OHE briefing

No 11 April 1980 30p

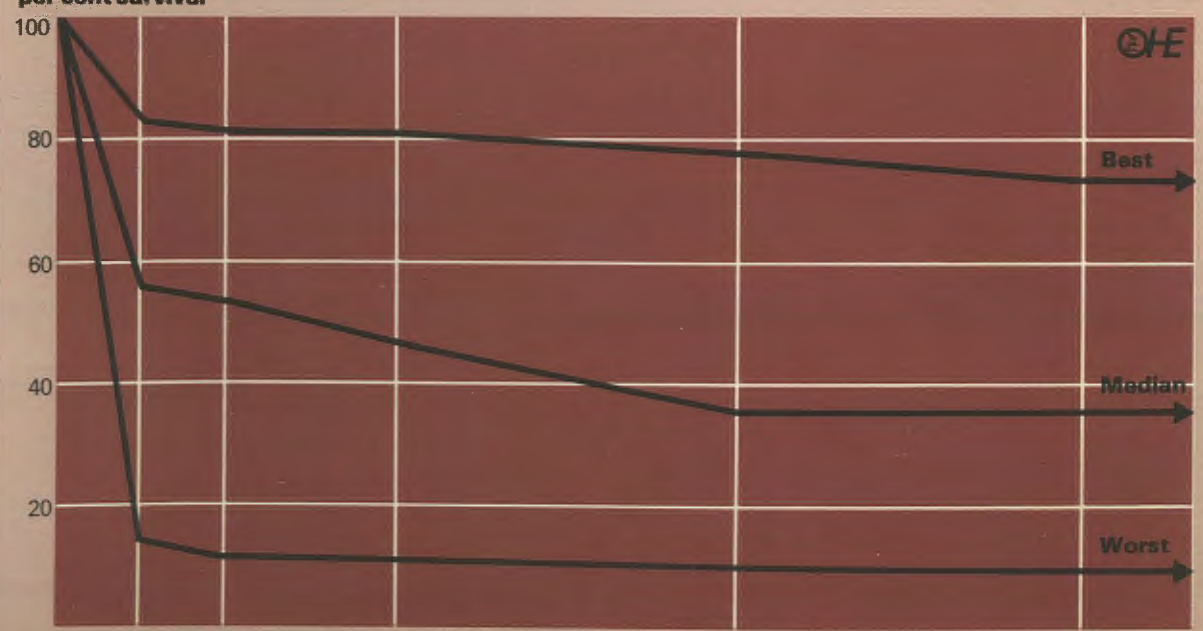
END STAGE RENAL FAILURE

The United Kingdom's performance in the treatment of End Stage Renal Failure[1] reflects, in microcosm, many of the strengths and weaknesses of the National Health Service. On the one hand, UK practice is almost certainly more cost-effective than that of any other country. It has been achieved in this instance by concentration on transplantation and on home rather than hospital dialysis. On the other hand, because of lack of resources, facilities for the most expensive modes of treatment are in considerably shorter supply than in comparable countries.

1 'End Stage Renal Failure', an originally American term, is preferred to the alternative 'Chronic Renal Failure'. Together with the complementary term for treatment, 'Renal Replacement Therapy', it reflects the point that spontaneous recovery of renal function is very rare and that death follows without replacement of renal function by some form of dialysis or by transplantation.

The existence of a central authority enabled the UK to be the first country to set up a national network of treatment centres. But this has brought with it neither the satisfaction of 'need' nor regional equality of services. The network, established in the context of medical views prevailing at the time, has displayed little capacity for change during a period of broadening conceptions of what is treatable. Furthermore, the present rigorous delegation of specific resource allocation decisions to regional and area health authorities, and the absence of alternative sources of finance, have combined to perpetuate early regional differences which arose. Even more significant variations exist in some aspects of the outcome of treatment. Recently published data, for example, emphasise the magnitude of the so-called 'centre effect' in transplantation shown in Figure 1. Three month graft survival is as low as 14 per cent

