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MANAGEMENT AND RESOURCE ALLOCATION IN END-STAGE RENAL FAILURE UNITS: A REVIEW OF CURRENT ISSUES

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PREFACE AND ACKNOWLEDGEMENTS

This report attempts to review the main issues surrounding the funding and management of units providing dialysis services to people suffering from end-stage renal failure in the United Kingdom for the benefit of health service managers, renal physicians and other staff. It is not a work of original scholarship or research, but rather the product of extensive editing and synthesis of a range of written and oral material principally from two sources. The structure is based on Bob Steele's November 1988 report for the Department of Health, *Management issues in renal failure*. Bob's work is heavily referenced throughout the report. Without it, the report could not have been compiled. *Management issues in renal failure* had been commissioned by the Department of Health primarily to enable a seminar to take place at which those involved in renal medicine, at various levels and in different capacities, could have the opportunity of discussing common problems in the management of units and the diverse solutions which they had pursued. The planned seminar was held at St John's College, Oxford on 20 and 21 March 1989 under the chairmanship of Professor F W O'Grady, Chief Scientist, Department of Health and Sir Douglas Black, former President of the Royal College of Physicians. The papers presented at the seminar together with the ensuing discussion were recorded and form the second main source for the report. The programme and list of participants at the seminar are reproduced in the Appendix (page 63) together with a helpful note of 'suggested issues for discussion', prepared for the seminar by Professor Alan Williams of the Department of Economics, University of York.

Thus Chapter 2 is based in large part around the paper given at the seminar by Keith Farrington of South East Thames Regional Health Authority. Chapter 3 deals almost entirely with issues raised by Dr R Wilkinson, Freeman Hospital, Newcastle. Chapter 4 is, in part, drawn from Dr Tony Wing's paper given at the Department of Health seminar. Chapter 5 is a summary of the presentation given by Dr Ruth Davies, University of Southampton which she has prepared specially for this report. The simulation model she describes was developed jointly with Huw Davies, a former research colleague at the University of Southampton. Chapter 6 attempts to do justice to the overview by Dr R H Kenward of South Cleveland Hospital of management efficiencies in renal units. Chapter 7 reflects the contributions to the seminar on the private sector by David McGlinn from the Welsh Office, Chris Cooper of Community Dialysis Services and Robin Dibblee of Unicare Medical Services.

While the Oxford seminar and Bob Steele's report provided the mainstays for most of what follows, Chapter 7 draws extensively from the three-year evaluation of commercial subsidiary renal units in Wales undertaken for the Welsh Office by Dr W G J Smith, Professor A W Asscher and Mr D R Cohen, and submitted to the Welsh Office in February 1989.

Wherever possible, I have endeavoured to seek comments and criticisms on the apropriate sections of the manuscript from selected participants at the Oxford seminar. I am extremely grateful to them for improving the final product and for helping a novice in the field of end-stage renal failure grasp at least some of the complexities they have been wrestling with for many years.

Data collected through the European Dialysis and Transplantation Association (EDTA) registry which are included in the report are reproduced by kind permission of Professor F P Brunner, chairman of the EDTA Registration Committee. I should also like to acknowledge the hard work of Yvonne Smith at St Thomas's in processing a long and complicated document so speedily.

Despite the fact that the Department of Health both commissioned the original survey of renal units from Bob Steele and staged the seminar which followed in March 1989, the contents of this report in no way reflect the policy of the Department in relation to end-stage renal failure.

Nicholas Mays
1990

EXECUTIVE SUMMARY

The objective of this report is to review the experience and information currently available in the United Kingdom (UK) on the problems and issues which face clinical and non-clinical managers of renal dialysis units in the National Health Service (NHS), now and in the near future.

Chapter 1 (Introduction: end-stage renal failure treatment in the UK) sets the scene by showing that there has been a rapid increase in the availabilty of dialysis facilities in the last decade in the UK, particularly since 1984. This is mainly accounted for by the expansion of continuous ambulatory peritoneal dialysis (CAPD) which is now the leading form of dialysis in the UK. From a position at the bottom of the West European league table, the current acceptance rate now exceeds that in Italy and is not far behind the French rate (Table 1, page 11). The UK patient stock has more than doubled in the last ten years, but the gap between the UK and other west European countries has only narrowed slightly (Figure 1, page 11). There are still considerable variations between regions in the level of treatment and the numbers of new patients taken onto dialysis, ranging from 74.4 per million population (pmp) in South East Thames RHA in 1985 to 35.2 pmp in Wessex in the same year. The experience of the UK in the last 20 years demonstrates that the NHS has used its limited resources for renal replacement therapy (RRT) in a broadly cost-effective manner by giving greater priority to home dialysis and, more recently, to CAPD than in most other countries and by encouraging an active programme of renal transplantation.

Demographic change, improvements in dialysis methods and pharmaceutical innovations affecting both dialysis and transplantation are interacting to maintain the pressure on resources for RRT in the UK. A far wider range of patients than ever before can now be successfully dialysed and transplanted. At the same time, the availability of expensive recombinant human erythropoietin offers the potential radically to improve the quality of life of the existing dialysis population. In these circumstances the efficient management of renal units assumes the importance of an ethical imperative.

Chapter 2 (Allocating regional finance) considers developments in the ways in which regional health authorities (RHAs) fund renal units in the NHS and tries to place recent RHA experience in the rapidly emerging context of the implementation of the government's reforms set out in the white paper, *Working for Patients* (Secretaries of State 1989).

In essence, RHAs are endeavouring to exercise a greater degree of financial control and accountability over renal units. There appear to be three models of funding which could be applied to dialysis units: the conventional allocation of a global budget by the RHA ('top-slicing') based on past expenditure with increments for planned developments and inflation; funding by the RHA on the basis of standard costs for an agreed type and level of workload; and district health authority (DHA) purchasing of dialysis services in a 'provider market'. Each method has its pros and cons so that the choice of funding method depends in large part on the combination of objectives which the RHA wishes to pursue (workload, quality, efficiency, economy, equity, predictability, and so on).

The conventional system of allocating 'top-sliced' global budgets to each unit has the advantage from the RHA's point of view that it requires little information on activities and costs and takes up relatively little management time. The units are subject to an overall cash-limit which should, in theory, encourage them to make the most cost-effective use of their allocations. The principal disadvantage from the RHA perspective is the lack of control over total spending and the absence of clear opportunities under global budgeting to ensure that units provide an appropriate balance of services and work efficiently.

The second system which funds units on the basis of standard costs for an agreed pattern and level of work requires a far higher level of managerial involvement by RHA staff in setting activity limits and monitoring expenditure against budgets as well as access to valid and reliable comparative cost and case-mix data between units. The system offers the promise that RHAs will be able to plan the workload of renal units and fund them reasonably for what they do while discouraging inefficiency. There is the possibility of being able to alter the pattern of provision to benefit 'efficient' units at the expense of 'inefficient' units. However, a major obstacle to the successful implementation of this type of system lies in the need for the RHA to define the content of each modality in terms of the range of clinical practice which is acceptable and which can be funded under a system of standard costs. Hitherto, understandably, RHA officers have tended to fudge this potentially contentious issue.

The average modality cost for each unit rather than a regional standard cost has been used in South East Thames RHA as the basis for setting the budgets of renal units. Since officers have found it difficult to arbitrate between variations in clinical practice and costs, these tend to be accepted as long as clinicians can give some sort of explanation in terms of differences in inputs.

A 'provider market' for dialysis services would involve distributing the regional sum currently available for dialysis to each district in relation to its population size, age structure and relative needs. This could either be in the form of an earmarked sum or an addition to the total district allocation which the DHA could use to purchase services on behalf of its residents as it sees fit. DHAs would thus go out to tender for dialysis and transplantation services to the available renal units which would have to compete for

business. Referrals would have to follow the pattern of contracts. While there is very little hard evidence about the consequences of moving to such a system, there are a number of specific features of end-stage renal failure (ESRF) which will influence the manner in which a provider market could be introduced in this field. Since treated ESRF is a chronic condition, patients are likely to remain on dialysis for considerable periods of time. Continuity of care is likely to be important, which militates against districts 'shopping around' regularly to place contracts with units offering the best value for money. Nonetheless, the concept of the provider market implies a greater degree of involvement by purchasers in specifying the type and quality of care to be delivered. It will also open the market for dialysis services still further to competition from private operators.

Chapter 3 (Matching constrained resources to changes in clinical workload) describes how renal units in the NHS have increased the patient acceptance rate since the mid-1960s through a combination of physical expansion, improved efficiency in the use of staff, consumables and equipment and increased use of home dialysis and CAPD in response to demographic changes and ever widening indications for successful dialysis. The Newcastle renal unit is looked at to exemplify this process. Although the unit is in the happy position that demand for dialysis places currently matches the available supply, this is unlikely to remain the case for long. The demand for paediatric renal services is set to rise sharply and even assuming that the new patient acceptance rate remains unchanged, and the transplant rate increased, the demand for adult dialysis is likely to rise given the improved length of survival of patients on dialysis.

There are major differences between regions in the percentage of RRT patients on the different modes of therapy. This suggests that RHAs should assess whether the existing patients could be managed more efficiently by adopting a different pattern of treatment. It also raises the question of the most cost-effective balance of modalities to develop in the event of resources being made available to expand the service.

Increased budgetary pressure is also being exerted by therapeutic developments such as the use of cyclosporine in immunosupression and recombinant erythropoietin in treating the anaemia of ESRF. Both are effective, but at great expense. The cost of a year's erythropoietin treatment is almost as great as the total annual cost of a patient on CAPD. Even if additional resources are made available for erythropoietin, this will not meet the demands of all those who could conceivably benefit. There is still an urgent need to establish a hierarchy of indications for treatment in relation to available resources by evaluating which types of patients stand to benefit most from treatment by erythropoietin.

Chapter 4 (Managing the budget at unit level) focuses on the process of budgetary management within renal units. Whichever precise system for allocating resources to renal units emerges in the wake of the government's reforms of the NHS, purchasers and planners of renal services are likely to require units to commit themselves to providing a specific level and pattern of services over a defined period for a negotiated price. In these circumstances, unit managers will need systems for internal monitoring and control of activity and expenditure to ensure that budgetary targets are fulfilled. The pre-conditions for successful budgetary management are identified: an appropriate degree of unit autonomy to deploy resources flexibly; acceptance by clinicians of the responsibility to manage within resource constraints; accurate, timely and relevant expenditure information; a budget which includes most or all the areas of expenditure which can be influenced by the work of the renal unit; and a pattern of budgetary incentives which encourages efficiency.

Adequate cost and expenditure information is the foundation for successful budget management at renal unit level. However, it is rare to find such data in renal units at present. It is not possible for unit directors within the same region to use the existing modality cost information in the NHS to compare their unit's performance with that of others, since there are no consistent rules for tracking expenditure or costing activities. In the future it will be essential for unit managers to have the ability to assess the financial and manpower implications of increases or decreases in workload of differing magnitude. Again, there is little evidence that units have access to the necessary marginal cost data to manage expansion or contraction of activity with confidence.

The chapter concludes by recommending the following to tackle some of the existing deficiencies in budget management in renal units: clarification of the scope of budgets and the areas of expenditure to be included in any cost comparisons; clarification of the degree of autonomy granted to budget-holders to alter patterns of resource use; development of agreed costing methods and conventions; production of timely, accurate and clinically relevant expenditure reports; and integration of financial and non-financial objectives in budget-setting and monitoring.

Chapter 5 (Planning the mix of patients to be treated using a simulation model) describes a simulation model developed specifically to assist units and health authorities at district, region and national level to plan renal services. The model is available in a microcomputer version for use by renal unit staff. The model allows users to estimate the effect on the current workload and costs of renal units of a wide range of variables likely to affect their activities in the future, including factors such as changing treatment policies, resource constraints, technological innovation, changes in demand, improvements in patient survival, and so on. Simulation models will be particularly helpful in the context of a provider market to enable unit managers to gauge the impact of winning or losing contracts to serve particular health authorities. They can also be used to test out the effects of choosing from a range of possible means for achieving a specific objective (for example, increasing the

proportion of patients over 70 years old who are accepted for treatment).

Chapter 6 (Efficiency issues in the operational management of renal units) reviews the current management arrangements within renal units and the practical steps taken by staff in units to improve the economy and/or efficiency with which services are delivered. The management of units is hampered by the absence of adequate management information and management support, unhelpful divisions of budgetary responsibility between different aspects of resource management, a lack of formal management training on the part of senior clinicians and a tendency to tackle management problems in a fragmented, *ad hoc* manner. There is a clear need to share the undoubted experience which exists within units in making more efficient use of resources. Opportunities exist to improve efficiency in consumables and equipment purchasing, the subsequent use of equipment and consumables, and staffing levels and skill-mix, but initiatives rarely embrace the interrelationships between these different aspects of resource management. At the same time, there is also considerable disagreement between experts about the usefulness of specific cost-improvement initiatives such as central versus local purchasing and re-use versus single use of dialysers and blood-lines, which can only be resolved by detailed cost-effectiveness studies.

Chapter 7 (The role of the private sector in the provision of dialysis services: general issues and the Welsh experience) centres around a case-study of the Welsh Office initiative of the mid-1980s to expand NHS dialysis services in Wales through the establishment of a main renal unit in Swansea accompanied by a number of subsidiary renal units (SRUs) in more sparsely populated areas to increase the level of haemodialysis. The establishment and management of SRUs were the subjects of a competitive tendering exercise involving public, voluntary and commercial bids. The contracts for the four SRUs which have been set up so far were won by specialist commercial firms. This was possibly a reflection of NHS inexperience in tendering for this type of service. The first two were regarded as experimental and have been the subject of one of the few evaluative studies of the relative cost-effectiveness of public and commercial provision of specific health services. The potential role of the private sector and the management techniques employed in commercial dialysis units are both likely to be of increasing interest to NHS renal unit staff and the prospective purchasers of renal services. The proposed provider market for NHS services will open up a wide range of services for the first time to the possibility of direct competition between the private sector and the NHS to secure clinical contracts.

At the two pilot SRUs which opened in August 1985, the private contractor was to provide a full haemodialysis service including the building, equipment, consumables and all non-medical staff on the basis of a fee-per-patient per dialysis session for a seven-year period. Patients remain under the care of the NHS consultant nephrologist from the main renal unit who dictates the clinical policy of the SRU. In this way, SRUs are able to form an integrated part of the overall pattern of NHS provision. In addition to the use of rigorous cost-control techniques, the commercial operators are distinguished by the flexibility with which staff are deployed in their units to undertake a wide range of tasks as required.

