td></td>
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Less 10% 32000 @ 250u/litre = 8 million units 10,11

xvi.
<table>
<thead>
<tr>
<th>PRODUCT</th>
<th>UNITS</th>
<th>IMMUNIZABLE</th>
<th>REFRIGERATED INBOX</th>
<th>TOTAL</th>
<th>POTENTIAL</th>
<th>PROCESSED</th>
<th>TOTAL</th>
<th>SOURCE OF PLASMA</th>
<th>PRODUCTION</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(liters)</td>
<td>(Units/box)</td>
<td></td>
<td>(Units)</td>
<td>(Units)</td>
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<td>(Units)</td>
<td>1974-5</td>
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<td></td>
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**V. CONTROL PATHOGENIC**

<table>
<thead>
<tr>
<th>PATHOGENIC</th>
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<th>TOTAL</th>
<th>SOURCE OF PLASMA</th>
<th>PRODUCTION</th>
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<td></td>
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<td>(Units/box)</td>
<td></td>
<td>(Units)</td>
<td>(Units)</td>
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<td>(Units)</td>
<td>1974-5</td>
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**VI. FURTHER USES (See)**

<table>
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<tr>
<th>USE</th>
<th>UNITS</th>
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<th>PROCESSED</th>
<th>TOTAL</th>
<th>SOURCE OF PLASMA</th>
<th>PRODUCTION</th>
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<tbody>
<tr>
<td></td>
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<td>(liters)</td>
<td>(Units/box)</td>
<td></td>
<td>(Units)</td>
<td>(Units)</td>
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<td>(Units)</td>
<td>1974-5</td>
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<td>1975-6</td>
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**VII. EFFECTIVENESS AND T.T. ALBUNIS**

<table>
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<th>EFFECTIVENESS</th>
<th>UNITS</th>
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<th>TOTAL</th>
<th>POTENTIAL</th>
<th>PROCESSED</th>
<th>TOTAL</th>
<th>SOURCE OF PLASMA</th>
<th>PRODUCTION</th>
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</thead>
<tbody>
<tr>
<td></td>
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<td>(liters)</td>
<td>(Units/box)</td>
<td></td>
<td>(Units)</td>
<td>(Units)</td>
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<td>(Units)</td>
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<td>1975-6</td>
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</table>

**VIII. SUMMARY**

<table>
<thead>
<tr>
<th>SUMMARY</th>
<th>UNITS</th>
<th>IMMUNIZABLE</th>
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<th>POTENTIAL</th>
<th>PROCESSED</th>
<th>TOTAL</th>
<th>SOURCE OF PLASMA</th>
<th>PRODUCTION</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(liters)</td>
<td>(Units/box)</td>
<td></td>
<td>(Units)</td>
<td>(Units)</td>
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<td>(Units)</td>
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</tr>
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<td></td>
<td></td>
<td></td>
<td>1975-6</td>
</tr>
<tr>
<td>Albuminoid fractions</td>
<td>Fresh frozen plasma</td>
<td>32100</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
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<td></td>
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</tr>
<tr>
<td>Time expired plasma</td>
<td>2600</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cryosupernatant</td>
<td>600</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
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<tr>
<td>Platelet poor plasma</td>
<td>2856</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<tr>
<td>Specific IgG plasma</td>
<td>1300</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>39456</td>
<td></td>
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<tr>
<td>Less 10%</td>
<td>35511</td>
<td>11</td>
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<tr>
<td>Salt poor albumin</td>
<td>5600</td>
<td>12</td>
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<tr>
<td>SPPS</td>
<td>29900 @ 1.5u/litre</td>
<td>13</td>
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<td></td>
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<td>= 44800</td>
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</tr>
<tr>
<td></td>
<td>= 8.6u/1000</td>
<td>14</td>
<td></td>
<td></td>
<td></td>
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<td>population</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**NOTES:**