Figure 1 *Graft survival by centre*



Source: UK Transplant Annual Report 1978/79

Table 1 *Incidence of chronic renal failure*

	Glamorgan	*Whole of Scotland*	*Whole of N. Ireland*	*Nottingham*
Incidence per million total population per annum for people with chronic uraemia judged suitable for dialysis and/or transplantation, with estimate of standard error*	39 ± 10.4 (under 60 years old) 28 ± 8.9* (under 50 years old)	52 ± 3.2* (under 65 years old) 38 ± 2.7* (under 55 years old)	38 ± 2.9 (5-59 years old) 33 ± 2.7* (5-54 years old)	45 ± 6.3 (under 65) 39 ± 5.9* (under 60)
Number of cases	14 (under 60 years old) 10 (under 50 years old)	270 (under 65 years old) 195 (under 55 years old)	176 (5-59 years old) 150 (5-54 years old)	51 (under 65) 44 (under 60)
Sources of data	Laboratory records, hospital admissions and notification by Practitioners.	Prospective notification by General Practitioners and Hospital Consultants. Check from death certificates and further check from laboratory records.	Prospective notification by General Practitioners and Hospital Consultants. 92% response from those consultants who might be expected to see the patients with renal failure.	Prospective study of case notes of patients identified as uraemic from laboratory records in 1970 – together with prospective study of uraemic patients in 6 months of 1973/74 including assessment of 'a large number' while still in hospital.
Comments	Suitability for dialysis determined by examination of hospital case notes.	Suitability for dialysis and/or transplantation determined by examination by a renal physician in about a quarter of the cases and from hospital case notes in most other cases.	Suitability for dialysis and/or transplantation determined by examination by the author of study in over half of cases; in other cases suitability judged by information from other doctors or from case notes. Liaison with organisers of Scottish study to make the two studies as comparable as possible.	The above figures exclude persons deemed to be unsuitable because of co-incident disease. Another 20 cases in the two studies (13 per million per annum) were classed as 'unsuitable or uncertain' for dialysis or transplantation, 16 of these were over 50 years old.

Sources Branch et al (1971), Pendreigh et al (1972), McGeown (1972) and Dombey et al (1975)

Note *These standard errors were not quoted by the authors of the studies. They are based upon the square roots of the numbers of cases detected, on the assumption that the samples may be expected to follow a Poisson distribution.

in some centres and as high as 84 per cent in others.

In public discussion of the issues surrounding End Stage Renal Failure reference is often made to the disparity between its incidence and the rate of intake of new patients. This disparity is higher in Britain than in any other major developed western country. New data from the European Dialysis and Transplant Association (EDTA) makes it clear that Britain's low overall rate of intake is a consequence of exclusion of older new patients from, or failure to refer them to, renal units. This *Briefing* discusses aspects of renal service provision in the UK, drawing particular attention to the mechanisms by which access to such care is controlled.

The incidence of chronic renal failure

The incidence of treatable chronic renal failure in Britain and other Western countries is small. The most commonly quoted figure is 35 to 40 people per million per year, based on four British studies in the late sixties and early seventies. (Branch et al 1971, Pendreigh et al 1972, McGeown 1972, Dombey et al 1975). Their results are summarised in Table 1.

These studies, however, excluded a large proportion of people with coincident diseases (like diabetes, cancer and disabling mental illness) and ignored older people (usually over 60) entirely. The use of less selective criteria of suitability for treatment leads to higher estimates of incidence. If all persons under 60, regardless of any other co-existing disease, were considered potential recipients of treatment the potential demand would rise to about 45 to 50 new patients per million total population per annum.

And in the most extreme case, if all over 60 year olds with terminal renal failure (whether with serious co-existing disease or not and regardless of age and frailty) were included then death rates suggest that, very roughly, demand could rise as high as 150 cases per million population per annum. Of course, many elderly people would only receive treatment for a very short time prior to death and would not, therefore, contribute significantly to the stock of patients on treatment at any one time.

In practical terms, perhaps the best guide to the maximum number of people who might benefit from treatment could be provided by data from the USA. In 1972 the Senate passed a law which extended access to treatment for renal failure, via Medicare, to about 95 per cent of the American population. Physicians and the public are now highly aware of the availability of treatment and are very liberal with respect to both coincident disease and age.

Because of a hiatus in the collection of statistics precise figures are not yet available. However, it is unofficially reported that the number of new patients accepted currently exceeds 60 per million per year.