The evaluation of the first two SRUs commissioned by the Welsh Office concludes that there is no evidence that commercial SRU haemodialysis is either cheaper or more effective than NHS main unit haemodialysis for similar ESRF patients. On the other hand, SRUs have provided a satisfactory standard of dialysis care to a broad mix of patients typical of those receiving hospital haemodialysis in main renal units in Wales within six months of signing contracts with the local health authorities. Both home haemodialysis and CAPD are cheaper than SRU haemodialysis and appear to be more cost-effective for patients who can manage them. However, no data are available on survival or quality of life over time of similar patients entering commercial SRUs as against a range of NHS provision.

Health authorities would be well advised to avoid making general assumptions about the superiority of either commercial or public provision of dialysis services on the basis of a single study. They should assess the merits of each sector in each specific set of circumstances. The Welsh experience also highlights the importance of contract specification, price-setting, the method of payment and monitoring and review arrangements if the theoretical benefits of competitive tendering are to be realised in practice.

1. INTRODUCTION: END-STAGE RENAL FAILURE TREATMENT IN THE UNITED KINGDOM

Renal disease, dialysis and transplantation have been extensively and often emotively discussed and written about in the UK in the last decade. Yet end-stage renal failure (ESRF) is a relatively uncommon condition. The number of patients undergoing treatment in the UK on 31 December 1987 was 15,119 (Brunner, Fassbinder, Broyer and others 1989). The attention devoted to ESRF stems from the fact that untreated patients will die and treatment costs are high, particularly since patients need treatment for the rest of their lives. Patient survival for all age groups has improved consistently over the last 15 years, thus adding to the problem of funding and rationing renal replacement therapy (RRT). Five year survival only falls below 50 per cent in patients who are over 65 years of age at the start of RRT (Brunner, Broyer, Brynger and others 1988). In sum, dialysis and transplantation offer effective therapy which extends life of a reasonable quality for those with ESRF. However, because of its high costs, the level of resources devoted to RRT and the rationing of those resources by doctors have become matters of public concern.

This first chapter briefly summarises the data on the pattern and level of ESRF treatment in the UK and other countries in order to provide a context for the discussion of management and funding of units which follows in the remaining chapters. The chapter concludes by setting out the objectives and structure of the report.

International comparisons

There are noticeable differences between countries with an apparently similar prevalence of ESRF in the numbers and types of patients treated by RRT and in the balance between the different forms of treatment used. The UK has long been regarded as one of the laggards of the western world in its level of treatment of ESRF, even when compared with countries with similar per capita health expenditure. However, far more patients are being treated than ten years ago. Nonetheless, relatively fewer elderly patients are accepted compared with Europe and the USA reflecting the lower priority accorded to ESRF in the UK.

Table 1: Number of renal replacement centres in the UK, Federal Republic of Germany, France and Italy

	United Kingdom	*Federal Republic of Germany*	*France*	*Italy*
Population (million)	56.3	61.2	55.1	57.0
Centres (1985)	67	331	215	392
(1987)	68	346	221	396
Centres per million population (1987)	1.2	5.6	4.0	6.9

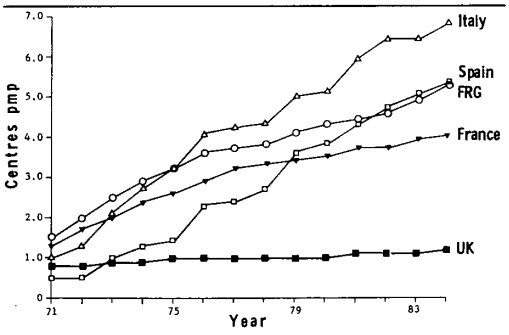
Source: EDTA Registry

The UK has one of the lowest levels of provision of nephrologists to population in the western world (Royal College of Physicians of London 1983). This is also reflected in the number of hospital centres for RRT in the UK compared to other European countries (Table 1 and Figure 1). The UK has fewer hospital centres per million population (pmp) than most other European countries. Many of the existing centres were set up through a system of central planning in the 1960s. In the 1970s, few new centres were established in the NHS at a time when facilities were mushrooming in other parts of Europe. In the UK, centres were planned to provide services for an extensive catchment population and, as a result, services tend to be relatively centralised in teaching hospitals and in large towns. Figure 1 shows the rapid growth in the number of centres since 1971 in Italy, Spain, Germany and France and the near steady state in the UK.

The UK lags behind many European countries of similar economic position in the number of new patients accepted for RRT. However, Table 2 shows that the UK has reduced this discrepancy, particularly in the last five years. For example, there was a 24 per cent increase between 1984 and 1986 in the acceptance rate for new patients with ESRD. The RRT acceptance rate of 50.8 pmp in 1987 is now slightly greater than Italy's (48.8 pmp), but far lower than West Germany's (84.9 pmp). In terms of the total stock of patients alive either on dialysis or with functioning grafts, the UK continues to trail behind many other European countries (Figure 2). Although the UK patient stock doubled between 1980 and 1987 from 128.7 to 267.6 pmp and the gap between UK and other European countries narrowed slightly, the West German figure in 1987 was 434.0 pmp, with France on 333.0 pmp and Italy on 327.0 pmp.

Figure 3 shows the growth in the European patient

Figure 1: Number of known centres per million population in five large west European countries



Source: EDTA Registry

stock per million population by mode of treatment. It indicates the growing contribution of transplantation and continuous ambulatory peritoneal dialysis (CAPD) to the total treatment effort. However, Figure 3 masks the existence of marked differences between countries in the proportions of patients on each modality. In most countries in Europe, hospital or centre-based haemodialysis is the dominant mode of RRT followed by cadaveric transplantation (Broyer, Brunner, Brynger and others 1987). Limited resources have compelled nephrologists in the UK to develop a very different pattern of care. The UK is highly unusual in the relative importance of home dialysis and CAPD and the fact that transplantation is the main form of RRT (Table 3). Hospital haemodialysis only contributes 15.5 per cent of the cases receiving treatment in UK, as against 74.4 per cent in Germany, 52.8 per cent in France and 75.2 per cent in Italy. In 1987, there were 6,638 patients with a functioning graft in the UK; roughly twice the number in France, Spain and West Germany and three times the number in Italy and the Netherlands (Brunner, Fassbinder, Broyer and others 1989). Transplantation is known to be the most effective and least costly form of treatment for ESRF, so the combined emphasis on independent methods of dialysis and a relatively large transplantation programme has enabled the UK to treat its ESRF patients more cost-effectively than other European countries such as the Federal Republic of Germany (FRG) where the programme is dominated by hospital haemodialysis (Wing, Selwood and Brunner 1987).

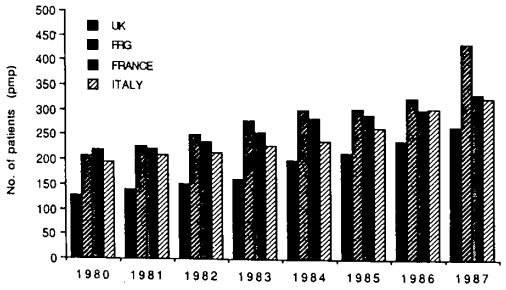
However, the UK still treats fewer patients than many other comparable European countries and has far fewer specialists and this is reflected in the selection of patients for RRT. For example, the rate

Table 2: Number of new patients accepted for renal replacement therapy per million population in the UK, Federal Republic of Germany, France and Italy

	United Kingdom	*Federal Republic of Germany*	*France*	*Italy*
1980	24.9	46.7	41.6	37.7
1981	27.8	50.7	43.6	43.2
1982	31.2	52.4	40.9	42.7
1983	33.4	55.8	44.3	45.5
1984	35.9	62.1	46.7	42.5
1985	43.1	59.4	42.9	46.8
1986	46.8	66.2	44.2	49.4
1987	50.8	84.9	58.1	48.8

Source: EDTA Registry

Figure 2: Number of patients on renal replacement therapy per million population in the UK, Federal Republic of Germany, France and Italy



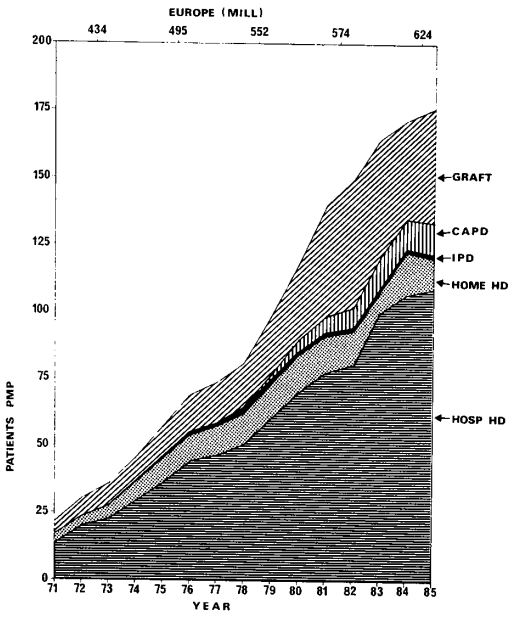
Source: Smith, Cohen and Asscher (1989)

Table 3: Proportions of patients on renal replacement therapy by modality in the UK, Federal Republic of Germany, France and Italy, 1982 and 1986

	Percentages on each modality			
	Hospital HD	*Home HD*	*CAPD*	*Graft*
1982				
UK	17.5	24.9	13.2	45.5
FRG	73.4	12.9	2.2	11.5
France	65.6	14.3	6.3	13.8
Italy	76.6	7.4	8.0	8.0
1986				
UK	15.5	13.4	20.2	50.9
FRG	74.4	5.2	3.2	17.2
France	52.8	10.9	5.7	30.6
Italy	75.2	4.3	8.3	12.2

Source: EDTA Registry and UK Transplant Service

Figure 3: Growth in numbers of patients per million population in Europe



Source: EDTA Registry

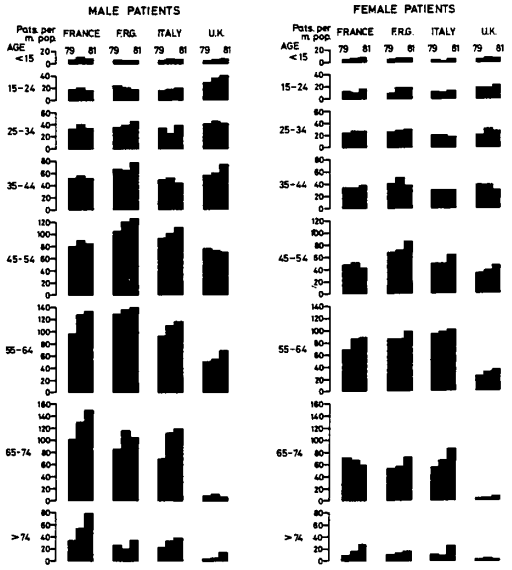
of acceptance of elderly patients in the UK is dramatically lower than in France, FRG or Italy (Figure 4). In general, the UK tends to ration its scarce RRT resources by preferentially treating younger, fitter patients with dependent children. In 1982, only 8 per cent of new patients in the UK were over 65 years of age, whereas in most other European countries the proportion was around 25 per cent (Wing 1983). Only 5.5 per cent of the new patients in 1987 were diabetic as against a European average of 7.5 per cent (Jacobs, Brunner, Brynger and others 1988).

Regional comparisons in the UK

The number of new patients accepted for RRT has risen sharply in recent years throughout the UK. In the early 1980s the acceptance rate was under 30 patients pmp per year, but in 1988 it reached 55 pmp per year (Table 4). Yet in England, there is still considerable variation in acceptance rates between regions. In part, this is a real effect of geographical accessibility and referral patterns. However, in part, the variation can be explained by the treatment of one region's patients in another region. For example, South West Thames is attributed with a take-on rate of only 23.3 pmp in 1988 but many South West Thames patients are treated in South East Thames; hence the latter's take-on rate of 76.1 pmp per year. For comparisons between regions, South East and South West Thames should thus be taken as a single entity. For those regions whose figures are not grossly distorted by cross-boundary flows, the current range is between 42.5 pmp in Northern Ireland and 83.8 pmp in North Western (Table 5).

As the UK programme of RRT has expanded so the proportion of high-risk patients has risen. In the UK in 1984, 45 per cent of new patients were over 55 years of age and/or diabetic. In 1987, this figure had risen to 56 per cent (Wing 1989). In Wales, 70 per cent of the RRT patients were classified as high-risk.

Figure 4: Age and sex specific patient acceptance rates per million population in the UK, France, Federal Republic of Germany and Italy, 1979–81.



Source: EDTA Registry

Table 4: Regional acceptance rates for new patients onto renal replacement therapy per million population

	Acceptance rate per million population	
Region	*1984*	*1988*
Northern	40.6	58.4
Yorkshire	34.2	44.2
Trent	40.4	49.1
E Anglia	40.5	65.0
NW Thames	30.6	49.7
NE Thames	30.3	61.1
SE Thames	47.5	76.1
SW Thames	25.3	23.3
Wessex	27.9	44.8
Oxford	37.5	50.4
S Western	32.6	51.2
W Midlands	26.3	52.0
Mersey	31.3	34.6
N Western	31.5	83.8
Wales	34.3	66.4
Scotland	38.2	62.8
N Ireland	20.0	42.5
Isle of Man	33.3	40.0
UK Total	33.8	55.0

Source: EDTA Registry

Table 5: Number of patients per million population on each modality for regions of UK as at 31 December 1988

	Patients pmp					
Region	*Hospital HD*	*Home HD*	*IPD*	*CAPD*	*Graft*	*Total*
Northern	67.1	6.1	8.1	54.2	165.8	301.3
Yorkshire	58.1	26.1	0.3	50.6	105.8	240.8
Trent	46.7	48.5	0.4	69.3	127.0	292.0
E Anglia	57.0	30.0	0.0	31.5	209.5	328.0
NW Thames	46.0	22.0	3.4	43.1	134.0	248.6
NE Thames	50.3	23.7	1.3	87.6	216.1	378.9
SE Thames	50.3	26.9	1.1	85.2	322.2	485.5
SW Thames	3.7	14.7	0.0	32.3	55.0	105.7
Wessex	29.7	11.0	0.0	46.6	115.2	202.4
Oxford	39.6	46.0	0.0	38.4	167.2	291.2
S Western	30.9	48.8	1.25	63.1	143.8	287.8
W Midlands	38.1	23.5	0.2	94.0	18.1*	173.8*
Mersey	58.8	20.4	0.0	27.9	160.8	267.9
N Western	39.3	36.0	4.5	66.3	96.5	327.5
Wales	45.4	31.4	0.7	71.1	134.3	282.9
Scotland	55.7	33.7	0.0	81.8	155.7	326.9
N Ireland	40.6	0.0	6.3	24.4	189.4	260.6
Isle of Man	100.0	0.0	0.0	10.0	0.0	110.0
UK Total	44.8	27.8	1.5	61.9	147.4*	283.4*
(%)	(15.8)	(9.8)	(0.5)	(21.8)	(52.0)	(100)

* Complete data not available.

