MERSEY REGIONAL TRANSFUSION SERVICE

PLASMA PROCUREMENT 1989/90, 1990/91
A TWO YEAR SCHEME TO SELF SUFFICIENCY

INTRODUCTION

1.1 Collection - Blood and Blood Products

The Mersey Regional Transfusion Service is solely responsible for the supply of whole blood and certain blood derivatives to an area which differs substantially from that of the Mersey Regional Health Authority (M.R.H.A.). While some blood products are prepared in Liverpool (e.g. platelet concentrate, cryoprecipitate, fresh frozen plasma) others are prepared on the large scale at the national Blood Products Laboratory (B.P.L.) at Elstree from plasma collected in the Mersey Region. B.P.L. products (Appendix 1) which include Human Albumen Solution and Factor Eight Concentrate, are presently allocated to each region on a pro rata basis according to the amount of raw plasma sent.

1.2 Blood Products Laboratory: 1988 Developments

The new B.P.L. was planned to fractionate all the plasma in England and Wales required to make the National Blood Transfusion Service self sufficient in blood products. Although its opening and commissioning were delayed, it is now fully operational and regional allocations are increasing monthly (Appendix II). The optimal output of B.P.L. is dependent on adequate supply of plasma from each Regional Transfusion Centre to provide all blood products for patients within its distribution area. Until recently, Mersey Region was meeting these targets, but when the completion of B.P.L. was held up, it was necessary to purchase imported blood derivatives such as Albumen and Factor Eight Concentrate. There is, therefore, a pressing need for resources to be allocated to the Mersey Regional Transfusion Service to allow plasma procurement to reach its target level.

1.3 Implications HC88/43 in Mersey Region

The Resource Assumptions and Planning Guidelines in relation to Health Services Development are set out in Health Circular 88/43. This document states that it is a health service objective that authorities should meet by 1990 the Region's target based on 8.82 tonnes* of fresh frozen plasma per million population. The population served by the Mersey Regional Transfusion Service is approximately 2.8 million which includes all the District Health Authorities within the region (apart from Crewe and Macclesfield), Clwyd, Gwynedd, parts of Powys, West Lancashire and a limited service to the Isle of Man. Hence the target set for Mersey in HC88/43 is 24.7 tonnes of plasma per annum by 1990.

*1000 litre of plasma is equivalent to 1 metric tonne

1.4 Amended Plasma Target: 1988

Since this target was set, it has become clear that the actual yield (130 unit/litre plasma) of Factor Eight Concentrate fractionated at B.P.L. is considerably less than was originally estimated, (165 unit/litre plasma). A number of other technical problems including the heat treatment required to render the product free of transfusion transmitted viruses such as hepatitis and the human immunodeficiency virus, have contributed to this reduction in output. It will, therefore, be necessary to increase the annual return of plasma from the Mersey Region proportionally to 31.35 tonnes. When targets for factor eight supply are met, the albumen stock will be entirely satisfactory.

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1.5 Proposals for Plasma Procurement towards 1990

The current annual collection of plasma by the Mersey Regional Transfusion Service is barely 20 tonnes. The 1990 target of 31.35 tonnes represents an increase of more than 50%. This plasma may be obtained from two sources:

The greater part will be recovered from whole blood donations; the maximum plasma yield being facilitated by the use of optimal additive solutions. An increase in blood collection to 125,000 in 1989/90 should permit separation of 80,000 units for this purpose. Each unit processed thus will provide 270ml plasma contributing to an annual total of 21,600 litres.

Since there is little need for red cell preparations in the region beyond 125,000 per annum, the balance is best collected directly by automated plasmapheresis. Using this technique, blood is centrifuged during donation to accelerate the separation of plasma from cellular components. Plasma is conserved and cells returned to the donor. A single procedure produces 500 to 600 ml of plasma, depending on the body weight of the donor. Since red cells, and hence iron stores, are conserved, plasmapheresis may be repeated more frequently (monthly or fortnightly) than whole blood donation under the supervision of a Consultant Haematologist. To provide the remaining 10,000 litres of plasma, approximately 20,000 procedures will be needed annually in the Mersey Region, the resources for which are detailed below.

1.6 Cross Charging and Income Generation

Under the guidance of the National Directorate, it is proposed to introduce cross charging between Regional Transfusion Centres (R.T.C.'s) and B.P.L. from 1st April, 1989. Although the terms have not yet been defined, it has been suggested that the purchase of plasma may be scaled according to its quality in terms of yield of Factor Eight Concentrate; plasmapheresis plasma being more valuable than recovered plasma. A prospective survey has recently been set up to provide an independent assay of Factor Eight content of plasma collected in various ways from each R.T.C. Whether or not the purchase price of plasma will subsequently be related to the results of this study is not yet known. The dissociation of plasma 'sales' by R.T.C.'s to B.P.L. and their subsequent 'purchase' of blood derivatives such as Factor Eight Concentrate and Albumen from the same source would allow income generation in those regions where supply exceeds demand. It is possible, therefore, that this scheme might also prove a source of income generation. (Appendix III)

2. RECOVERY OF PLASMA FROM WHOLE BLOOD DONATIONS

2.1 Benefits of Optimal Additive Solutions

A blood donation may be separated within a closed system to yield a unit of plasma reduced blood and 180ml of plasma. Using an optimal additive solution such as SAG-M (100ml saline - adenine - glucose with mannitol) the viability of the red cells is enhanced and plasma yield increased by 50% to 270ml per donation. It is proposed to increase the number of units processed in this way from 70,000 to 80,000 by 1990 with a plasma yield of 21,600 litres. (Appendix IV)

2.2 Increase Blood Collection

As well as meeting the requirement for plasma fractionation, the support of patients with products prepared in Liverpool, such as platelet concentrate, whole blood etc. must be ensured. Blood collection should, therefore, be restored to 125,000 donations per annum with an energetic recruiting campaign. It may also be necessary to increase weekend sessions.