In contrast, the rate of intake of new patients in the UK in 1978 was 19 per million population. A major reason for the disparity between this and even the most conservative estimates of 'need' is illustrated in Table 2 which compares age specific rates of intake of new patients in 1978 in the UK, France, W. Germany and Italy. Up to the age of 44 UK rates were of the same order as those of the other countries. From the 45-54 age group, however, the UK intake was significantly lower. It was lower still for the

Table 2 *Acceptance of new patients by country. Rate per million population in different age groups, 1978.*

	W. Germany	*France*	*Italy*	*United Kingdom*
<15	2.3	3.9	3.5	4.0
15-24	13.1	13.9	12.5	17.7
25-34	22.8	27.6	22.0	26.9
35-44	41.7	34.2	37.2	33.1
45-54	58.8	59.8	55.7	43.5
55-64	71.3	69.5	69.5	22.7
65-74	49.9	56.6	52.2	3.5
75+	8.6	17.6	7.3	0
Total	30.9	30.4	29.0	19.2

Source: Proceedings of the European Dialysis and Transplant Association, Vol XVI.

55-64 age group and for the 65-74 group the rate of intake dropped to 3.5 per million compared with about 50 per million for France, W. Germany and Italy.

Those older people who fail to reach renal centres, together with a much smaller number of younger people, presumably die. To an extent, death due to renal failure will be masked by certification of deaths due to cardiovascular causes, since so many patients are hypertensive.

The development of services in Britain and other countries

From the NHS reorganisation in 1974, it has been DHSS policy not to intervene directly in regional and area resource decisions except in a very restricted range of circumstances. This means that any expansion of facilities must be financed out of local resources in competition with all other users of money. The priority given to renal replacement therapy varies considerably from region to region and, therefore, regional variations in the level of provision of services are likely to remain, or even increase, in the future. Table 3 summarises data relating to 1977.

Table 4 summarises certain statistics for the United Kingdom and other European countries. A number of points are clearly evident from this table. First, the UK maintains a significantly higher rate of transplantation than the other major Western European countries, France, Italy and West Germany. Of the smaller countries, only Sweden and Denmark perform more per unit population. Second, the UK 'stock' of patients on home dialysis is higher than any other European country. It is, indeed, the highest in the world. Third, the UK 'stock' of patients on hospital dialysis is very low and, consequently, the total 'stock' of patients on all forms of renal replacement therapy is relatively low. Per unit population it is below that of any other Western European country except for Portugal, Spain and Ireland. As regards new patients, only Portugal and Ireland among Western European countries had lesser rates of intake than the UK in 1977. Finally, the number of treatment centres per unit population is lower in the UK than in any other Western European country, with the sole exception of Portugal.

These comparative statistics illustrate the extent to which treatment of end stage renal failure differs in Britain from that offered in comparable Western European countries, differences which are in part a consequence of the organisational and financial structure of the NHS and in part a consequence of the early establishment of a treatment network. They are also, presumably, in part a consequence of Britain's relatively low per capita income.

Generally, the policies adopted in Britain, home dialysis and emphasis on transplantation, are those which by accident or design have resulted in expenditure, per year of life gained, lower than that of any other country. The differences extend to the details of treatment. For example, whereas disposable dialysers are almost universally used in the USA and other Western European countries, both because of convenience and labour costs saved, most NHS patients continue to use the more labour intensive rebuildable (Kiil) dialysers. Accounted labour costs of regular rebuilding are, of course, zero if performed by patients and their families themselves at home.

The original network set up in Britain was designed round the assumption of acceptance criteria rather more restrictive than now. It envisaged home dialysis complemented by transplantation. Arguably, these are the preferred modes for the sort of patients then anticipated, as well as the cheapest. In subsequent years it has been found that there are no fundamental problems in organising a continually expanding home dialysis programme, integrated with transplantation, from existing centres. But what has been found to be a real problem is dealing with people who cannot adapt well to home dialysis. In other European countries and in America they would find their way onto hospital or 'in-centre'[2]

2 In centre dialysis is a useful American term referring to dialysis carried out at a permanently staffed centre. The centre site may range from a hospital to converted office premises and the level of staffing may range from that associated with a major hospital to the minimum necessary for safety or security purposes.