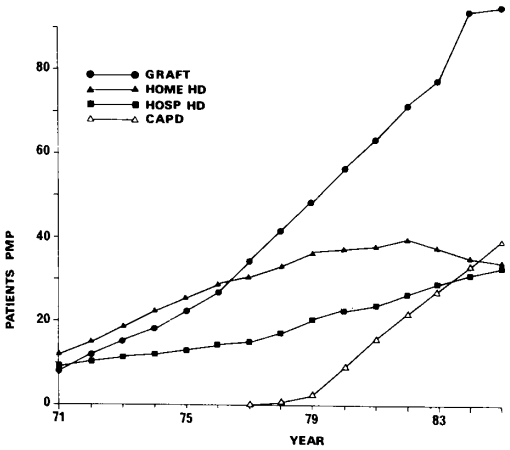
Source: EDTA Registry

The stock of patients has progressively increased in the UK and has more than doubled since the early 1980s. However, there are still regional variations in the level of treatment which correlate positively and significantly with the acceptance rates for new patients. In 1987, there were 257.1 patients pmp on RRT in Wales, 267.5 pmp in England and 291.8 pmp in Scotland. Regional variations in the overall numbers of patients pmp on RRT are also accompanied by substantial differences between regions in the relative importance of different modalities in the total patient population. The majority of patients in most regions have a functioning graft, but the types of dialysis used vary widely.

Figure 5 shows the UK stock of patients by modality for each of the years between 1971 and 1985. It demonstrates the growing importance of transplantation and CAPD in RRT. In 1978, there were 849 cadaveric kidney transplants. By 1988, this figure had risen to 1,575 (Oliver 1989), limited only by the availability of cadaver organs. By 1985, CAPD was the most frequently employed method of dialysis at national level. Transplantation represents 51 per cent, hospital haemodialysis 15.5 per cent, home dialysis 13.5 per cent and CAPD 20 per cent of the RRT stock in the UK. Transplantation remains the main method of treatment while CAPD continues to develop and home dialysis shows a gradual relative decline.

However, this conceals substantial regional variations in the relative contribution of the different modes of treatment (Table 5). For example, in East Anglia, the RRT programme has long been dominated by the work of the renal transplantation team at Cambridge and CAPD has been little needed (Figure 6); whereas in Oxford Region, transplantation has grown more slowly and home haemodialysis has continued to play the major role ahead of other methods of dialysis (Figure 7). By contrast, home dialysis is used by only a small minority of RRT patients in Northern Region (Table 5). These regional variations reflect the interaction of a number of factors: the pre-existing pattern of dialysis provision, treatment and selection policies of individual units and consultants, policy decisions taken by RHAs, the degree of population dispersal and the availability of different types of resources, including the home circumstances of patients which affect their ability to cope with different modalities.

Figure 5: Number of patients per million population on each modality in the UK as at 31 December 1971–1985

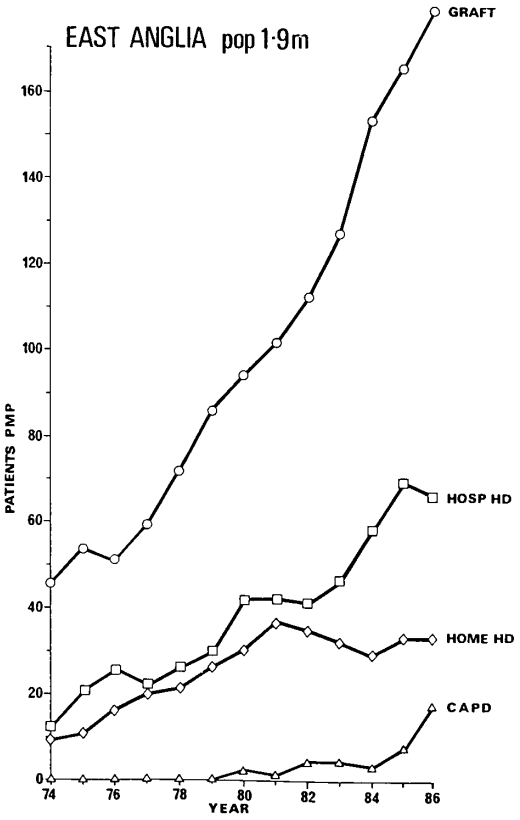


Source: EDTA Registry

Relative cost-effectiveness of different modalities

RRT is significantly more expensive per patient than many other NHS treatments. Dialysis costs are comparable with the costs of procedures such as heart or liver transplants (Oliver 1989). Dialysis is expensive primarily because it is a form of life-preserving chronic care with substantial revenue implications. Estimates of the financial costs of RRT using different methods of treatment from the costing study by Mancini (1983) undertaken for the Department of Health and Social Security (DHSS) are given in Table 6. According to these estimates a successful transplant

Figure 6: Number of patients per million population on each modality in East Anglia as at 31 December 1974–86

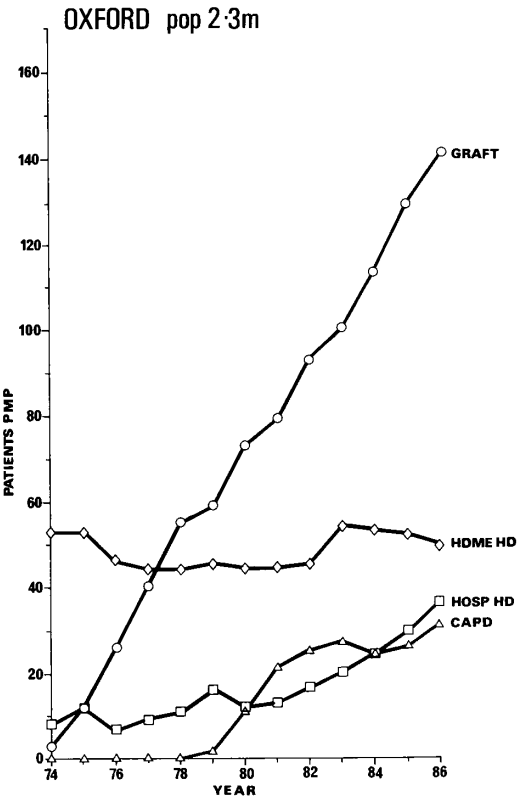


Source: EDTA Registry

is the best option in financial terms, but the costs of a graft which fails in the first year are considerable and comparable to the costs of hospital haemodialysis. These costings were carried out before cyclosporine was in general use. Cyclosporine reduces the likelihood of graft rejection, but is extremely expensive. The Department of Health (DH) updates Mancini's estimates from time to time. Currently, the Department works on the assumption that the first year of hospital haemodialysis costs the NHS £16,500, the first year of home dialysis £13,200 and the first year of CAPD £14,000. The first year cost of a successful transplant is currently estimated to be £7,400 (Oliver 1989).

In general, and sensibly, the UK has invested its limited resources for RRT (approximately 0.6 per cent of the annual budget of a typical regional health authority in England (Dowie 1984)) by giving greater priority to home dialysis and, latterly, CAPD than many other countries and encouraging an active transplant programme which is larger than that in many other countries. In many ways, this was not a planned strategy, but compelled by the strict control exercised in the NHS on the opening of new renal units. There are questions about whether and how the existing utilisation of hospital haemodialysis units might be improved (Davison, Read and Lewins 1984) by a combination of investment and improved organisation (see Chapter 6), and issues surrounding the better procurement of cadaver organs. However, perhaps the greatest challenge facing the services for ESRF is the capacity to respond to medical developments which are claimed to improve the quality of life of ESRF patients, but at greater cost. Clinical trials suggest that the availability of recombinant human erythropoietin will dramatically improve the quality of life of patients on dialysis who suffer from anaemia, but the costs in 1989 for a year's supply were between £3,000 and £5,000 per patient (Wilkinson 1989). In these circumstances, with a fixed renal unit budget, rationing decisions will have to be taken to ensure that resources are used in the most cost-effective manner to benefit the greatest possible number of patients. There is nothing essentially novel in this requirement, since nephrologists in the UK system of health care have long had to manage the gradual expansion of a service for which treatment needs have appeared consistently to outstrip the supply of resources. However, innovations such as cyclosporine and recombinant erythropoietin serve to expose and sharpen up the implicit rationing process which physicians in the UK operate on behalf of health authorities and the government (Halper 1989).

Figure 7: Number of patients per million population on each modality in Oxford as at 31 December 1974–86



Source: EDTA Registry

Purpose and outline of the report

If nephrologists are to continue to discharge their role as society's rationing agents effectively and humanely, they must be well informed about the relative costs and benefits of different forms of RRT and various drug therapies, and understand the implications of a range of organisational solutions and options for the management of renal units. The evidence from Steele's 1988 survey for the DH of *Management Issues in Renal Failure* in England, drew attention to the very wide range of approaches to the funding and management of dialysis services which prevail in individual renal units and between RHAs (Steele

Table 6: Estimated financial costs of different modes of renal replacement therapy

Treatment	*Basic annual cost* £	*Total annual cost* £
Hospital haemodialysis	9,500–11,000	11,200–13,650
Home haemodialysis	6,500– 7.000	7,100– 8,700
CAPD	5,400– 6,200	7,500– 9,800
Transplantation:		
first year		5,000– 5,700
maintenance		1,400– 1,650
unsuccessful graft		8,500–13,500

Notes: Basic costs exclude inpatient admissions, outpatient attendances, drugs. Total costs include inpatient admissions, outpatient attendances, drugs. Unsuccessful graft is first year cost and assumes return to dialysis.
At November 1981 prices.

Source: Mancini (1983)

1988). This conclusion was reinforced by an analysis of the invited papers and discussion at a seminar organised by the DH in March 1989 to take forward the issues raised in Steele's original report (see Appendix, page 63, for the programme of the seminar). However, the very range of resource management practices in units and the complexity of the management problems facing units, suggested that a report setting out the currently available experience and information on problems in the management of dialysis in renal units would be worthwhile; hence this report.

The report builds on and synthesises material from Steele's report and the proceedings of the DH seminar. The aim is to raise and discuss the principal contemporary issues of external funding and internal management of dialysis programmes by renal units. Although transplantation and other renal surgical services are not strictly separable from the medical treatment of ESRF and are discussed at various points in the report, the primary focus is on the funding and management of dialysis programmes. Chapter 2 considers the allocation of financial resources to renal dialysis units and draws out the implications for units of three conceptually different approaches to funding: conventional 'top-slicing' by RHAs; funding by modality cost profiles; and a provider market as sketched out in the government's white paper (Secretaries of State for Health, Wales, Northern Ireland and Scotland 1989). Chapter 3 discusses how renal dialysis units have in the past managed their workload in order to live within the resources which they have been allocated. The experience of dialysis services in Newcastle is used as a case study. The chapter finishes by summarising the range of recent clinical developments which will once again place pressures on renal unit budgets. Chapter 4 extends the discussion of resource management within units by highlighting the general preconditions for successful budget management and the problems which can arise if these are not met. A lack of appropriate financial information is identified as a particular weakness undermining proper financial management by unit directors.

Management decisions in renal units tend to be taken with inadequate information and without sufficient attention to the interaction of each of the elements comprising renal services. Chapter 5 describes a simulation model of the RRT system which can be used to assist in planning and budgeting at international, national, regional, or individual unit level. In practice, hitherto, renal units have attempted to improve their efficiency through a series of *ad hoc*, incremental changes to various aspects of their operation (for example, management structures, staffing, consumables' use, purchasing and so on). Chapter 6 reviews past experience and the potential for future improvement of the internal management of dialysis units.

It is widely believed that the private sector devotes more attention to efficient resource use than the NHS and, thus, the experience of the NHS in contracting out dialysis services to commercial operators should provide timely lessons to NHS providers. Chapter 7 charts the involvement of private operators in the dialysis market in the UK, before focusing on the Welsh Office decision to contract out dialysis in two subsidiary renal units (SRUs). The chapter also summarises the results of the evaluation of the commercial SRUs in Wales (Smith, Cohen and Asscher 1989). Chapter 8 offers a short precis of the report and makes recommendations concerning the sorts of health services research needed to assist unit directors improve the management of their units.

2. ALLOCATING REGIONAL FINANCE

Introduction

The NHS white paper *Working for Patients* (Secretaries of State for Health, Wales, Northern Ireland and Scotland 1989) is likely to lead to major changes in the methods used by regions and districts to allocate financial resources to different acute hospital services, including renal services. However, the proposals in the white paper for a 'provider market' were prefigured, at least in outline, in earlier attempts by health authorities to link the funding of specialties more closely to their workload and to improve efficiency by altering the financial incentive structure. Since the mid-1980s, most if not all regions have been reviewing and adjusting their mechanisms for funding services designated as regional or multi-district specialties, including renal medicine.

Historically, services for dialysis and transplantation have developed incrementally at specialised centres responsible for serving the needs of groups of districts or entire regions. Until recently the trend was for regions to become increasingly responsible for the direct funding of these regional or multi-district services via a system of 'top-slicing' which operated outside the sub-regional RAWP (Resource Allocation Working Party) process (DHSS 1976). Money for renal and other specialised services was deducted from the region's allocation and passed down to individual centres. The remaining amount was subjected to RAWP. In this way, money for regional specialties was protected from the risk of RAWP redistribution. Not surprisingly, there was a tendency for the number and scope of regional specialties to increase as providers sought to obtain guaranteed funding from regions. Units were genrally funded on the basis of their past expenditure with uplifts for inflation. Bids for more money for service developments were negotiated annually at meetings between regional officers and the consultant renal physicians in each unit.

A variety of concerns have motivated regions to reconsider these arrangements:

1. The inequitably high use of regional specialties by the residents of the district in which the service is located.

2. Inadequate financial management and unplanned overspends by specific renal units.

3. Lack of integration of renal units in the management process of the hospital or district where they are located.

4. Absence of a clear pattern of incentives to greater efficiency in the system of funding and evidence of substantial variation between units in cost per patient dialysed (Farrington 1989).

