(as sent to SHHD for meeting on 1 May)

PLASMA PROTEIN FRACTION

1. SHHD intend to produce 6.5 bottles of PPF per 1000 population. Given a population of 5m this would be 32,500 bottles per annum. This figure has been recommended by the Scottish Central Committee on Blood Transfusion presumably because it represents the Scottish estimate of the quantity required to meet clinical need.

2. The capacity to produce PPF (at Liberton or Elstree) is related to:-

   (a) Approximate number of donations collected per 1000 population

   (b) Estimated proportion of donations which clinicians are prepared to use as concentrated red cells.

   (c) Number of donations required to produce a litre of plasma

   (d) Number of bottles of PPF produced from a litre of plasma; this may vary according to (i) total protein concentration of plasma (ii) albumin content of the protein in the PPF.

3. In England and Wales, with a population of 50m., the position in terms of the factors at 2 is:-

(a) 30	..	1,500,000 total donations
(b) 40%	..	600,000 donations for fractionation
(c) 5.5	..	109,000 litres plasma
(d) 1.25* on the basis of:- (i) 53 gm/litre (ii) 95% albumin	..	136,000 bottles PPF (2.72 bottles per 1000 population)

   (* This is a revised figure. In discussion and correspondence with the Scots we have hitherto quoted a figure of 1.15)

4. In Scotland, with a population of 5m. the position in terms of the factors at 2 appears to be:-

(a) 40	..	200,000 total donations
(b) 60%	..	120,000 donations for fractionation
(c) 5	..	24,000 litres plasma
(d) 1.5 on the basis of:- (i) ? gm/litre (ii) ? % albumin	..	36,000 bottles PPF (7.2 bottles per 1000 population)

5. On the figures at 3 and 4 the Scottish yield of 7.2 is sufficient to meet their estimated need of 6.5, whereas there is a 'gap' of 3.78 between this latter figure and the yield in England and Wales of 2.72 (all figures in bottles of PPF per 1000 population).

6. On the basis of experience at Elstree, DHSS has questioned the Scottish factors at 4(c) and (d) so far without response. However, even if "the

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most favourable technical possibilities" were applied to England and Wales ie

(c) 1 litre of plasma from 5 donations of blood (not 5.5)

(d) 1.5 bottles of PPF per litre of plasma (not 1.25) on the basis of:-

(i) protein concentration of 60 gm/litre plasma (not 53)

(ii) 90% albumin content of protein in the PPF (not 95%)

.... yield of PPF would be raised only to 180,000 bottles (3.6 bottles per 1000 population). There would still be a 'gap' of 2.9 bottles per 1000 population which could not be bridged by technical factors.

7. If it were possible to raise the proportion of donations of blood which clinicians in England and Wales are prepared to use as concentrated red cells to the Scottish estimated figure of 60%, the yield of PPF in England and Wales could theoretically (assuming additional fractionation laboratory facilities could be provided - see paragraphs 10 and 14 below) be raised to 270,000 bottles (5.4 bottles per 1000 population) leaving a 'gap' of 1.1 bottles per 1000 population. To achieve even a 40% 'use' of concentrated red cells in England and Wales will require much effort in the education of clinicians over the next few years. To achieve a 60% use would clearly take several years more.

8. The difficulty in doing this might be partially eased if efforts to increase the provision of PPF were concerted with those to increase the provision of fresh frozen plasma for preparing anti-haemophilic globulin since plasma for the latter purpose can also be used as a source of PPF. If the two objectives were combined the co-operation of clinicians might more readily be obtained.

9. SHHD are anxious that DHSS should accept and work to their estimate of 6.5 bottles of PPF per 1000 population which they regard as conservative (some Scottish estimates of need are as high as 10-12 bottles per 1000 population) since they fear that otherwise commercial firms will step in to meet the clinical demand and that this will have potentially serious consequences for the voluntary basis of the blood transfusion services in the UK.

10. However, given the planned capacity of PFC Liberton and the existing capacity of BPL Elstree, it would not be possible to produce enough bottles of PPF at these two laboratories to achieve in England and Wales the Scottish target of 6.5 per 1000 population. Liberton is at present briefed to produce about 103,000 bottles per annum of which some 33,000 would be required in Scotland leaving about 70,000 'surplus' for England and Wales. As Elstree's maximum capacity is about 140,000 bottles per annum, the total production capacity available to England and Wales would be slightly more than 200,000 bottles per annum (4.0 bottles per 1000 population) leaving a 'gap' of about 2.5 bottles per 1000 population.

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11. To make full use of the existing laboratory fractionation capacity in Great Britain, and thereby achieve a target of 4.0 bottles per 1000 population in England and Wales, the number of donations available for fractionation in England and Wales would have to be increased by 50% from 600,000 to 900,000 - vide paragraph 3, and assuming that for the next few years the 'use' of concentrated red cells in England and Wales is unlikely to exceed 40%. As it costs about £3 to collect a donation of blood, the achievement of a target of 4.0 bottles PFF per 1000 population in England and Wales would give rise to additional annual expenditure of about £1.0m not counting any further capital expenditure which would be necessary at RTCs.

12. A question for decision will be whether the additional annual requirement of 300,000 donations for fractionation should be obtained by plasmapheresis or by collecting more blood in the normal manner. The latter method would involve some wastage of concentrated red cells though this could be expected to diminish as the total demand by clinicians for blood is likely to rise.

13. To achieve a target of 6.5 bottles per 1000 population - ie to close the 'gap' of 2.5 referred to in paragraph 10 - would involve increasing the number of donations available for fractionation in England and Wales by about a further 600,000 (over and above the 300,000 mentioned in paragraph 11) at an additional annual revenue cost of about £2m. This figure could however be reduced according to the extent that clinicians could be persuaded to 'use' more than 40% of donations in the form of red cells.

14. Any target higher than 4.0 bottles per 1000 population would involve not only the revenue (and related capital) expenditure of the order of magnitude indicated in paragraphs 11 and 13 but also the building of another fractionation laboratory. An important aspect for consideration would be whether this should be done by extending PFC Liberton or by building a new BPL at Elstree or elsewhere. It is not possible to estimate what a new laboratory might cost since this will depend on its size but it may be relevant that the new laboratory at Elstree cost not much less than £1m.

15. Matters for discussion at the meeting on 1 May include the following:

(i) To decide on estimates of need for PPF

(ii) To formulate policy regarding the use of concentrated red cells

(iii) To agree protein concentration of PPF and albumin content of protein (BP 1973 requires PPF to contain at least 4.3 g. percent total protein of which not less than 90% is albumin. The latter figure was adopted (first published in BP Addendum 1969) on general grounds because of verbal reports of vasodepresser reactions; some of these reports have now been published. It is thought that these reactions may be related to the globulins present, ie the non-albumin part of the protein).

(iv) To consider further action needed in the light of the conclusions reached on items (i)-(iii).

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