Table 3 *Summary of statistics on end stage renal failure by English region. Rates per million population*

Region	*New patients 1977*	*Patients on home dialysis at 31/12/77*	*Patients on hospital dialysis at 31/12/77*	*Patients with a functioning transplant at 31/12/77*	*Total patients at 31/12/77*	*Transplants (1978)*
Northern	19	24	36	50	111	12
Yorkshire	15	22	18	18	59	6
Trent	19	47	15	17	79	12
E Anglia	16	20	19	63	104	26
NW Thames	19	33	20	50	103	10
NE Thames	23	67	24	54	146	18
SE Thames*	38	47	29	75	153	29
SW Thames*	5	11	4	4	20	—
Wessex**	6	25	3	14	42	13
Oxford	14	45	9	39	95	21
S Western	17	47	13	22	85	7
W Midlands	13	15	11	35	61	16
Mersey	13	37	9	29	76	18
N Western	10	21	11	24	57	16
ENGLAND	18	33	16	35	85	17

Source: DHSS

*Most patients from the South West Thames Region are treated in the South East Thames Region.

**This is the Wessex statistic as recorded by the DHSS. According to the physician in charge of the only unit in the region the correct figure for 1977 should have been about 10 to 12 per million.

Renal replacement therapy — techniques and outcomes

Dialysis

Dialysis has provided a practical means of long-term replacement of renal function since the early sixties. Data from the European Dialysis and Transplant Association* show that, by the end of 1978, over 1,000 people in Europe had been kept alive for 10 years or more by dialysis alone. Despite many improvements in technique, however, it remains an arduous form of treatment. A typical regime in Britain is five or six haemodialyses per fortnight, each lasting several hours. Even though dialysis may be carried out at night a continuing feeling of ennervation is common.

Much research has gone into reducing the size of dialysis equipment with a view to giving the patient more flexibility and freedom. Portable haemodialysis equipment, for example for use on holiday, has been made possible by the use of sorbents, ion exchange resins and the urea splitting enzyme urease, to regenerate the dialysate fluid for re-use.

One promising current development is the laboratory use of granules of activated charcoal encapsulated by blood compatible semi-permeable membranes. It has long been known that activated charcoal granules will absorb many uraemic metabolites and drugs from perfused blood, but charcoal alone adversely affects platelets. However, if the granules are coated, the resulting microcapsules, with very high surface/volume ratios, are capable of removing toxins from perfusing blood without affecting platelets (Chang 1978).

A great deal of interest has also been generated by the recent development of Continuous Ambulatory Peritoneal Dialysis (CAPD) in a number of countries, particularly Canada and the USA. CAPD relies on the presence of a permanent indwelling catheter giving access to the patient's peritoneal cavity. Four times a day the patient introduces dialysate fluid from a sterile plastic bag (at present by force of gravity). He/she can then cap off the catheter and go about normal activities without any need to be attached to a machine. At the same time as the fresh dialysate fluid is introduced the old dialysate fluid, which has been equilibrating with the blood in the peritoneal vessels is drained off. The four procedures per day are said to take a total of about two and a half hours. The major advantage is freedom from a machine. The main disadvantage is the risk of peritonitis. A number of centres in the USA and Canada have claimed to have reduced frequency of peritonitis to acceptable levels.

CAPD, however, is still in the experimental stage and, although it clearly works, nothing is known of its long-term effects. Estimates of the proportion of patients who might be suitable for CAPD vary widely. Many authorities believe its future lies mainly with older people because of the relative simplicity of self treatment.

Transplantation

Transplantation, when successful, is the preferred form of treatment, both in terms of rehabilitation and wellbeing of the patient and from the point of view of cost to the health services. It became a practicable form of treatment with the introduction of effective immunosuppressive drugs (the first of which appeared in 1960) and by the end of the sixties it had become routine procedure. The major problem was, and still is, the immune reaction which protects the body against incompatible foreign material.

EDTA analyses have shown significant improvements in both patient survival (Table B1) and graft survival (Table B2) in Europe in recent years. The contribution of various factors governing survival, however, remain controversial. For example, the effect of matching HLA-A and B loci between donor and recipient is unclear.