In response to these concerns, three trends could already be observed before the NHS white paper: a move by regions to lessen the direct link between consultant renal physicians and regional officers by encouraging district and/or hospital management to play a larger role in the negotiation of allocations and the monitoring of expenditure; attempts by hospital managements to involve renal units more closely in meeting the financial objectives of the hospital, for example, by making efficiency savings; and an increased emphasis on detailed costing of activities with a view to developing systems of activity-based funding (Steele 1988). Taken together and reinforced by the white paper proposals, these trends indicate a general move away from lump-sum allocations made directly by regions to individual renal units towards a more developed system in which units are increasingly funded for what they agree to provide to the districts whose patients use their services.

The remainder of this chapter will review the pros and cons of the principal options available for the funding of renal services, before relating these to the statements in the white paper and supporting documents on funding regional specialties. This will be fleshed out by a case study of how South East Thames RHA has approached the funding of renal services over the last five years (Farrington 1989). The chapter concludes by attempting to look forward to the evolution of funding mechanisms as the white paper proposals gradually take effect.

Methods of funding renal services

From reviewing the practice of the 14 RHAs in England in the last five years and looking at their plans and options for the future, three significantly different methods of funding renal services can be identified. There is, firstly, the conventional system still practised by most regions of a historical allocation with an annual uplift for inflation plus any available development monies determined by the region in the light of its commitments to other regional specialties. Under this approach, the level of the allocation to renal services is firmly the responsibility of the region, but beyond making the allocation the regional officers have little involvement in monitoring the work of renal units.

The second method is characterised by a far greater level of regional involvement, with the region initiating a process of costing using rudimentary clinical standards of activity to produce an expected cost for each type of case. These costs are then assembled into a budget for each unit based on agreement as to the number and type of cases to be treated. The region then monitors the subsequent activity and costs of each unit and attempts to assess the quality of the service delivered.

The third approach represents a radical alternative in which responsibility for funding renal services is devolved to districts who purchase services in a 'provider market'. Under this method, 'top-slicing' would be curtailed or abolished and all funds for specialised services would be passed in the form of a

capitation-based allowance directly to districts which are (only nominally at present) the users of these services. Districts would then be free to decide for themselves, how much, where and what price they would pay for specialised services such as dialysis and transplantation. To date, no region has introduced such a concept for renal services but there is growing interest in the idea from regions, district hospital managers and nephrologists. The implementation of the NHS white paper is sure to encourage the development of this form of resource allocation in which the purchaser and provider of health care are formally separated in a regulated market. However, it is not clear at the time of writing (November 1989) how precisely the NHS reforms will affect regional specialties.

In all regions, evidence suggests that the process of deciding the allocations to renal units and the setting of activity targets is becoming more detailed, whether under a conventional approach based on the historic pattern of service or under the newer method of activity and performance-related budget-setting, and it is becoming more difficult to breach the financial limit set by regions. In general, it would appear that the conventional method of funding renal services is associated to varying degrees, depending on the region concerned, with a more *laisser faire* attitude towards the financial management of each unit. Overspending by units, together with unplanned subsidy from other parts of the hospital budget or from additional regional subventions, has occurred fairly regularly with this method. Steele (1988) reports that a number of the consultant renal physicians he interviewed stated that 'although region sets us targets, we never consciously refuse anyone'. However, it would seem increasingly unlikely that this sort of behaviour, exploiting the life or death nature of ESRF, will be tolerated in future. Nephrologists and other staff in renal units are likely to need a fuller understanding of the implications of the different methods of funding under discussion following the white paper, if they are to manage their units responsibly and efficiently in the future.

Criteria by which alternative funding methods might be judged

Like the evolution of renal services themselves, the systems developed to fund renal dialysis and transplantation units in England have grown up haphazardly in response to short-run or local circumstances. Since there is a strong possibility of major change in the methods of funding used hitherto, it is timely to try to assess the strengths and weaknesses of the three principal variants which are available. Unfortunately, it is not possible to do this meaningfully without identifying the objectives, or at least the potential range of objectives which could be set for a funding system to achieve. A wide variety of possible objectives can be identified. For example, funding arrangements could be dedicated to:

1. maximising the workload achieved within a given level of resources;

2. providing incentives to improve the quality of care (however defined);

3. providing a stimulus to reduce treatment costs per patient and/or overall;

4. securing geographical equity in the use of services in relation to need;

5. ensuring a close and predictable relation between the future workload and the resources available to meet that workload;

6. making each kind of financial decision the responsibility of those best placed to make the decision (for example, distinguishing between decisions on how much to spend on renal services, where it should be spent and how it should be spent).

Although many other detailed criteria are brought into the argument about the choice of funding methods, they can usually be categorised into three basic types: equity criteria; efficiency criteria; and pragmatic or operational criteria. Thus, criteria 1 and 2 above, when put together, reflect a concern with efficiency; criterion 4 reflects a concern with equity; and 3, 5 and 6 relate to pragmatic or operational matters in providing a service easily, flexibly or cheaply. In most cases, the RHA, its officers, the public, patients, managers and clinicians, will place different weight on the importance of these three sets of criteria when judging any proposed changes. For example, an RHA might argue that equity of acessibility to care should be an overriding factor in devising a system for funding renal units. It is well established that admission rates and new outpatient appointments for a wide range of hospital services, including ESRF, are inversely proportional to the distance between the patients' homes and the specialist centre (Dalziel and Garrett 1987). As a vivid demonstration of this, Steele (1988) quotes 1983 figures for the Northern RHA which showed that the annual admission rates for nephrology for residents of districts which did not have their own renal units varied between 7.7 per 100,000 population in West Cumbria, remote from the renal units, to 72.3 per 100,000 in North Tyneside, close to Newcastle. The RHA has subsequently been fortunate enough financially to be able to take steps to ameliorate this position by providing a separate renal unit for Cumbria at Carlisle. Such spatial inequities could conceivably have been met by a number of contrasting options: a top-down, planned direction of funds to establish units in under-served areas and/or compel the existing units to give priority to distant patients; a system of diffential tariffs so that units would be paid more by the RHA for treating ESRF patients from 'under-served' districts than from 'over-served' districts; or, a devolved system in which each district in the region would be given a global, capitation-based sum based on its population needs out of which it could fund an appropriate level of hospital and community health services, including facilities for the dialysis and transplantation of its residents at the best available centre.

If the region were to make equity the overriding

factor, then it might be possible to judge the funding options on the basis of their ability to realise that single objective. On the other hand, regions are usually concerned with efficiency or clinical standards at the same time as equity. For example, setting up a number of small dialysis units in rural areas to combat equity problems may be a response to an accessibility problem, but may prejudice the overall efficiency of the region's renal services. Small units might have too small a workload to provide a comprehensive service at a reasonable cost. Cost-effectiveness analyses would be required to assess the costs and benefits of a policy of decentralisation versus concentration of provision in relation to equity and efficiency criteria.

Conventional approach to funding: 'top-slicing'

Under the conventional approach to the funding of renal services which existed in all regions up to the mid-1980s, and which is still found in many, the RHA decides on the total sum to be spent on renal services in the region for the following financial year which is then removed or 'top-sliced' from the region's total allocation from the DH. This 'top-sliced' sum is then passed to renal units in the form of a block grant. The sum is usually composed of an allocation based on past expenditure adjusted for forecast inflation in health care costs, plus an additional amount if the region has chosen to make development monies available to renal services in that year. Although the allocation is normally simply a sum of money without a direct relation to a specified pattern of activity, it is usually made in the context of broad regional policies in the form of a desired level of new patient acceptances or a target rate of transplantation. Under this approach, it is not necessary to use detailed cost data. Crude aggregate average costs (for example, cost-per-new-patient) are sufficient.

More often than not, formal bids for development monies are not made; the region shares the additional funds on the basis of some assessment of the needs of each centre. For example, the region may be concerned to equalise the geographical accessibility to dialysis services across urban and rural districts and relate developments to this objective.

Discussions between consultants from renal units and regional officers on the level of funding of units are usually held once a year under the auspices of the specialist medical advisory committee in each region. These committees vary in the extent to which they reflect medical, planning, finance and other interests. Under this system, there will normally be little or no review of a unit's expenditure and activity during the year until the annual cycle is repeated.

A number of regions (for example, North East Thames and North West Thames) continue to operate this relatively uncomplicated system largely unmodified and have little or no involvement in influencing the pattern of clinical activity in units. In Trent, for example, revenue funding from 'top-slicing' by the RHA has long been based on the total number of patients on dialysis at any one time as recorded by the units themselves. This has allowed a progressive increase in the number of patients on dialysis over the last 20 years. New equipment is funded by the region in response to annual bids from units. Other regions have made minor modifications to the scheme by, for example, making the basic renal budget part of the allocations to the district where the unit is sited and confining direct regional funding to bids from units for small sums of development money to be spent on specified changes in activity.

There are minor differences between the regions which use 'top-slicing' in the way in which the bidding system for growth money operates. In some regions, each unit puts in an independent bid (increasingly, these are processed through the district management system); in others, these bids are coordinated and harmonised, perhaps by the regional advisory committee before they are presented to the region as a package. Under the former arrangement, units are in some way in competition with one another for growth money and certain units may lose out; in the latter, attempts are made to present a realistic, overall bid which stands some chance of being funded.

The conventional system of funding renal services by block grant with additional development money as available has been criticised from a number of different perspectives. Health economists have argued that such a system offers few, if any, direct financial incentives to the efficient use of resources by units, since historic costs are reimbursed and additional funds are not contingent upon demonstrating that the existing expenditure is efficiently used. The tendency is, thus, for units to grow without having to scrutinise the efficiency of their organisation or the appropriateness of the patients chosen for treatment.

Regional and district managers have criticised the traditional system on a variety of scores: the lack of adequate control over spending and the problem of unforeseen overspending; the limited opportunity for either regional or district managerial involvement in the working of units motivated by concerns as to the reasons for the large variations in cost-per-patient between units; the tendency for the system to function with crude cost data; and the absence of a relation between increases in funding and specific commitments from providers in terms of increases in workload and productivity.

Renal physicians have also expressed a range of concerns based on their experience of the conventional funding arrangements: the insensitivity of the level of funding of units to the changing number and case-mix of the patients treated; the reliance of units for developments on the bureaucratic apportionment of growth monies by RHA officers; and the inability of the system to reward good quality care.

These sources of dissatisfaction have stimulated a minority of regions to review the way in which renal services have been funded with the aim of implementing radically different systems. The first of these to be described is a system using 'clinical modality profiles' developed by South East Thames RHA (Farrington 1989)

Funding using modality profiles

In 1983, South East Thames RHA began to review

services provided for more than one district in order to establish a definition of regional or multi-district services which required separate regional funding and to identify for each service the costs which were genuinely incurred in providing a specialised service and those which were generated through offering a routine district service. The long-term objective of the review was to plan and rationalise regional services which had grown up haphazardly without coherent planning in the previous decade.

Renal services receive the largest single financial allocation of the multi-district (regional) specialties in South East Thames RHA. In 1986/87, the sum expended on renal services was £12.52 million out of a budget of £61.16 million. The next largest multi-district specialty (MDS) was cardiothoracic surgery with £8.34 million.

Spending on renal services grew rapidly in the mid-1980s in South East Thames. Service developments were made without proper financial planning and inadequate consultation with regional officers; this led to overspending which the RHA found itself having to rectify at the end of each financial year. The region distributed £3.35 million of additional non-recurring funds to cover cumulative overspending and projected activity by renal units up to 31 March 1986. Regional officers felt helpless to contain the costs of the renal programme because of the life or death nature of ESRF. Yet, they were aware that the additional funds absorbed by the renal services were at the expense of much needed expansion in other parts of the region's health services. They were also aware that, as far as the available data allowed, there appeared to be a huge variation in costs between the renal units in the region.

In 1985, a comprehensive review of South East Thames renal services was undertaken and in February 1986 a policy document was produced entitled *Adult Renal Services*. The report made two main recommendations: first, that a computer system should be developed to produce operational financial information to clinicians at a patient level which could then be made available in summary form for RHA and DHA use; and, second, that a new method of funding units should be devised to move away from incremental funding towards 'a flexible resource management policy' based on the expected costs of delivery of an agreed workload.

The 'flexible resource management policy' is based on a detailed costing, comprising:

1. Cost ascertainment – partitioning costs into fixed (for example, administration, estate management, and so on, which do not vary in relation to activity), semi-fixed (for example, medical and nursing costs which are fixed in the short-term, but which have a step-wise relation to changes in activity) and unit variable costs (for example, drugs, MSSE, and so on).

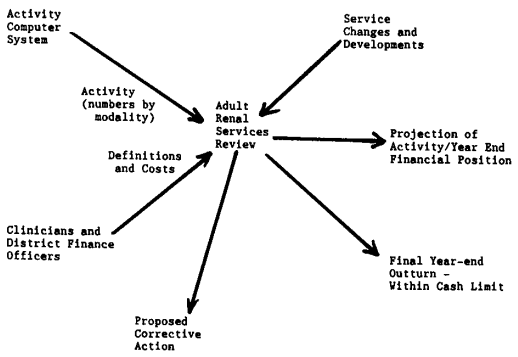
2. Modality costs – calculating the fixed, semi-fixed and variable costs for each of six treatment modalities – namely, home dialysis, hospital dialysis, CAPD, transplant operations, first year maintenance after transplant and subsequent years' maintenance.

The objective of the exercise was to produce a regional standard cost for each modality which could be then used as the basis for resource allocation to units. However, this has not yet proved possible because of differences in costing methods between units, variations in the case-mix of patients treated on each of the six modalities at each unit and variations in clinical practice affecting the nature of the service offered (and costs) under each modality. For example, there were major differences in the method of CAPD used in each unit. These affected costs, but there were no clear indications as to which method was clinically superior. In effect, the costing exercise has yielded five different sets of average modality costs, one for each of the units in the region. Regional officers did not feel capable of challenging these variations in clinical practice nor of arbitrating between them. Ultimately, the development of regional standard costs would necessitate identification of a 'clinical profile' setting out the care appropriate for each mode of treatment and type of patient with adjustments for more severe or complex cases.

Figure 8 summarises the flexible resource management policy in operation (Farrington 1989). Computer systems at each of the five units provide activity data to the Adult Renal Services Review on the number of transplants and the number of patients on each modality of dialysis each month. Clinicians and district finance officers provide definitions of the services provided and costs for each modality to the Adult Renal Services Review. Any service changes and developments (for example, erythropoietin) are also fed into the review group which meets three times a year to set budgets for units and review progress in relation to these budgets.