2.3 Annual Costs of Increase in Plasma Recovery

10,000 SAG-M packs @ £5.50	£55,500
2 part time Processing Laboratory Assistants at 18 hours/week	£ 6,797
Publicity/Recruiting	£ 1,500
	£63,797

3. EXPANSION OF PLASMAPHERESIS PROGRAMME

3.1 Current Assets

There are presently six machines performing plasmapheresis within the Mersey Regional Transfusion Service. The Haemonetics VSO (Mark 1) Surge machine is a more sophisticated model whose use is reserved for specially selected platelet donations and bone marrow purging and will not be considered further in this paper.

3.2 Proposal for Revenue Saving 1988/89

All six plasmapheresis machines are capable of producing solely plasma (500 or 600 ml) or platelet rich plasma (equivalent to platelets from 3 whole blood donations, plus platelet poor plasma (approximately 400 ml)). Despite the economical nature of this technique in terms of platelet production, apheresis procedures were reduced to 3,000 in 1988/89. It is, however, a matter for concern that of the six machines on site, only two are the up to date plasma collection systems (P.C.S.) which uses cost effective disposable software. Plasmapheresis with the P.C.S. saves approximately £10 per litre of plasma in comparison with the older Haemonetics Model 50. There is, therefore, an urgent need to exchange the four Model 50 machines to generate a revenue saving. A few weeks ago this was costed as shown in Appendix V. Since then an approach has been made to provide free hardware (machines) in return for a fixed five year contract for harnesses and maintenance of a service contract at 10% purchase price per machine but this requires confirmation and thorough investigation.

3.3 Two Year Build Up to Regional Self Sufficiency

As shown in Appendix IV plasmapheresis will provide the greater part of the Mersey increase in plasma procurement. The reliable and frequent attendance of donors on the apheresis panel lends to the efficiency and economy of this scheme.

In 1989/90, 4,500 litres of apheresis plasma may be obtained from 9,000 procedures. Provided that the Haemonetics 50s were urgently replaced by P.C.S. models, this could be achieved using six machines. There are ten members of the nursing staff trained in apheresis techniques to accommodate the changing workload.

Both of the existing Liverpool collection sites (Lord Street and West Derby Street) are suitably equipped. The costs of this as expressed in Appendix VI are mainly in extra plastic disposable harnesses and clinical support.

In 1990/91, 10,000 litres of apheresis plasma are to be produced from 20,000 procedures. A further six P.C.S. machines will be required but the capital outlay is not yet clear. It is possible that hardware may be provided free of charge as indicated above. (3.2)

The revenue consequences of the final step will include the clerical staff as in 1989/90 with 20,000 plastic disposable harnesses, 3 additional part-time plasmapheresis donor attendants and 3 clinical assistant sessions to cover evening work.

The premises should not require modification but a microprocessor will be needed to economise on clerical work.

3.4 Consultant Appointment

The Guidelines on the Use of Cell Separators within the Transfusion Services of England and Wales state that all donors should be reviewed annually by the Consultant in Charge of the Unit. The unit is presently run efficiently by a sessional medical officer but the responsibility taken thus by a clinical assistant is unsatisfactory. The planned increase in workload with concomitant increasing frequency of donor visits makes the appointment of a Consultant in Charge a priority.

4. RECOMMENDATIONS FOR PLASMA PROCUREMENT 1989/91

4.1 Annual whole blood collection to be increased to 125,000 units.

4.2 80,000 units of blood to be taken into SAG-M packs for optimal plasma yield (21,600 litres plasma per year)

4.3 Energetic recruiting campaign to accommodate increased donor attendance.

4.4 Appointment Consultant Haematologist to supervise recruitment and medical care of apheresis volunteers and to direct expansion programme.

4.5 Increase plasmapheresis 1989/90 in established Liverpool Centres by trained nursing staff already in post (4,500 litres plasmapheresis)

4.6 (a) Appointment 2 clerical officers, one April and one October to keep pace with increasing donor attendance.

(b) Purchase microprocessor to economise on clerical staff.

4.7 Appoint clinical staff to achieve target 1990/91 (10,000 litre plasmapheresis) by extending hours donation

(a) 3 part-time plasmapheresis donor attendants

(b) 3 clinical assistant sessions

(c) Acquire 6 additional plasmapheresis machines (see legend)

This programme requires urgent implementation to achieve the nationally directed target for regional plasma self sufficiency by the end of 1990.

The expansion of plasmapheresis is recommended because of the better factor eight yield of plasma obtained in this way, which may receive credit with the proposed scheme of cross charging in 1989.