It is known that graft and patient survival vary significantly from country to country and, indeed, from centre to centre. As Figure 1 shows, three month graft survival is as low as 14 per cent in some centres and as high as 84 per cent in others.

The same applies to patient survival. Although Table B1 appears to confirm the generally held view that transplantation carries a significantly greater risk of mortality than dialysis in the first year, and particularly in the first few months, the results of some centres indicate little difference in mortality risk between dialysis and transplantation. For example, in a series of 110 patients who received grafts since 1975 in the Oxford region (most of them first cadaver grafts) 95 per cent patient survival was reported at one year (Oliver and Morris 1978). The extent to which variations reflect differences in selection policies or in patient management remains unclear.

Table B1 *Percent patient survival, all ages, on different modes of therapy, 1976-1978*

	Sample size	*1 year*	*2 years*	*3 years*
Patient survival hospital haemodialysis	27,495	87.5 ± 0.2	77.0 ± 0.4	68.0 ± 0.6
Patient survival home haemodialysis	4,518	95.3 ± 0.4	90.7 ± 0.6	84.3 ± 1.1
Patient survival 1st live donor graft	833	87.7 ± 1.2	82.2 ± 1.6	79.4 ± 2.1
Patient survival 1st cadaver graft	5,782	81.1 ± 0.5	74.9 ± 0.7	70.6 ± 0.9

Source: EDTA

Table B2 *Percent graft survival, all ages, 1976-1978*

	Sample size	*3 months*	*1 year*	*2 years*	*3 years*
Living donor	833	82.1 ± 1.4	75.4 ± 1.6	68.8 ± 1.9	64.7 ± 2.4
Cadaver	5,782	67.0 ± 0.6	55.6 ± 0.7	50.3 ± 0.7	45.7 ± 1.0

Source: EDTA

*EDTA hold comprehensive computer files of information of persons treated in European centres, including Eastern and Southern Europe. Its analyses, published in annual reports of its proceedings, are the source of much of the data presented in this *Briefing*.

Table 4 *Statistics on end stage renal failure by European country. Rates per million population*

Country	*New patients 1977*	*(Mean Age in 1977)*	*New patients 1978*	*Patients on home dialysis at 31/12/78*	*Patients on hospital dialysis at 31/12/78*	*Patients with a functioning transplant at 31/12/78*	*Total patients at 31/12/78*	*Transplants performed 1978*	*Treatment centres in 1978*
Belgium	35	(47.9)	—	10	113	45	168	12	5.1
Czechoslovakia	9	(31.0)	—	0	23	7	30	5	1.1
Denmark	40	(44.1)	—	24	56	88	168	25	2.0
West Germany	31	(48.4)	31	28	88	10	127	4	3.8
France	34	(47.7)	30	26	107	21	155	5	3.3
East Germany	17	(36.5)	—	0	31	16	47	8	2.3
Ireland	13	(36.4)	—	16	30	23	69	10	1.3
Italy	26	(47.5)	29	14	107	11	131	2	4.3
Netherlands	26	(41.9)	—	8	84	39	131	14	3.1
Poland	4	(34.5)	—	0	8	2	10	1	0.8
Spain	22	(40.3)	—	5	73	6	84	3	2.7
Sweden	36	(47.5)	—	14	51	67	132	25	3.0
Switzerland	40	(47.2)	—	30	97	71	198	16	4.7
Yugoslavia	12	(40.6)	—	0	43	5	48	1	2.2
United Kingdom	16	(38.1)	19	36	18	41	94	16	1.0

Source: EDTA, DHSS, UK Transplant.

programmes. In Britain, however, if renal centres were to accept patients with a view to long-term in-centre dialysis they would soon find themselves under severe pressure of space.

There are at present eight hospital dialysis 'stations' per million population in England. They are used for training for home dialysis, for temporary dialysis and, if there is no alternative for a person already on treatment, for long-term in-centre dialysis. A typical figure in Western Europe is, by comparison, 50 hospital 'stations' per million population.

The problem of non-availability of in-centre facilities is particularly relevant to older people, over the age of 55 or 60 at the start of treatment. They are less able to learn home dialysis successfully and they are generally thought to be unsuitable for transplantation.