The average modality costs per patient for each unit and the projected workload for each unit are used as the basis for setting unit budgets for the coming year. At present, budgets are 'flexed' or adjusted on the flexible cost element in direct proportion to changes in the level of activity. The semi-fixed

Figure 8: South East Thames RHA flexible resource management policy for renal services: inputs and outputs



Source: Farrington (1989)

costs are regarded as fixed unless and until substantial developments occur in services at which point they are altered step-wise. The intention is to develop a regional standard cost for each mode and use these costs in the budgeting process in future. However, the average costs for each unit have been used by the RHA as the starting point for investigations of the causes of the observed cost differences between units.

The review body comprised clinicians, unit finance officers, district finance officers and general managers from the districts where units are sited, and the region's multi-district specialty management team. The thrice yearly meetings of the Adult Renal Services Review allow discussion of problems as soon as they emerge (for example, price increases of drugs such as cyclosporine; the rising demand for erythropoietin and how this can be funded on a static renal budget). The review meetings enable activity levels to be continuously monitored and discussed. This enables negotiations to take place about whether changes should be made within unit budgets to shift resources from one modality to another or even, in some cases, between units. The review has the additional responsibility of managing the capital stock of the renal units.

Cost improvement programmes are also discussed. All MDSs are expected to meet cost improvement targets in the same way as ordinary district services in South East Thames. Twenty per cent of the MDS cost improvement savings are returned to the relevant districts for their own purposes and the remaining 80 per cent is made available for MDS developments.

Twice a year the Adult Renal Services Review produces projections of activity and the likely year-end financial position. If the estimated activity and expenditure appear too high in relation to the total sum allocated to renal services, corrective action is proposed to the review group. At the end of each financial year the Adult Renal Services Review produces a year-end out-turn which, if the flexible resource management policy has been successful, will be within the overall cash-limit and will have enabled the treatment of the number of patients set out in the activity budget at the beginning of the year. Currently, South East Thames aims to budget for an additional 50 patients on dialysis each year.

Table 7 gives an example of a flexible resource management policy statement for a South East Thames renal unit during 1988/89. The statement shows the unit treating fewer patients than were budgeted for during the latest month for which activity data were available. Such a situation could provoke a variety of corrective actions by the Adult Renal Services Review in consultation with the clinical director of the unit. The review group could recommend primary virement (within modality), secondary virement (between modalities), or tertiary virement (between units), depending on the reasons for the discrepancy between budgeted and actual activity. Within-year virement could be converted subsequently into a budgeting change for the following year.

The costs currently used in the flexible resource management policy in South East Thames and in the example give in Table 7 are based on the prevailing pattern of clinical practice in the particular unit. As long as cost variation can be explained in terms of recognisable differences in the inputs used (for example, use of System II versus Solo or Mainline in CAPD, plus the extent to which units succeed in shifting their CAPD fluids' costs onto FP10 prescribing by GPs), these are incorporated by the region's financial planners into the unit's funding baseline. Regional officers do not question variations in clinical practice. They simply audit the financial implications of accepted variations in practice.

The costs given in Table 7 are confined to those directly attributable to the renal unit. They do not include all the hospital costs of managing renal patients. For example, the costs of admissions of patients for the treatment of inter-current infections while on dialysis cannot be traced with the South East

Table 7: An example of a South East Thames RHA flexible resource management policy monthly statement for a renal unit

	Activity			*Average annual costs per live patient (£)*			
Modality	*Actual activity (monthly mean)*	*Activity targets (budget) 1988/89*	*Projected year end activity 1988/89*	*Actual variable costs*	*Semi-fixed costs*	*Fixed costs*	*Total costs*
Home haemodialysis	27	36	26	7,970	29,300	900	237,420
Hospital haemodialysis	19	36	26	5,760	107,100	30,900	287,760
CAPD	23	35	35	9,860	87,000	48,500	480,600
Transplants	15	15	15	2,350	40,700	9,200	85,150
1st year maintenance	10	12	15	830	6,600	5,000	24,050
Subsequent years' maintenance	40	65	50	70	5,700	3,300	12,500
Acute renal failure	(Block grant not related to activity)						73,500
Nephrology services	(Block grant not related to activity)						295,700
Totals	119	124	152	753,280	276,400	97,800	1,496,680
Including uplift for prices to March 1989							1,661,315
Deduction for cost improvement programmes							20,248
Budget 1988/89							1,641,067

Source: Farrington (1989)

Thames system. Non-renal bed usage costs can be considerable. This can lead to perverse incentives for the clinical management of patients. A new technique may improve the quality of care and even reduce the total costs of treating a patient, but the savings may fall outside the specified renal budget. For example, there is evidence that the system for CAPD, while more expensive than alternatives, reduces the level of peritonitis. However, the savings in admissions for peritonitis are made by the district. The renal unit budget simply bears the increased cost of the new CAPD technique. Part of the unexplained difference between units in their average modality costs may be due to the varying extent to which a unit's costs are absorbed into the general running costs of the hospital (see Chapter 4 for further discussion of this). The Adult Renal Services Review is beginning to grapple with these sorts of issues where an innovation may reduce the overall cost of treatment or improve patient quality of life without producing any appreciable saving in the renal budget, or where there may be hidden subsidies to units. Part of the answer to these problems depends on being able to trace all the costs of providing a renal service (including outpatient costs, non-renal inpatient costs, histopathology, CSSD) before setting budgets for renal units.

Overview of funding on the basis of modality profiles

The system of funding regional specialties based on modality or clinical profiles developed by South East Thames RHA gives the region a major role in determining the costs of each element in the renal service, setting activity limits and budgets, and monitoring expenditure against budgets. The system involves explicit agreements between units and the region which set out the limits on workload and the consequences of exceeding or failing to achieve these targets.

Reasonably detailed cost data on fixed, semi-fixed and variable costs for each modality of renal treatment are generated for use in the region's funding system. Currently, the RHA respects the actual costs of each unit in making allocations, but the intention is to move to a system of standard regional costs for each treatment modality which can be adjusted to reflect the age and case severity of the patients served at any one time. Linked to the use of standard costs, the RHA's objective is to take account of the relative efficiency of units in changing allocations at the margin. However, moving to a system of standard (or expected) costs requires a radical change in the attitude of regional officers to variations in clinical practice between centres. Hitherto, these variations have been accepted at face value. Instead, clinical protocols will have to be developed for each modality and/or type of patient in discussion with clinicians and decisions made about 'optimal' or 'appropriate' practice for funding purposes before standard costs can be ascertained. This requires good knowledge of the relative cost-effectiveness of the different options currently practised in the field of renal services and represents a major change from the former system of setting an arbitrary global budget for a renal unit and letting the clinicians decide how best to make use of the sum allocated to them.

One implication of the development of a system of funding based on modality profiles is that the system of resource allocation should influence clinical practice in the direction of greater efficiency (for example, in the choice of treatment modality offered to different sorts of patients). However, for this to happen, there is an underlying requirement for studies of the cost-effectiveness of alternative methods and patterns of renal treatment and for a system of medical audit so that a proper concept of efficiency based on the quality as well as the cost of services, can be used to inform funding decisions.

Funding through provider markets

The third principal form of funding of regional specialties which has begun to be applied to renal services is associated with the term 'provider market'. The concept of a 'provider market' for regional specialties has grown out of earlier experiments with cross-charging which has been used to fund services such as cardiothoracic surgery in a number of regions over the last few years.

Cross-charging: an interim development

Cross-charging for specialised services between districts emerged in the NHS as a response to perceived inadequacies in the method of accounting for cross-boundary flows of patients in the national and sub-regional RAWP process. In RAWP, cross-boundary flows were accounted for by retrospective adjustments to RHA or DHA resource 'targets' (not actual allocations) at national average specialty costs. Districts and hospitals which provided more complex treatments argued that the use of national average specialty costs discriminated against them unfairly. They proposed the development of methods of cross-charging in which patient flows for specialised services not already covered by other means (such as 'top slicing') would be reimbursed at a level as near as possible to their actual costs, and in cash, with a direct adjustment to current allocations rather than changes to their long-term, equitable, 'targets'.

Under a system of cross-charging, each patient treated represents a source of income to the particular unit. Instead of the existing pattern of flows being costed approximately and compensated for indirectly and after a delay, the district from which the patient is referred is billed for the service provided on the basis of some agreed, prospective schedule of costs.

Separation of purchase from provision: the provider market

Cross-charging represents a relatively minor adjustment to the conventional methods of allocating funds in the NHS, since it largely accepts the existing pattern of referral as given and simply aims to cost it in a more sophisticated way. However, the objective of the provider market (sometimes known as the

internal market, depending on whether the private sector is involved) are more ambitious. Under a provider market, providers of publicly-funded health care compete with one another to win contracts from purchasers, who are usually DHAs, to provide good quality, cost-effective care for DHA residents. The flow of patients between DHAs and to different centres is generated not by the largely unplanned actions of GPs, patients and specialists, but by the success with which units can win contracts and their attractiveness to DHAs and purchasing agencies. As well as offering theoretical incentives to efficiency through competition, the provider market is normally described as offering equity gains. As purchasers of services on behalf of their residents, DHAs may be given either a capitation-based sum to meet all the needs of their population or a sum for the specific service in question based on the prevalence of the relevant conditions in the district. In this way, districts without specialised facilities of their own and relatively remote from such facilities would, for the first time, have the funds to purchase these services for their residents. This could reduce the intra-regional disparities in accessibility and utilisation for specialised services which are observed in many regions. It could lead to the setting up of more, smaller renal units by districts, although districts would wish to satisfy themselves that such a policy would not lead to excessive increases in overhead costs.

Table 8: A provider market for funding regional specialties

Advantages	*Disadvantages*
1. *Pragmatic*	
User districts able to take own decisions on funding and relative priority of a particular service in relation to need – decisions not confined to RHA and providing district/clinicians	Need for detailed cost and quality data
Providers funded for the services they provide – costing is more accurate	Interferes with traditional referral patterns
	Requires close collaboration between management and consultants in running provider unit according to contract terms
2. *Efficiency*	
Competition between units for tenders in theory leads to efficiency gains as units scrutinise activity and organisation	
Units with spare capacity able to offer services at marginal cost	
Possible greater specialisation and centralisation leads to higher quality	Accessibility and convenience may be sacrificed to centralisation
Possible greater use of more cost-effective locations for treatment outside expensive teaching hospitals	
3. *Equity*	
More immediate, direct payment to providers	Centralisation may reduce accessibility and choice of site of treatment
User districts given 'fair share' of funds to buy services for residents	
Districts forced to have explicit policy for treatment using regional specialties	

A system of funding regional specialties through a provider market would involve distributing the funds normally 'top-sliced' by the RHA directly to the districts who are at present only nominal users of the regional specialties, on the basis of their population size, age structure and relative needs. Districts would then be free to decide the priority which they attached to the services previously provided outside their control before going out to tender for the provision of specialised services to their residents. Thus, in the renal field, an authority would issue a tender document for the treatment of chronic renal failure. This could take the form of the number of patients to be dialysed or the number of sessions or specify in more detail the proportion on home dialysis, CAPD, and so on. Renal centres would have to compete for patients by offering good quality (however defined), economical treatment. Their income would depend on the number and size of the tenders which they were able to win. Units would need access to reliable information on their costs to avoid setting unsustainable prices and purchasers would wish to satisfy themselves that the quality of the service was reasonable in relation to the price paid.

Table 8 sets out some of the advantages and disadvantages of the introduction of a provider market into the funding of a regional specialty such as renal services. Although a great deal has been written following the publication of the NHS white paper about the pros and cons of the provider market for the NHS, there is very little hard evidence on which to assess the likely consequences of moving over to such a system for renal services or, indeed, for any other specialised service (House of Commons Social Services Committee 1989).

There are, however, a number of specific features of ESRF which will influence the possible effects of introducing a provider market. ESRF is a chronic condition which, in the case of dialysis patients, usually requires regular and frequent attendance at a specialised centre. Thus, for patients and their relatives, the time and effort required to get to a centre is a crucial component of the cost of the service as experienced by its users. As a consequence, hospital haemodialysis services have to be provided relatively close to patients' homes. There is relatively little scope for greater concentration of facilities in search of greater efficiency. Since dialysis is relatively

successful, the same patients are likely to be using the renal service over many years and continuity of care is also an important aspect of a good clinical regime. For this reason, it might be inadvisable to have frequent changes of provider as a result of successive tendering exercises. All these features of ESRF and its management militate against a vigorous, competitive trade in renal services. Nonetheless, the potential for competition in a system may be just as effective in altering providers' behaviour as actual competition itself. The threat, however remote, that a contract may be moved elsewhere may be a potent force for units to examine their clinical practices.

Allocating regional finance: an overview in light of the NHS white paper

From the preceding account of the three principal approaches to funding renal services which regions can adopt, it is apparent that there is no single 'correct' approach. Each method has its strengths and weaknesses. The widely practised conventional system of allocating a block grant to a renal unit based on past costs and activity is currently under criticism, mainly because it appears to offer relatively little scope for the implementation of either managerial changes or market-led, competitive strategies to improve performance in renal units. However, neither of the more radical, newer approaches has been extensively tried out in practice. South East Thames RHA has developed a system of funding renal services which embodies strong regional non-clinical involvement in setting budgets and monitoring unit performance, but the system is still under development. The politically sensitive step of setting regional standards for the process of care by modality and uniform costs has not yet been implemented and requires substantial input from clinicians.

Proposals for funding renal services based on the broad concept of a 'provider market' are even more speculative and further from a full realisation by RHAs. However, the publication of the government's white paper, *Working for Patients*, in February 1989 (Secretaries of State for Health, Wales, Northern Ireland and Scotland 1989) has altered the debate about the merits and drawbacks of the three funding approaches available to RHAs, since it proposes the development of a provider market for all hospital services in the NHS. The white paper working paper no 2 states:

> The Government considers that decisions on services which are currently organised on a regional or multi-district basis should be taken locally but with a presumption in favour of contract funding. (Department of Health 1989a, p 22)

Although the working paper does not go into any detail on how the NHS Management Executive intends regional services to develop, the objective appears to be to move gradually to a system in which user districts contract with service providers for the provision of specific regional services within a broad framework set by the RHA. Each RHA will be permitted to work out the detail of the system of planning and financing specialised services in its own way. Of the three types of contract outlined in the working paper (block, cost and volume and cost-per-case), it seems unlikely that renal services will be funded on the basis of cost-per-case contracts which appear to be most suitable for elective surgery. However, renal services appear to be equally appropriate for block contracts or cost and volume contracts. The working paper sketches a possible method for funding supra-regional services which could equally well be used by an RHA to fund renal services. Under this, the DH funds the fixed costs of supra-regional units and the variable costs are met through contracts with DHAs and/or GPs with their own practice budgets, with the idea of encouraging units to attract the maximum number of cases compatible with their infrastructural resources and with maintaining the quality of service required to win contracts. Whatever the precise details of any system of provider market funding of renal services, tertiary referrals will be more closely regulated in number and place of referral in future to conform with previously agreed contracts.