1. d = donation; PP = fresh plasma; IgG = immunoglobulin
2. Figures topped up to nearest $10^2$ where possible.
3. Donations:
   a. Glasgow increased by 8% expected by Director when new mobile centre (authorised) in service.
   b. Aberdeen intake increased by 35% as agreed at allocation of 1976-7 development money.
   c. Edinburgh, Dundee and Inverness left at present donation rate.
4. Use of whole blood based on 60% use of concentrated red cells.
5. Plasma yield from donations calculated as:
   a. 200ml from outdated blood
   b. 180ml when concentrating cells
   c. 140ml after cryoprecipitate preparation
   d. 140ml after platelet preparation
6. Cryoprecipitate largely replaced by intermediate factor VIII but 10% of present use likely to be required for treatment of von Willebrand's disease.
7. Platelet use estimated at 20000 annually, present use adjusted accordingly. Cell separators—requirements from ordinary donations.
8. All time-expired and fresh frozen plasma to PFC on assumption dried plasma will be obsolete.
9. Confined to Factor VIII and albuminoid fractions.
10. Yield at 250 units/litre. PFC and its study group hope to improve this.

xvii.
11. 10% deducted from plasma intake to account for possible processing loss.
12. Use of salt-poor albumin estimated as 2500 units annually.
13. Yield of SPPS as 1.5 units/litre. PFC hope to improve on this.
14. Units of SPPS/1000 population based on 5.2 million.
APPENDIX 6

PROFESSIONAL, SCIENTIFIC and TECHNICAL CONTRIBUTIONS
1975-76

1. Papers published


xxi.


2. **Papers Delivered at Conferences, Symposia etc.**

**GLASGOW**


**EDINBURGH**

Barclay, G.R. (1975) 'Variations in the responses of lymphocytes from healthy individuals to mitogens'. British Society for Immunology, London.


xxiii.
Cash, J.D. (1976) 'Thrombogenicity of factor IX concentrates' Factor VIII Inhibitor Workshop, Vienna.


Hopkins, R. (1975) 'Evidence of exposure to hepatitis B surface antigen (HBsAg) in a Burns Unit' 8th Meeting of The British Burn Association, Stoke Mandeville Hospital.


Kay, A.B. (1975) 'Changing clinical patterns in bronchial asthma in relation to complement and IgE' European Society of Clinical Investigation, Rotterdam.

Kay, A.B. (1975) 'Functions of the eosinophil' British Society for Allergy and Clinical Immunology/British Society for Immunology, Manchester.

Kay, A.B. (1975) 'Complement and immunoglobulins in bronchial asthma' International Congress of Tuberculosis, Mexico City.


Urbaniak, S. (1975) 'Lymphoid cell dependent (K-cell) lysis of human erythrocytes sensitised with rhesus alloantibodies' British Society for Haematology, Glasgow.


INVERNESS


PROTEIN FRACTIONATION CENTRE


3. Membership of Committees

GLASGOW

Barr, A.  Motherwell/Lanark District Radiation Safety Committee.

Mitchell, R.  Postgraduate Advisory Committee in Haematology, University of Glasgow.

Muir, Wm.  Advisory Committee to the Department of Biological Sciences, Glasgow College of Technology.

Local Health Council, Hamilton and East Kilbride.

Munro, A.C.  Scottish Antibody Production Unit, Project Steering Group and Working Party.

West of Scotland Immunology Group Committee.

Templeton, J.G.  National Consultative Committee of Scientists in Professions Allied to Medicine (N.S.C.C.).

N.S.C.C. Blood Transfusion and Haematology Sub-Committee.

Blood Transfusion Advisory Group, S.H.H.D.

Wallace, J.  Medical Research Council, Blood Transfusion Research Committee.


Central Health Departments - Advisory Group on Hepatitis
Advisory Group on Haemolytic Disease in the Newborn
Working Party on Medical Staffing of Regional Transfusion Centres.
EDINBURGH

Cash, J.D.

Factor IX Toxicity Working Party -
International Society on Thrombosis
and Haemostasis.

Council of British Society of Haematology.

Council of Edinburgh Pathological Club.

Editorial Board - European Journal of
Clinical Investigation.

Factor IX Working Party Medical Research
Council.

British Pharmacopoeia Commission -
Committee 12: Blood Products Panel.

Cardiac Surgery - Programme Planning Group.

Kay, A.B.

Scottish Home and Health Dept. - Working
Party on Clinical Immunology.

Dept. of Health and Social Security -
Code of Practice on the use of the
Continuous Flow Cell Separator.

Member - Editorial Board, European Journal
of Clinical Investigation.

White, A.G.

National Consultative Committee of Scientists
in Professions Allied to Medicine.

Blood Transfusion, Haematology and Related
Disciplines Sub-Committee of the National
Consultative Committee.

Secretary of the Graduate Scientists
Group (S.N.B.T.S.)