There is little doubt that the relative paucity of in-centre dialysis facilities is largely responsible for the very low rate of acceptance of older persons, in comparison with other European countries. Their experience, and indeed that of the USA, suggests that Britain's renal replacement services will face increasing pressure for the extension of in-centre facilities, especially from older people.

In all Western European countries with insurance-based health services, the general population is covered for treatment of renal failure by compulsory, state-sponsored protection. Thus in West Germany the government-sponsored insurance organisations pay for virtually 100 per cent of dialysis. In France the population is covered by virtue of those with renal failure being defined as disabled. Their treatment is paid for out of insurance deducted at source from employees' pay. Private health insurance plays little part in financing treatment. The position is similar in the USA where a 1972 law specifically extended insurance cover against the cost of dialysis, via Medicare, to 95 per cent of the population.

The key difference in financing between Britain and most other countries appears to be the separation of the 'payers for' and the 'providers of' services in the latter. Providers of dialysis operating within insurance based systems (whether proprietary, public or charitable) claim fees for each item of service from the responsible insurance carrier. The insurance carrier will pay standard fees (Medicare, in the USA, has a 'screen' level of $150 per dialysis beyond which the dialysis provider must provide justification). But they have no control over the number or class of patients accepted. Nor, more importantly, have insurance carriers had much authority over the number of new facilities for dialysis that were set up in the past.

Yet some control is now exercised in the USA by requiring new facilities to demonstrate sufficient local demand for an 80 per cent utilisation rate. A similar licensing procedure is being set up in Belgium. Such moves may be seen as a response to cost escalation. Expensive modes of treatment and inexorably increasing numbers on treatment have led to a great deal of concern in most countries about the overall cost of renal replacement therapy. In Britain, in contrast, concern is largely about under-provision.

Possible reasons for the disparity between incidence of end stage renal failure and acceptance for renal replacement therapy

In the UK in 1978, 19.2 new patients per million population were accepted for renal replacement therapy. Whichever estimate of incidence is used (either 35-40 per million per annum from the British studies in the late sixties, or about 60 per million implied by USA experience) it appears that a large number of people (between one and two thousand) are dying whose lives may have been prolonged.

Leaving aside the question of the quality of life, and the priority that might be given to renal failure, this section simply considers the reasons for the disparities noted. There are four major ones. Each will be dealt with in turn using information gathered from the directors of nine NHS renal units (out of a total of 47) covering nine of the fourteen NHS regions in England.

It is important to note at the outset that despite the apparently large gap between need and provision, many units report they are coping with demand. Of the nine directors of renal units interviewed, five said they were not rejecting any referred patients whom they felt, on their own criteria, to be medically suitable for treatment. In only one case, in the West Midlands, did a director report rejecting good (rather than borderline) cases.

Lack of resources

One common belief is that shortage of kidney (dialysis) machines is a limiting factor. This is not so. Following the 1978 budget speech, in which specific provision was made for 400 extra machines, a questionnaire was sent to each of the 47 dialysis units in England. Out of the 41 units which replied only one reported the availability of machines as a constraint.

The questionnaire went on to ask what were the major constraints, if any. Sixty five per cent of the units said that shortage of staff was the most important factor.

These results were confirmed by findings from interviews with directors of renal centres. Shortages of nursing staff were reported by 5 out of the 9 units, more specifically inability to fill the nursing establishment.

Five units reported shortage of space and bed stations. Two mentioned an inadequate medical establishment, particularly a shortage of transplant surgeons.

A consequence of limited facilities, particularly for hospital dialysis, is that patients may be offered a mode of treatment not considered ideal. It was commonly reported that less good candidates for home dialysis may be pushed towards a 'crash' transplant with a relatively poorly matched kidney.

Kidneys for transplantation

There is a shortage of kidneys for transplantation. Pincherle has estimated the potential need at about 30 transplants per million population per year, 20 per million for first transplants and the remainder for retransplants (Pincherle 1979).

Two factors could increase the potential demand for transplants. First is the relaxation of age and fitness criteria for first transplantation (many units have an upper age limit of 55, but this may change). The second, and very important, factor is the survival rate of transplantees. If patient survival were to rise but graft survival were to remain the same, the potential demand for second, third and even subsequent transplants could be very considerably increased.