Another feature of the provider market approach is likely to be a higher degree of managerial involvement in setting detailed objectives for clinical work. In this respect, the seemingly fundamental theoretical distinction between funding regional services on the basis of agreed clinical profiles and standard costs which South East Thames has been pioneering, and funding regional services through units competing for district contracts in a provider market, largely disappears in practice when viewed from the providers' perspective. For example, when describing how a provider market system based on block contracts with DHAs might work, the working paper states:

> The contract would be viewed as funding a given level of capacity, particularly with respect to the treatment of urgent cases. The level of capacity would be agreed reflecting past and expected future referrals where immediate treatment was required. Such contracts should additionally reflect a variety of performance aims, for example an increase in the proportion of day cases, which is often a more cost-effective form of treatment. (Department of Health 1989a, pp 9–10)

Such an approach has much in common with South East Thames RHA's flexible resource management policy which, for example, envisages switching funds between more and less efficient renal units in an effort to exert a positive influence over the pattern of clinical decision making. Future approaches seem highly likely to attempt to embody explicit and structured patterns of incentives to clinicians designed to stimulate cost-effective patient selection and choice of modalities by the nephrologist rather than the very general incentive offered by the global budget to make the best use of the resources allocated. This implies that the purchasing agent, whether it turns out to be the RHA or user DHAs, has access to sufficient information to assess the legitimacy of variations in clinical practice and cost between units and specify alterations in the cost and type of care.

Without this information, treatment-related reimbursement (as in South East Thames Region) and the provider market risk degenerating into systems for funding the existing pattern of treatment modalities at or near to historic costs. This would offer no incentives to choosing the most cost-effective strategies of patient management. The production of useful cost and activity data for managing renal services is discussed in Chapter 4.

The implementation of the white paper proposals in relation to funding renal services is likely further to open up the market for the provision of NHS renal services to the private sector. Public purchasers of renal services will be expected to make contracts with the most cost-effective provider compatible with patient convenience, irrespective of whether this is an NHS unit or a private company. Limited experience hitherto in the UK suggests that in particular circumstances, or for particular types of dialysis, the private sector may be more efficient than the NHS (see Chapter 7). However, this remains to be tested across the full range of renal services and on a large scale in the context of a competitive provider market. Meanwhile, it is clearly in the interests of NHS renal unit managers to study the organisation, staffing, accounting and other methods used by private operators to assure the future viability of NHS units.

3. MATCHING CONSTRAINED RESOURCES TO CHANGES IN CLINICAL WORKLOAD: PAST EXPANSION, CURRENT RATIONING AND FUTURE DEVELOPMENTS

Introduction

Renal units face external forces for change (demographic, social, economic and political) and changes internal to medicine related to the technical possibilities for treatment of a wider range of cases, increases in productivity and the consequences of the implementation of the technical improvements. Longer patient survival on dialysis of previously 'high risk groups', better knowledge by GPs and general physicians of the benefits and possibilities of treatment, and rising patient expectations linked to demographic changes, are interacting to increase the demand for services and increase the case severity and cost of patients on dialysis.

Renal replacement therapy is successful and life-saving and official targets of treatments in relation to population are rising as a result, but renal replacement therapy is costly and has to take its place with all the other NHS priorities. Expansion of the programme also implies taking a higer proportion of more expensive, older, diabetic patients in whom the effectiveness of treatment is likely to be less than in lower risk patients. Thus, a general constraint on expansion is simply the overall level of NHS funding. However, there are two further sets of issues which affect the ability of the NHS to increase treatment levels: the efficiency with which existing units use their current resources and respond to innovations; and the ease with which expansion can occur even if more money were made available given that there are:

1. relatively few renal centres and little spare capacity;

2. rudimentary budget-setting expertise and little of the necessary cost data available in units;

3. little knowledge of which method of regional or district funding is most likely to facilitate a rational adaptive response in relation to health authorities' objectives for the renal services.

Until quite recently many ESRD units have been able to treat most patients referred to them without explicit need for harsh rationing decisions. But many nephrologists believe that demand and supply are increasingly likely to move out of equilibrium, although not all units would agree. For example, experience in Newcastle suggests that a steady state can be reached with a 60 per million per annum acceptance rate and 60 transplants per million per year (Wilkinson 1989). However, this may not persist as new clinical demands manifest themselves (for example, for paediatric renal services).

Physical expansion

Expansion of the few, relatively large centres which currently exist is limited. Large capital investment would need to be made before revenue could be used to treat more patients, since it is argued that home and ambulatory methods of dialysis are probably approaching their maximum level of development.

In the last decade (in the absence of major schemes in many regions) units responded in a variety of imaginative ways to increase productivity using the same physical facilities. Tactics have included:

1. Development of minimal care dialysis with shorter treatment times and more shifts.

2. Setting up satellite units, which are usually set up and managed by the parent unit.

3. The growth of CAPD which is generally regarded as the cheapest form of treatment to the NHS with the further advantage that patients can quickly and easily be trained to treat themselves at home. CAPD has released units from the existing physical space constraints in the hospital and has allowed revenue to be converted directly into additonal patient acceptances.

4. An increase in transplant rates which has made a major contribution to reducing the required increase of dialysis programmes.

All these modalities still require hospital support and emergency hospital dialysis facilities which are now close to maximum utilisation (Wilkinson 1989).

Minimal care and satellite units were often set up because of physical space constraints and, in addition, a concern to improve geographical accessibility for distant patients. The existence of satellite units raises questions of the appropriate balance between regional centres and more local centres and what should be performed in each. North Western RHA policy is to reduce concentration of activity at its four sub-regional specialist centres towards a more decentralised service in each district for long-term dialysis (home and hospital), minimal care and CAPD, with the four centres providing training, advice, management of difficult cases, and services related to transplants and tertiary referrals.

In a few regions there is discussion of entire new units, but these are the exception. Where they do occur, planned new units are increasingly being put out to competitive tender. Interest has been expressed by a number of private companies in bidding against NHS tenderers. However, tendering for clinical services requires good data on costs, outputs and quality (see Chapter 7 for a discussion of this).

The experience of the Newcastle dialysis unit provides an illustration of how units have been steadily able to increase the number of new patients accepted over the last 25 years by using all the above techniques (Wilkinson 1989). Both staffing and dialysis places have grown gradually over the years in response to changes in the dialysis techniques available and in their effectiveness. Improvements in the

effectiveness of dialysis have meant not only that patients survive longer on dialysis, but that the indications for successful dialysis have widened to include, for example, children, diabetics and more elderly people. In 1976, only 1 per cent of new patients accepted for dialysis were diabetics as opposed to 11 per cent in 1985. Diabetic patient survival in Newcastle is approximately 40 per cent at six years which is half the non-diabetic rate. In the 1980s, there has been more than a tenfold increase in the number of over-60s accepted for renal replacement therapy; but transplant survival is markedly poorer in elderly patients. Despite accepting more older and less healthy patients, the Newcastle annual mortality rate of 15 per cent has remained unchanged for a number of years.

The cumulative impact of these trends means that the number of patients accepted for dialysis rose from 11 in 1964 to 113 in 1988 based on a population of 1.8 million. This represents a current, overall acceptance rate of 60 per million per annum. There are currently 310 patients on dialysis at the Newcastle unit.

The unit coped with the increase in workload by securing additional funds from the region, by taking advantage of new forms of treatment and by making improvements in productivity. Thus, in the 1960s and 1970s, the bulk of the increase in workload was met by the expansion of hospital dialysis brought about by the opening of new hospital and satellite units. In the 1980s, the capacity for hospital dialysis continued to expand principally through increasing the number of shifts. This has been made possible by the gradual reduction in dialysis hours per patient, rather than through investment in additional machines.

The emergence of home haemodialysis also contributed in the late 1960s and 1970s to an increase in the numbers of patients, peaking at 51 patients in 1977 before reducing gradually to 42 patients in 1981. With the introduction of CAPD in 1980, there was a very rapid reduction in home haemodialysis to the current level of 17 patients. The proportion of dialysis patients on home haemodialysis is lower in the Northern Region than elsewhere in England (EDTA 1986).

Hospital peritoneal dialysis made a small but consistent contribution to the overall pattern of dialysis in Newcastle, ranging between 5 and 17 patients per year. It has been used for elderly patients unable to manage CAPD who cannot be offered hospital haemodialysis.

In the 1980s, the main contributor to the continuing rise in patients treated in Newcastle was CAPD. In 1980, 23 patients were treated by CAPD; by 1987, 168 patients were maintained on this form of dialysis in addition to 17 patients, mainly children, on continuous cycling peritoneal dialysis. The advent of CAPD enabled the Newcastle unit to expand provision without an increase in hospital dialysis space.

The increasing transplant rate in the last 15 years has been another major factor in allowing an increase in the acceptance rate as it removes patients from dialysis, thus releasing capacity to treat new patients. Since 1981 there has been a steady rise in the number of transplants: there were 94 cadaver transplants and 18 living donor transplants in 1988.

Wilkinson (1989) reports that the rise in the Newcastle dialysis population appears to have levelled out for the moment at around 310 patients from a 1.8 million population. There is no evidence in the region of suitable patients not being referred either by GPs or general physicians. Equilibrium appears to have been reached between supply and demand with an acceptance rate of 60 per million per annum, 15 per cent annual mortality and approximately 110 transplants each year. However, in the future, there is likely to be a substantial increase in the demand for paediatric renal services in Newcastle, as elsewhere, with the development of antenatal renal ultrasound scanning. Furthermore, the development of a new renal unit in Carlisle to serve Cumbria is likely to reveal hitherto unmet need and, ultimately, increase the total number of patients on dialysis.

The expansion of renal replacement therapy in Newcastle and in the other two centres in the Northern Region has taken place against a background of a fairly steady incremental growth in real terms in regional funding. Currently, in Northern RHA each of the renal units receives a regional allocation related to the number of patients treated. Additional funds for expansion have continued to be made available to renal services over the last four to five years and a new renal unit to serve Cumbria opened at the end of 1989. Additional funds are distributed between the units after an annual meeting between unit representatives and regional officers. The general policy is to minimise any underused capacity by making marginal changes to the catchments of the centres. Thus, the experience of ESRD services in the Northern Region from 1964 to the present may not reflect the sorts of rationing decisions and efficiency improvements which lie ahead if units are to continue to respond to increases in demand.

Rationing: increasing and changing demand?

It is less easy than five years ago to exclude elderly patients from dialysis on medical grounds since today the survival on dialysis of elderly patients has improved. The situation is similar for diabetic patients with ESRF, although still not as good as for uncomplicated patients and younger patients. Diabetics comprise 25 per cent of the dialysis workload in Scandinavia but only 5–10 per cent in the UK (Jacobs, Brunner, Brynger, and others 1983). It is probable that there will be a rise in numbers of diabetics referred for dialysis, but this will depend on GPs' and general physicians' perceptions of their appropriateness for dialysis (Challah, Wing, Bauer, Morris and Shroeder 1984). There is also likely to be a trend to take on proportionately more elderly patients. These trends together may increase patient mortality rates since the five year survival rates are as follows:

80 per cent aged 15–44 years
62 per cent aged 45–64 years } non-diabetic

44 per cent aged 15–44 years)
25 per cent aged 45–64 years } diabetic

These statistics suggest that there will be increased treatment costs and reductions in quality and quantity of life gained per unit of input by the dialysis

programme in the future if increasing proportions of these patients are accepted. However, at the same time there is likely to be an expansion in paediatric peritoneal dialysis with the advances in prenatal diagnosis of kidney disease. Selection of patients for RRT is complex, representing the intertwining of medical and social criteria. It raises questions of social priorities and the overall level of funding. It needs to be informed by good data on the costs and benefits for different sorts of patients of the range of therapeutic options available at different levels of funding.

Making estimates of future dialysis needs

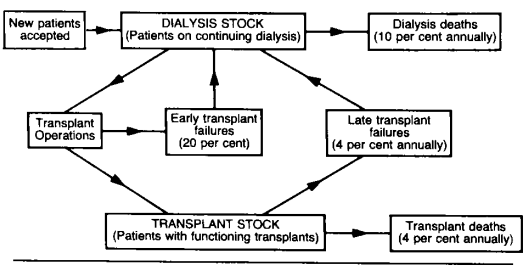
In order to be able to bid for resources and offer the appropriate volume of RRT and the appropriate balance of modalities in the future, renal units require information and models which enable them to predict future demands. Quite how the unit chooses to respond to aggregate future demands depends on patient characteristics (for example, age) and preferences, and on local clinical policies and their relation to the existing pattern of facilities. However, since further expansion in capacity appears to be impossible in a relatively large number of units without further capital investment (suggesting the need for new units rather than expansion of the existing units) this may, paradoxically, offer an opportunity to think creatively and afresh about the most appropriate pattern and modality of treatment.

Steele (1988, pp 44–47) provides a worked example of how a region can make crude calculations of future aggregate demand for dialysis and then relate them to the variety of dialysis techniques available to meet the demand. Each modality has its own costs and benefits when applied to specific patient groups in specific organisational contexts and at specific levels of activity.

The number of patients requiring dialysis in each period is assumed to be a function of:

1. the number of patients accepted for the renal replacement programme;
2. the number of new patients established on dialysis;
3. the number of renal transplants performed;
4. the number of early and late failures of transplants;
5. the number of deaths of patients on dialysis (see Figure 9).

Figure 9: Progress of patients in renal replacement programme



Using assumptions of a 10 per cent per year dialysis mortality rate, 20 per cent per year early transplant failure rate, 4 per cent per year late transplant failure rate and a 4 per cent per year transplant mortality rate, it is possible to set parameters for 4 and 5 above.

Figure 10 shows the results of combining these assumptions with data from the Northern Region to model the effects on the total number of patients requiring dialysis over a ten-year period of:

(a) changes in the number of new patients seen each year holding the transplant rate constant; or

(b) similar changes in the number of new patients, but with a progressive rise in the annual rate of transplantation.