INVERNESS

Cook, I.A.

Regional Transfusion Service Directors'
Working Party on Anti-D (DHSS)

ABERDEEN

Lewis, H.B.M.

Chairman, BSI Technical Committee SGS/11 -
Transfusion equipment for medical use.

xxvii.
PROTEIN FRACTIONATION CENTRE

Poster, P.R.

Blood Transfusion Haematology Sub-Committee:
National Consultative Committee of Scientists
in Professions Allied to Medicine.

Watt, J.C.

European Pharmacopoeia Commission, Group of
Experts No. 6B (Blood and Blood Products).

British Pharmacopoeia Commission, Committee 12:
Biological Products Blood Products Panel.

Committee on Safety of Medicines: Biologicals
Sub-Committee.

Committee on Review of Medicines:
Sub-Committee on Immunological Products.

European Pharmacopoeia Commission Working
Party on Blood Products of Placental Origin.

European Pharmacopoeia Commission Working
Party on Pyrogen Testing of Blood and
Blood Products. (Co-ordinator).

SHHD Advisory Group on Blood Transfusion.

M.R.C. Working Party on Factor IX
Concentrates.

European Space Agency Material Sciences
Consultant Group.

White, B.J.

Blood Transfusion Haematology Sub-Committee
National Consultative Committee of Scientists
in Professions Allied to Medicine.

xxviii.
4. Honorary Appointments

HEADQUARTERS

Major-General H.C. Jeffrey

Honorary Consultant,
Lothian Health Board.

GLASGOW

Dr. R. Mitchell

Honorary Consultant in Clinical Pathology to the 6 Area Health Boards in the West of Scotland.

Honorary Lecturer in Haematology,
University of Glasgow.

Dr. J. Wallace

Honorary Consultant in Clinical Pathology to the 6 Area Health Boards in the West of Scotland.

Honorary Lecturer, University of Glasgow.

Honorary Consultant to the Army in Scotland.

EDINBURGH

Dr. J.D. Cash

Consultant, Lothian Health Board.

Honorary Consultant to Government of Sudan EIS.

Dr. A.B. Kay

Consultant, Lothian Health Board.

DUNDEE

Dr. Boswell

Honorary Lecturer, University of Dundee.

Dr. Cameron

Honorary Senior Lecturer,
University of Dundee.
ABERDEEN

Dr. H.B.M. Lewis
Honorary Senior Lecturer,
University of Aberdeen.

PROTEIN
FRACTIONATION
CENTRE

Mr. J.C. Watt
Honorary Fellow, University of
Edinburgh Faculty of Veterinary
Medicine.

Honorary Consultant, Iranian
National Blood Transfusion
Service.

Honorary Consultant, Canadian
Red Cross, Blood Transfusion
Service.

xxx.
### BTS STAFF ESTABLISHMENT AT 31 MARCH 1976

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<th>Region</th>
<th>Medical</th>
<th>Nursing</th>
<th>Scientific</th>
<th>P &amp; T</th>
<th>A &amp; C</th>
<th>ANC.</th>
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</tbody>
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|               | 44.25   | 155     | 32         | 262.5 | 105.25| 250  | 849    |

xxx1.
APPENDIX A

VEHICLES IN USE AT 31 MARCH 1976

1. GLASGOW
   4 Equipment Vehicles
   4 Personnel Carriers
   9 Refrigerated Vehicles
   2 Transit Vans
   1 Saloon Car
   1 Land Rover
   1 Mobile Laboratory
   1 Mobile Blood Collecting Unit

2. EDINBURGH
   1 Blood Mobile (Personnel/Equipment/Refrigerated, Vehicle)
   4 Saloon Cars
   1 Equipment/Personnel Vehicle
   1 Refrigerated Vehicle
   1 Personnel Carrier
   3 Equipment Vehicles

3. DUNDEE
   1 Blood Mobile (Personnel/Equipment/Refrigerated, Vehicle)
   2 Saloon Cars

4. ABERDEEN
   1 Blood Mobile (Personnel/Equipment/Refrigerated, Vehicle)
   2 Saloon Cars

5. INVERNESS
   1 Refrigerated/Equipment Vehicle
   1 Personnel Carrier
   2 Saloon Cars

6. P.P.C.
   1 Refrigerated Vehicle
   1 Equipment Vehicle
   2 Saloon Cars

xxxii.