A prospective study in Nottingham (Dombey et al 1975) found that 12 cadaver kidneys were removed for transplantation out of a possible 34 (17 donors) in one year. Extrapolation of these results gives a rate of about 43 potential cadaver kidneys per million population per year. This would be sufficient to meet Pincherle's estimate of need but could be insufficient if, for example, transplantee survival increases unilaterally.

The Nottingham survey found the two major barriers to harvesting were lack of awareness among hospital doctors and reluctance among donors' relatives. There have recently been efforts to increase kidney harvesting. Three transplant units in England are considering the appointment of a transplant co-ordinator, likely to be a highly qualified nurse.

Restrictive criteria of suitability for treatment

In all the nine renal units visited, the decision to accept or not was taken by the physician in charge. His individual views, therefore, are clearly an important selection factor. Criteria are, of course, applied with flexibility but, typically, British physicians are more conservative than their counterparts in Europe and the USA. This is illustrated by differences in selection policies for older people. In 1978 70 per cent of European centres reported imposing no age limit for acceptance while 22 per cent had a general rule to exclude those over 55. In the UK only 18 per cent of centres imposed no age limit, 45 per cent reported excluding those over 65 and 35 per cent and 2 per cent respectively reported excluding persons over 55 and 45 (EDTA 1978).

Failure to refer

There is a good deal of anecdotal evidence here. Physicians have quoted cases (which they have discovered accidentally) of young, good candidates for treatment dying without referral. There are also cases of patients insisting on referral after initially not being offered it. Presumably the less insistent ones die . There are, in addition, otherwise inexplicable variations in referral rates between comparable and contiguous areas served by different health service personnel. This suggests that doctors in some areas are more aware of kidney disease and the facilities for treatment than those in other areas. It was not only the rate of referral that was mentioned by the physicians interviewed but also the stage at which referral takes place. Many reported that patients have been referred at a terminal phase, when prognosis is worse. One physician specifically mentioned a problem with diabetics who must be referred early (before they go blind) if they are to be suitable for treatment.

Renal replacement is a 'super-speciality' with between one and, at the most, five treatment centres per region. It is easy to see, therefore, how a large number of suitable candidates can be lost in the referral process.

Potential patients will usually be referred as outpatients to the general medicine department of a local hospital. It is at this stage that selection takes place. The consultant may not refer on to a renal unit because of a real or imagined shortage of facilities for treatment. He may also be unwilling to refer on because of his own assessment of the likely quality of life under treatment. Thus patients with renal failure may reach the renal unit at a late stage in their condition or not at all. Furthermore, it seems likely that only a strong-willed patient or his family would be capable of finding his/her way on to long-term treatment against negative responses at each stage of the referral hierarchy. Renal units rarely make any positive efforts to seek out new patients. Nor, generally, do physicians based in NHS renal units arrange consultations in peripheral locations.

The cost of end stage renal failure

In 'Renal Failure: a priority in health'? (OHE 1978) total NHS running costs of treatment for end stage renal failure were estimated at £22 million in the UK in 1976. Application of the same method, using 1978 EDTA data and the appropriate inflation factors gives an estimate of

Table 5 *Projections of services in the UK for end stage renal failure at equilibrium level (approached in about 30 years) on various assumptions, 1980 prices*

Assumption regarding intake of new patients	*Persons on dialysis*	*Persons with a functioning transplant*	*Annual transplant operations*	*Annual cost 1980 prices*
	No.	*No.*	*No.*	*£million*
UK rate all age groups	5,700	5,800	1,000	135
UK rate 0-34 and 45 and over. European rate 35-44	5,900	6,000	1,100	139
UK rate 0-34 and 55 and over. European rate 35-54	6,200	6,400	1,200	147
UK rate 0-34 and 65 and over. European rate 35-64	7,600	7,000	1,300	176
UK rate 0-34. European rate 35 and over	9,200	7,000	1,300	207

Note: The different acceptance rates are taken from Table 2. 'European rate' is represented by an unweighted average for France, Italy and W. Germany.

£38 million at 1980 prices.
With a simple computer model it is possible to project the order of magnitude of future costs of treating renal failure, on the basis of certain assumptions about acceptance and transplantation rates and using EDTA data on death rates and graft failure rates.