In (a) the number of new patients seen was set at 140, 150 or 160 each year with a fixed number of transplants of 70 each year. In (b) the number of new patients seen was set at 140, 150 or 160, but each year the number of transplants was increased from 70 in year 1 to 150 in year 10.

The results are that, with the lowest assumed rate of acceptance of new patients (140 per year – which is near to current rates), transplants constant at 70 per year, and all other things remaining equal, dialysis requirements will have increased by 180 per cent by the end of a decade. With the maximum assumption about the take-on of new patients (160 per year – 28 per cent above the target for the RHA of new patients per million per year set in 1983), the resulting increase in requirements for dialysis places would be 210 per cent as long as transplants remain constant.

Even with the gradual increase in transplants (doubling over the decade), there would still be a significant rise in dialysis requirements, peaking in year 9 before slowly declining. For example, with the assumption of only 140 new patients annually, dialysis needs would peak 36 per cent above current levels. With the highest new patient per annum assumption (160), the peak figure would represent a 60 per cent increase on current levels.

These relatively simple projections suggest that:

1. if current levels of acceptance are to be maintained (140 annually) and transplantation rates do not rise (all other factors remaining the same), there will need to be a very substantial (180 per cent) rise in the number of dialysis places in this region;
2. even with a highly optimistic assumption of a doubling in the transplantation rate in ten years (Gore, Hinds and Rutherford 1989) more dialysis places (36 per cent more) will be required in the short to medium term to maintain current levels of acceptance (140 per year);
3. the alternatives to (a) or (b) involve substantial reductions in acceptance rates of new patients.

The cost of responding to these estimates of future needs and drawing up plans depends not only on the transplantation rate but also on the choice of dialysis techniques and the fact that patients already on dialysis transfer between modalities. Transfers have

resource implications, such as the need to train patients in new techniques.

Given baseline data on the numbers of patients using each technique at the beginning of a year, predictions of the numbers in each modality at the end of the year can be made by applying assumptions (based on prior experience and any likely clinical policy changes) on the number of new patients in each modality; the number of patients transferring to other modalities or to other units; and the numbers of deaths of new and old patients.

This process can be extended over longer time periods using annual assumptions about new patients, about transfers between modalities and about deaths. These data can then be linked to resource use data to generate cost profiles of units and regions over time. Chapter 5 describes a computer simulation model which has been developed to facilitate these sorts of calculations for planning purposes (Davies 1985a; Davies 1985b; Davies and Davies 1987).

The initial use of different modalities and subsequent transfers between types of dialysis are strongly influenced by the clinical policies prevalent in different units and regions. Cross-sectional data from EDTA show that there are considerable differences between regions in England in the percentage of patients on different forms of therapy. For example, in Mersey RHA, 59 per cent of patients in 1988 were on hospital haemodialysis, whereas in adjacent North Western RHA only 39 per cent were. North Western RHA had twice as high a proportion on CAPD as Mersey RHA (see Table 5, page 13). Both at a point in time and longitudinally, such large differences between RHAs will lead to large variation in the costs of providing renal services. It is highly unlikely that more than a small proportion of the variation in dialysis modalities can be accounted for by patient characteristics, accessibility of renal units, patient preference, and so on. The implication of such variation would appear to be the requirement of RHAs to investigate whether the same number of patients could be managed more economically by a different balance of techniques without affecting patient survival and quality of life.

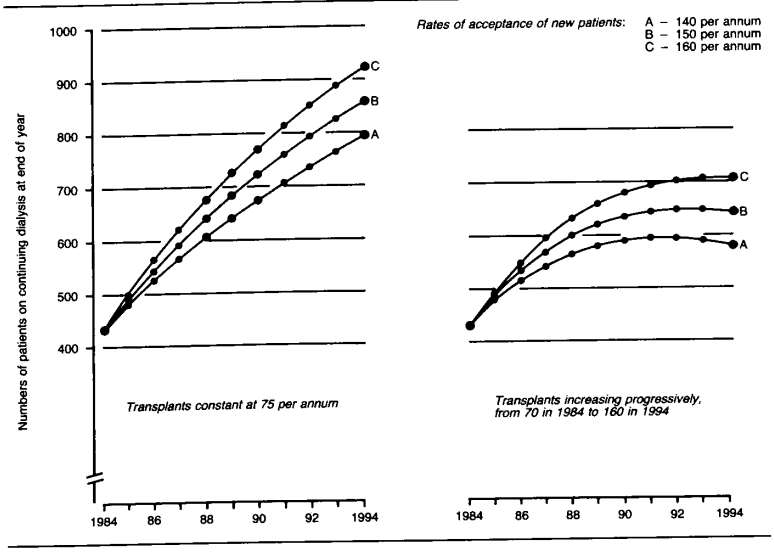
Therapeutic changes which will affect cost and quality: the need for evaluation

Units are currently facing up to the likelihood of increasing demand for dialysis services because of past improvements in survival of patients on dialysis and innovations such as CAPD which allowed an increase in the numbers treated. A range of further therapeutic innovations are currently placing new pressures on the fixed budgets of units (Wilkinson 1989). These innovations are cost-generating and usually appear to be worthwhile, but few have been subject to rigorous cost-effectiveness evaluation.

Short dialysis via haemodiafiltration

Haemodiafiltration combines haemodialysis and haemofiltration and enables a high clearance of low molecular weight substances. Haemodiafiltration may, therefore, allow effective short dialysis using high flux, bio-compatible membrane dialysis. There have been reports of a reduction in dialysis sessions to 110 minutes, three times a week without evidence of patient deterioration (Surian and others 1989). Clearly, short dialysis allows the number of shifts of patients on a dialysis unit to be increased. Short dialysis (if effective) would be more convenient and, therefore, more acceptable to patients. However, in assessing the cost-effectiveness of short dialysis several other factors would have to be taken into account: the increased cost of the dialyser; the cost of

Figure 10: Dialysis requirements with limited transplant activity



4. MANAGING THE BUDGET AT UNIT LEVEL

Introduction

Budgeting involves two processes, budget setting and budget management. Chapter 2 described the ways in which budget setting or resource allocation between renal units and regions (and perhaps in the future, increasingly, districts) has taken place and how it may develop. New and emerging forms of budget setting will make the process of budget management within renal limits ever more important. It was noted that under the conventional system of budget setting, renal services were designated as a regional specialty. In general, the RHA made the strategic decisions on the location and quantity of services to be provided and negotiated the level of expenditure to meet this level of service with units. From year to year, budgets tended to be set incrementally so that the previous year's level of service and expenditure, uprated for price changes, was automatically incorporated into the following year's budget. Negotiations with the RHA centred around growth or development funds. This process implied that the existing level, pattern and cost of services were acceptable and correct. It could operate with relatively little detailed information about the costs and operations of individual units. Under this system, units could be relatively confident that their past patterns of expenditure and spending would be secure in the future. Budget setting involved little or no questioning of clinical policies. Units were left to manage a sum of money with relatively few strings attached.

Both the other methods of budget setting which regions have begun to experiment with – funding by clinical profiles and standard costs and the provider market approach (described in Chapter 2) – broadly involve some form of what is known as zero-based budgeting. Under zero-based budgeting all activities in the unit are identified, classified and costed, and the budget is built up *de novo* by aggregating costed units of activity. The budget comprises those items which can be justified in the negotiations between the providers and their funders and which have funders' approval. Clearly, effective implementation of such a process requires a far higher level of information about activity, costs and policy decisions of units than other methods. While incremental budgeting exercises tend to be relatively straightforward and take place each year, the labour required for zero-based budgeting tends to make it a periodic exercise for setting a rolling programme of activity and funding over a number of years. Ideally, this programme should allow an element of flexibility to cope with the inevitable uncertainty which attends health care delivery. With a chronic condition such as ESRF, in which long-term commitments are made to patients, detailed annual contracts are unlikely to be appropriate, particularly in circumstances such as a provider market in which there is a possibility of a fundamental renegotiation or removal of a contract to another unit. In this context, contracts should be set over, perhaps, a three- to four-year period.

While a three- or four-year budgetary agreement may appear to units as a welcome relief from a process of annual, incremental budgeting, it imposes a greater financial discipline on units than was previously the case. Units will have to be reasonably sure that they can continue to deliver the level and type of service set out in the budget statement over a relatively lengthy period of time in which there may be numerous unforeseen circumstances both in the demand and supply conditions of the unit.

The function of budgets

Before discussing the problems of budget management in renal units, it may be helpful to set out the rationale for budgeting in general. A budget can be defined as a predetermined statement of management policy during a given period which provides a standard for comparison with the results actually achieved. Thus, normally budgets are couched not just in financial or resource terms but also in terms of policies, objectives and output. In the NHS, hitherto, budgets have tended to be expressed simply in terms of inputs, such as expenditure or manpower availability. However, in management theory at least, there are held to be five main reasons for developing budgets in terms of expenditure and output:

1. efficiency;
2. equity;
3. explicitness;
4. monitoring;
5. control.

Efficiency

By setting financial constraints through a budget with or without explicit activity targets, it is hoped that managers and clinicians will review their working practices, purchasing, and so on, to become more cost conscious and more efficient in achieving a greater output from the same resources. Some of the possible steps which unit directors are taking in this direction are outlined in Chapter 6, Efficiency issues in the operational management of renal units.

Equity

By quantifying the resources which are going into a particular unit or activity, it is clear who is receiving how much of what. This makes it possible to compare the existing pattern of resource allocation with a pattern based on prioritised need and to make the necessary adjustments accordingly. Thus, budgets can be used to stimulate the pursuit of equitable distributional policies.

Explicitness

Budgets are explicit statements of policy and the level of financial commitment to a particular activity or service. By their quantified explicitness they enable others to comment on the policies being pursued and their priority.

Monitoring and control

Budgeting necessitates regular monitoring of activity and expenditure over time within the relevant budgetary period so that prompt corrective action can be taken to ensure that budgetary targets are fulfilled. The existence of budget monitoring gives managers, clinical or non-clinical, the potential to control the pattern of activity and expenditure in their unit or specialty.

Preconditions for successful budget management

Autonomy and responsibility

For consultants, becoming a budget holder offers the attraction of a greater degree of autonomy to take decisions affecting the deployment and use of the resources contained within the renal unit budget, without having to involve hospital management on a day-to-day basis. One precondition for successful budgetary management is that the responsible clinician or unit manager should have the authority to make significant changes to resource use in the unit in order to pursue the objectives set out in the budgeting exercise. However, with a degree of autonomy and authority comes the responsibility to accept the resource constraints on which the budget is based and to try to make the best of the cash-limit which has been accepted at the beginning of the budgeting period. Clinicians may be reluctant to accept this responsibility on the grounds that the cost estimates on which the budget was set are incorrect or insufficiently accurate. Hence, sound costing and regular information on expenditure are vital prerequisites for effective budget management.

Cost information

Out-turn statements which allow those responsible for the budget to monitor their actual activity and expenditure in comparison with what was expected need to be timely, accurate and relevant for successful budget management (Steele 1988, p 29). Data need to be *timely* so that corrective action can be speedily taken before irreversible problems are produced. The normal expectation in the NHS is for renal units to receive statements within a month of the end of the period to which the statement refers but, in practice, this does not always happen and there are delays. Statements also need to be sufficiently *accurate* to provide a reasonable approximation of what is actually happening in the unit so that clinicians can take seriously the signals contained in them. Steele (1988) found that none of the ten renal units surveyed in his study believed that their statements of expenditure were correct. Although the idea of 'accuracy' or 'true costs' in accountancy is a relative rather than an absolute concept and the degree of accuracy striven for should be related to the purposes to which cost data are put, the perceived faults in the expenditure information in renal units did appear to have debilitating consequences for budget management. Some unit staff spent time correcting data; others ignored the statements altogether. Steele (1988) records that only rarely was there any meaningful discussion with finance staff about statements and equally rarely any action taken against the budget.

Wing (1989) gave two examples of how seemingly minor administrative errors by clerks and storekeepers could undermine confidence in cost information. He and his colleagues in the St Thomas' renal unit were seriously misled in their assessment of the relative cost of haemodialysis and CAPD because a storekeeper had failed to appreciate that Travenol disposables were used in both methods of dialysis and had allocated all Travenol costs to one method. Similarly, all the azathioprin prescribed in the hospital was placed against the renal unit budget for a time due to a clerical error in the hospital pharmacy. Meanwhile, the clinical staff in the renal unit were puzzling over how their practice might have changed to increase consumption of the drug! Units have to ensure that finance, clerical and supplies staff understand something of the process of care involved in renal services if these sorts of errors are to be avoided.

Statements of expenditure in relation to budget also need to be *relevant* to the options for corrective action available to the budget manager. Ideally, statements should relate inputs and variations in inputs to outputs and variations in outputs, so that spending and activity can be linked and efficiency considerations brought to bear on budget management. Frequently, in the NHS, budgets and statements are functional rather than output oriented. They provide data on input expenditure by functional cost headings for the unit as a whole rather than relating costs to the production of different sorts of outputs. This means that statements tend to indicate how much has been spent on drugs, dressings and other consumables for the whole unit, but give little indication of the costs of treating different types of patients or of providing different forms of therapy. While a number of units have access to information on expenditure by mode of dialysis, this tends to be an analysis of the consumable costs of treatment as these can be more easily traced routinely by careful allocation of suppliers' invoices to different modalities. The allocation of staff and overhead costs is far more difficult and laborious and tends to be excluded.

The scope of the budget and cost tracing

The identification of problems in the tracing and allocation of costs to modalities in turn raises the general question of which costs to include in renal budgets and which cost information to include in

the replacement fluids required for haemofiltration; the higher level of nursing supervision needed during this form of treatment; and the possible consequences for the patient. The bio-compatible membranes necessary for use in the high-flux dialysers needed for short dialysis are very much more expensive than the cuprofane membranes used in ordinary haemodialysis. As a result, their use in ordinary dialysis is generally recommended only for patients with inadequate phosphate clearance or evidence of problems associated with bio-incompatibility.

Good cost-effectiveness studies of short versus conventional dialysis in similar groups of patients are urgently required if nephrologists are to decide the extent to which they may use short dialysis as one possible response to matching constrained resources with an increasing clinical workload. For it may be that some patients are currently receiving longer periods of dialysis that they need and that economies could be made by carefully tailoring dialysis to the needs of individual patients and reducing their dialysis hours accordingly.

