

—is well recognised, and these are already widely used. In this country one of the most useful applications would be in facilitating the separation of plasma in regional centres for local requirements and for the transportation of the surplus to a central processing laboratory, coupled with "banking" the cells for routine use. The price of the double pack referred to in your leading article is about 25s., but a very satisfactory double pack, widely used in Australia and New Zealand, is marketed for 7s. 6d. The discrepancy in the cost of the two articles requires explanation, and it is disappointing that no British firm seems prepared to enter this field. At 25s., the cost of even the double pack must compare favourably with that of preparing the existing glass bottles, appropriate reagents, and equipment. It should not be taken for granted, however, that plastic containers will provide the answers to all the problems of supply or that they are free from risks. A service based on full blood utilisation need not await the substitution of glass bottles by plastic containers—however desirable this may be. The Edinburgh service outlined above has been built up over the years, and is still operated using the conventional glass equipment. It has worked well in practice, and given excellent clinical results, and in our hands has shown a degree of safety at least equal to that so far claimed for plastic packs.¹ This does not mean, however, that we do not now advocate a change to more suitable equipment.

Improved equipment and techniques, however, are not the factors involved in providing the kind of service required in modern transfusion practice. Much more is needed to make the best use of the available resources and eliminate some of the appalling sources of waste described in your leading article. The transfusion services must maintain close links with the hospitals they supply, and must collaborate with the clinical departments. They must also coordinate the efforts of all the regions to take advantage of local variations in supply and demand. The modern applications of blood and blood-components require full-time laboratory as well as clinical cover, including rapid and effective communications linking clinical department, transfusion service, and blood-donors. Developments involving the increasing need for fresh blood or rare blood-groups, and the importance of plasma fractions in preventive medicine, indicate the need for a new and more enlightened approach to donor organisation. It is doubtful whether the growing importance of blood-donors is fully appreciated by either the medical profession or the public, and only by taking all these facets into account will the type of service you suggest be given reality.

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SIR,—In your leading article (March 11, p. 548) you rightly emphasise the value of small-volume antihæmophilic factor (A.H.F.) cryoprecipitate infusion for the treatment of bleeding episodes in hæmophilia. This advantage is especially important in children, and in my limited experience with five patients (with deep-muscle hæmatoma, bite injury to tongue, dental extractions, and acute hæmarthrosis of ankle, and in one on rehabilitation with active physiotherapy after recurrent knee hæmarthroses) the results have been encouraging. We in this department have found it satisfactory to give cryoprecipitate directly, using a disposable plastic syringe, rather than a giving set as used by Dr. Prentice and his colleagues (March 4, p. 457).

A further advantage is that parents may seek medical advice earlier, knowing that one simple injection only may be required. In addition, nursing of small, often heavily sedated, children on long-continued intravenous-drip therapy will only rarely be needed.

Until supplies of cryoprecipitate become readily available the use of fresh frozen plasma will continue to provide the basis of treatment in many hospitals. Continuous infusion therapy and

1. Cumming, R. A., Davies, S. H., Ellis, D., Grant, W. *Vox sang.* 1965, 10, 687.

the use of large volumes of plasma (20 ml. per kg. twice a day) may lead to circulatory over-load. In the past 2 years four of our patients have required active therapy to combat early heart-failure, while previously one child died because of over-transfusion during a major bleeding episode.

The problem of circulatory over-load can largely be prevented by giving oral frusemide ('Lasix' 1–3 mg. per kg. daily) over the period of plasma infusion. The resulting diuresis not only allows a greater volume to be given with safety but also allows a faster rate of transfusion—a real advantage with a substance as labile as A.H.F. There is no evidence of frusemide interfering with blood-coagulation.¹

Cryoprecipitate is now the method of choice in treating bleeding episodes in patients with hæmophilia, but, when not available, adequate therapy with fresh frozen plasma is possible and can be made relatively safe by the simultaneous administration of frusemide. Concentrated human A.H.F. should be reserved for patients in whom hæmostasis presents particular difficulty.

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HÆMOPHILIA B_M

SIR,—I read with interest the findings of Dr. Hougic and Dr. Twomey last week (p. 698). This raises for consideration the following points.

The quoted levels of factor IX for the mother and grandmother are no conclusive proof of their being carriers of factor-IX deficiency. The method of inheritance of the defect as a whole remains therefore unsettled.

Although there is evidence supporting the presence of two types of blood-factor IX,^{2–4} and possibly a third in brain tissue,⁵ the data presented in the family M₁ as in the case previously described,⁶ add up to no more than deficiency of blood-factor IX combined with extreme insensitivity to bovine brain extract,⁷ which is dependent on factor VII.⁸ This is supported by the fact that once the latter was removed by aluminium-hydroxide adsorption, the species specificity no longer existed. Furthermore, the absence of a hæmorrhagic diathesis in the mother and grandmother suggests that their prolonged thrombotests are due to species specificity rather than to an inhibitor.

Nevertheless, it now seems that there are three varieties of factor-IX defect: diminished factor-IX deficiency with Bridge anticoagulant in the plasma¹⁰ (Christmas disease), combined factor-IX defect and capillary abnormality in which the in-vivo concentration of factor-IX is normal but its evolution is impaired,³ and factor-IX deficiency with insensitivity to bovine brain extract.

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CHRONIC DIALYSIS WITHOUT TRANSFUSION

SIR,—In view of the recent concern about the risk of hepatitis in chronic dialysis units, it would seem of interest to record personal experience of chronic dialysis without the requirement of regular blood-transfusion.

For the past year, it has been my policy not to transfuse patients receiving chronic hæmodialysis treatment. This policy was developed as an adjunct to successful remote home hæmodialysis and was applied in 1965 in one patient in Switzer-

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