Table 5 presents the results of such an exercise in terms of equilibrium levels of annual cost (at 1980 prices). Such levels would not be approached for about another thirty years, by which time the number of people dying each year from the stock on treatment would be equal to the annual intake of new patients.

A comparison has been made between i) the anticipated equilibrium cost assuming a continuing intake at the UK 1978 level and ii) the cost if intake rates among older people were to rise to levels equivalent to the average for France, West Germany and Italy in 1978.

Continued intake at UK 1978 levels implies an equilibrium cost of £135 million. If intake were increased to the average European level for the 35-44 age group the projected cost rises to £139 million. If intake in the 45-54 age group were similarly increased the projected cost rises to £147 million. Addition of the 55-64 group raises costs to £176 million. Finally, if intake were increased to the average European level for all ages over 34, then the projected equilibrium cost becomes £207 million.

Conclusion

End stage renal failure provided one of the first examples of the application of new high cost technologies demonstrably capable of extending useful life. In this case the number of patients is not great. The projections of Table 5 indicate that if the UK acceptance rate of new patients were equal to the average European rate at present then, at equilibrium level, about 0.03 per cent of the population would be alive as a consequence of renal replacement therapy. The cost would be about £200 million in 1980 prices.

But the near future will certainly see the development of equally expensive and effective technologies in other areas where many more patients will be involved and where the financial consequences for the NHS will be that much greater. Already there are examples of heart surgery which, though effective, are sufficiently expensive to have generated resistance to their use by health authorities.

The financial structure of the NHS is not ideally suited to rapid changes in expenditure in particular sectors. Only in a very restricted range of circumstances will the DHSS directly finance new developments. And if new treatments are to be financed from fixed regional and area funds then, inevitably, growth in one area can only be achieved by equivalent savings in another. The challenge to the NHS is to develop systems of financing which are sufficiently flexible to accommodate new technologies and to provide first class health services for the community without allowing expenditure to grow out of proportion to the likely benefits.

References

Branch R.A., Clark G.W., Cochrane A.L., Jones J.H. and Scarborough H. (1971) Incidence of uraemia and requirements for maintenance dialysis.

Chang T.M.S. (1978) The Future of Haemodialysis. In Dialysis Review, (edited by A.M. Davison) Pitman Medical. pp 269-277.

Dombey S.L. and Knapp M.S. (1975) Prospective survey of availability of cadaveric kidneys for transplantation. *BMJ 2,* 482-483.

Dombey S.L., Sagar D. and Knapp M.S. (1975) Chronic Renal Failure in Nottingham and requirements for dialysis and transplant facilities. *BMJ 2,* 484-485.

EDTA (1978) Proceedings of the European Dialysis and Transplant Association, Vol. 15.

EDTA (1979) Proceedings of the European Dialysis and Transplant Association, Vol. 16.

McGeowan M.G. (1972) Chronic renal failure in Northern Ireland. *Lancet, 1,* 307.

Oliver D.O., Morris P.J. The Organisation and results of an integrated home dialysis and transplant service. In Dialysis Review (edited by A.M. Davison) 1978. Pitman Medical.

Pendreigh D.M., Heasman M.A., Howitt L.F., Kennedy A.C., MacDougall A.I., MacCloud M., Robson J.S. and Stewart W.K. (1972) Survey of Chronic renal failure in Scotland. *Lancet, 1,* 304.

Pincherle G. (1979) Kidney Transplantation and Dialysis. HMSO, London.

UK Transplant. Annual Report 1978/79.

Office of Health Economics

The Office of Health Economics was founded in 1962 by the Association of the British Pharmaceutical Industry.
Its terms of reference are:
To undertake research on the economic aspects of medical care.
To investigate other health and social problems.
To collect data from other countries.
To publish results, data and conclusions relevant to the above.
The Office of Health Economics welcomes financial support and discussions on research problems with any persons or bodies interested in its work.

Office of Health Economics
130 Regent Street London W1R 5FE

End Stage Renal Failure

This briefing was prepared by William Laing.

This briefing is based in part on information gathered by the author during a study on behalf of the British United Provident Association. The Office of Health Economics thanks BUPA for its co-operation in making data available.

Printed by White Crescent Press Ltd