Bicarbonate versus acetate dialysis

As dialysis units increasingly recognise the need to make the most efficient use of their inevitably constrained resources, all aspects of the dialysis process are likely to come under scrutiny. The choice of whether to put patients on bicarbonate versus acetate dialysis has, up to now, been a matter of clinical policy within each unit. Bicarbonate dialysis has generally been preferred for the vast majority of patients, but as Wilkinson (1989) observes of his own practice in Newcastle, 'we have adopted bicarbonate dialysis in 90 per cent of our patients without really very good evidence that this additional cost was necessary'. Once again, the assessment of the costs and benefits of the two forms of dialysis is likely to produce a complex picture. For example, acetate dialysis is cheaper to use and does not require sophisticated dialysis machines. Against this, there are disadvantages associated with acetate dialysis, such as the limitations imposed by the rate at which acetate can be metabolised to bicarbonates and reports of acetaldehyde accumulations during dialysis. High levels of serum acetate and the possibility of high levels of acetaldehyde are associated with major side-effects, such as peripheral vasodilation, cardio depression and chronic metabolic acidosis with interference with calcification of the bone and growth retardation in children.

Nephrologists would welcome a cost-effectiveness study of bicarbonate versus acetate dialysis, since decisions are currently being taken on inadequate information.

The use of cyclosporine in immunosuppression

The drug cyclosporine, used to reduce the likelihood of graft rejection, is widely regarded as a substantial step forward in the management of ESRF. For understandable commercial reasons the manufacturers, Sandoz, recommend that it should be given to all patients throughout their lives. Multi-centre studies in a number of countries have shown that patient and graft survival is improved with the use of cyclosporine rather than azathioprin which was previously the chosen drug for immunosuppression (The Canadian Multicentre Transplant Study Group 1983; European Multicentre Trial Group 1983). Hakala and colleagues report graft survival rates with cyclosporine of 80 per cent at 12 months, 70 per cent at 3 years and 55 per cent at 5 years; this compared with 65 per cent at 12 months, 55 per cent at 3 years and 40 per cent at 5 years using azathioprin (Hakala, Starzl, Rosenthal, Shaw and Iwatsuki 1983). There is evidence that the better graft and patient survival on cyclosporine applies in older as well as younger age groups. However, the annual cost per patient is currently approximately five times greater for cyclosporine than azathioprin.

The first year on cyclosporine costs about £3000 as against £750 for a year on azathioprin. In the NHS, where cost is always a consideration, cyclosporine is used sparingly. Wilkinson (1989) reports that in order to minimise costs at the Freeman Hospital in Newcastle, all patients are given cyclosporine for the first six months of graft life, but then move on to cheaper azathioprin and prednisolone unless there has been evidence of rejection or loss of a previous graft from rejection. Similar practices are common in other renal units in the NHS.

Better graft function with cyclosporine ought, in theory, to be associated with fewer hospital stays and reduced hospital costs which might offset some of the higher costs of cyclosporine over alternatives (Showstack, Katz, Amend, and others 1989). Once again, the use of cyclosporine requires good information on relative cost-effectiveness. A number of renal units are currently undertaking long-term randomised trials of selected sub-groups of dialysis patients comparing cyclosporine with azathioprin and prednisolone.

The use of recombinant DNA erythropoietin in anaemia

One of the most widely discussed and contentious recent innovations in the treatment of ESRD has been the molecular engineering of recombinant erythropoietin as a means to correct the anaemia associated with chronic renal failure without the need for blood transfusion. There is relatively good evidence that erythropoietin is effective in this role (Eschbach 1989) and that patients experience an improvement in quality of life and exercise capacity (Canadian Erythropoietin Study Group 1989).

There is great interest in using erythropoietin as opposed to blood transfusions in anaemic patients because of the risk of transmission of non-A, non-B hepatitis by transfusion leading, in a high proportion of cases, to chronic liver damage. Transfusion also induces antibodies in the recipient which may make it more difficult to find a suitable kidney for transplantation. However, erythropoietin treatment may necessitate longer dialysis or the use of more effective and more expensive dialysers since its use increases

haematocrit which reduces the flow of plasma through the dialyser, thus reducing the clearance rate of potassium, phosphate and creatinine. Hypertension is also exacerbated by the use of erythropoietin. In addition, there is increased frequency of clotting at the vascular access because the blood tends to become more viscous.

As well as correcting anaemia and avoiding infection associated with transfusion, erythropoietin has a number of other benefits. Obviously, it reduces or avoids the minor cost of blood for transfusion. However, perhaps the main benefit resides in the claim that patients on erythropoietin will enjoy a better quality of life since they will not need regular blood transfusions which are time-consuming and inconvenient for living a normal life and cannot safely be given sufficiently frequently to maintain a satisfactory haemaglobin level.

Erythropoietin has become controversial principally because it is very expensive. In 1989, treatment costs amounted to between £3,000 and £5,000 per person per year in the NHS. This means that, in the short-term, units have had to ration the use of erythropoietin to those most at risk of anaemia in whom there are major contraindications to transfusion. In Newcastle, ten patients were receiving erythropoietin in 1989 (Wilkinson 1989). These were patients with a haemaglobin level less than 7 gm who also had contra-indications to transfusion such as severe heart disease or difficulties in cross-matching. Another 50 patients on dialysis in Newcastle had haemaglobin levels less than 7 gm and were considered by local nephrologists as suitable for erythropoietin on the basis of this conservative definition of their ability to benefit. Treating these patients would have cost an additional £200,000. An estimate of the maximum number of patients potentially able to benefit from erythropoietin therapy in Newcastle produces a tentative bill of £1.2 million per year. This assumes that half the 300 existing dialysis patients and half the 200–300 known pre-dialysis patients will be eligible for the drug.

It is highly unlikely that dialysis units will be able to provide erythropoietin to all the patients who stand to benefit from its use for the foreseeable future. Some form of rationing is inevitable. At present, units are targeting resources on commonsense grounds on those with the lowest haemaglobin counts and contra-indications to transfusion. However, without evaluative studies, it will be impossible to assess the extent to which such a programme might justifiably be expanded.

Developments in paediatric renal services

There is likely to be a substantial increase in the demand for paediatric dialysis and transplantation brought about by the innovation of antenatal ultrasonic diagnosis of renal failure. This will have major revenue implications. Wilkinson (1989, personal communication from Dr M Coulthard, paediatric nephrologist, Newcastle) estimates that five cases will be detected in this way each year from the 1.8 million population served by the Newcastle unit. If the policy of not transplanting children until seven years of age is maintained, then in Newcastle this would build to a steady-state peritoneal dialysis population of 40 in seven years.

Commentary on clinical developments

The recent clinical innovations affecting practice in renal units are likely to sharpen the underlying conflict in the management of units operating on a relatively fixed budget between increasing the number of patients treated (for example, through investment in facilities for short or tailored dialysis) or improving the quality of care and well-being of existing patients (for example, through the application of cyclosporine and erythropoietin). Both cyclosporine and erythropoietin have created financial pressures on RHAs to put further money into dialysis units to improve patient quality of life. However, there is an urgent need to undertake the necessary cost-effectiveness studies based on randomised controlled trials before committing what could be considerable sums of money to expensive innovations.

statements. This, in part, depends on who in the unit and in the hospital has the authority and power to control particular areas of expenditure. In most cases, the renal unit is the cost centre and all expenditure under the conventional areas of expenditure produced under the NHS standard accounting system (SAS) (for example, medical staff, nursing staff, technical staff, drugs, medical and surgical equipment, and so on) is allocated to the renal unit. In a few renal units SAS costs are made available at consultant level so that each consultant can identify an expenditure share within the unit. One problem with consultant level accounting in renal units arises because most renal consultants also have some commitments in the specialty of general medicine as well as in nephrology. There can be practical difficulties in disentangling the expenditure they generate in their different capacities and in allocating the expenditure appropriately, since renal patients are frequently admitted to general medical beds under the care of nephrologists for care relating to the work of the renal unit. However, these problems are not insurmountable.

Budgets and expenditure monitoring of renal units can be broadly or narrowly specified. A broad definition of relevant expenditure would include in the renal unit budget all costs which could conceivably be associated with the renal unit, including, for example, a share of the general hospital overheads. The system of management budgeting introduced into the NHS in the mid-1980s was informed by this sort of logic. Consultants were to be presented with statements containing full overhead costs which they were to be charged for. In this way, it was hoped that consultants would become directly interested in the level of such costs and would bring pressure to bear on one another and on general managers to keep these costs as low as possible.

An alternative, narrow definition of the renal unit budget would include only those items of expenditure which the responsible clinician could directly influence, such as medical staff costs, drug expenditure, and so on. Even this definition would appear to extend beyond the scope of the budget statements normally provided for many renal units. Defining the scope of the budget in terms of items under the nephrologist's control inevitably raises a series of questions. Currently, in practice, which items are under the nephrologist's control? Which important items are not? Should these items be under the nephrologist's control? What will be the consequences of giving the nephrologist more control of these items? For example, the nursing inputs are financially very important, but are a potentially controversial area of expenditure for a renal unit. In some renal units, renal nursing expenditure is subsumed within the general nursing budget of the hospital and the consultant has little or no say in nurse staffing levels. Changing this situation is likely to involve conflict with nurse managers who may be sceptical of and hostile to the claims of medical staff to manage the deployment of nursing staff, even in specialised fields such as dialysis and transplantation. Nonetheless, the ability to make changes in staffing levels and staff-mix is integral to efficient budget management (see Chapter 6 for further discussion of this).

One aspect of the question of which costs to allocate to renal budgets concerns the inpatient 'overspill' costs of ESRF treatment which frequently fail to feature fully in renal budgets and expenditure calculations. These are of concern to managers of hospitals with renal units, who may fear that the renal service is receiving a hidden subsidy at the expense of other equally hard-pressed parts of the hospital. Such an approach to accounting for expenditure may also prejudice clinicians in their perceptions of the relative cost-effectiveness of different modalities and their choice of treatments. For example, it is the orthodoxy in the UK to assert that transplantation as a method of treatment for ESRF is the most cost-effective and least financially costly to the NHS. However, there are substantial 'hidden' costs of transplantation which are not normally brought to the attention of renal physicians through the usual expenditure statements which most of them receive. Wing (1989) draws attention to the extra expenditure associated with a failed graft while a seriously ill patient is recovering in a hospital bed. Sensitised patients are found to be particularly expensive because of their higher use of immunosuppressive drugs such as ATG and ALG and the added possibility of preparatory immunoabsorption. An additional cost which is often overlooked is the cost of the UK Transplant Service which coordinates donors and recipients.

Budgetary incentives

An important aspect of any budgetary system is the pattern of incentives surrounding savings, underspends, overspends and efficiency improvements. Incentives can be monetary or non-monetary. Questions which could arise include: who has use of budgetary surpluses; are there incentives for units to make a positive effort to make savings and, if so, how are the savings distributed; can savings be used for capital or revenue purposes? In Steele's survey only a minority of units operated within an explicit financial incentive structure. Manchester Royal Infirmary and the Royal Victoria Infirmary, Newcastle, had the incentive that they could retain any savings for their own use. At St Thomas' Hospital, London, the unit had been permitted to recruit a nephrology counsellor when the DHA withdrew financial support from the unit's medical social worker post on the strength of savings made over the previous three years (Wing 1989). The unit had been less successful in saving on its machine replacement budget by extracting extra years of life out of machines in order to pay for a better team of technicians. However, the unit director was keen to have as much freedom as possible to shift money from capital to revenue and vice versa in pursuit of efficiency. None of the other units in Steele's survey were offered explicit incentives to make savings. In some cases, it was reported that surpluses or planned savings would be returned to the RHA who might or might not reallocate the money to renal services.

This is not to say that the budgetary systems in these cases contained no implicit incentives to improve performance. All units were well aware of the general incentive that by being cost-conscious under the most commonly found system of global budgets, it should be possible to treat more patients and prevent more premature deaths. In practice, this has been the incentive for all renal units for the last 25 years in the NHS and has led in Wing's view to the characteristic pattern of UK renal services in which transplantation receives great emphasis, younger and less risky patients are preferred and innovations improving patient quality of life are strictly rationed (Wing 1989).

Costing renal services at unit level

Valid, up-to-date and reliable costs for different types of patients and modalities are important for successful budget management at unit level, yet these are rarely available. The same costs are also central to any system of budget-setting or resource allocation which is based on modes of treatment rather than a straightforward global sum (for example, South East Thames RHA's system described in Chapter 2). Such a system depends on the resource allocator having access to comparable data for each unit so that standard costs can be developed based on 'good practice' rather than inherited inefficiencies. The costs of alternative treatment options and the behaviour of these costs with changes in activity levels should be known. Which costs are of most interest, staff, equipment, consumables and so on, will depend on the question to be answered, the time period and the extent of change in activity which is being contemplated. Clearly, staff and capital equipment costs will tend to increase step-wise with increases in activity, whereas consumable costs will tend to increase in linear fashion as activity rises. Therefore, in the short-term, or with small changes in activity levels, equipment costs can be regarded as invariable, but in the longer term this may not be so. Budget managers need to be able to estimate the point at which previously 'fixed' costs remain 'fixed' no longer.

Cost comparisons between units

Regional resource allocators or districts as purchasing agencies will wish to compare the costs of different units. However, unit managers themselves will be increasingly interested in future to compare their modality and patient costs with other NHS units in order to learn about possible organisational improvements which they could make. Steele (1988) attempted to collect modality costs from units for comparative purposes. Table 9 presents the results which show massive variations between units. He concluded that the modality costs contained different sets of costs and were not strictly comparable. Table 10 presents modality cost data for the renal units in South East Thames RHA, supposedly drawn up using the same costing methodology in each unit. Again, there are significant differences between centres for the same modality and even the ranking of the costs of the modalities differs with location. It is hard to believe that home dialysis in unit C costs £25,583 per patient year while in unit E the cost is only £6,664. In unit A, CAPD is markedly cheaper than home dialysis, but in unit B the opposite is reported to be true. The data in Tables 9 and 10 suggest that the relative cost information currently available is virtually impossible to interpret on its own

Table 9: Estimated costs for renal units in survey by Steele (1988)

Modality	*Unit (costs in £s per patient per year)*					
	A[1]	*B*[1]	*C*[2]	*D*	*E*[2]	*F*[3]
CAPD	6,240	4,500–7,500	8,806	6,037	5,000	8,000–10,000
Satellite CAPD		9,500				
Home haemodialysis	6,291	2,800–4,400	6,495	6,664	4,000	10,000
Hospital haemodialysis	9,303		18,118	15,893	4,680	13,000
Satellite haemodialysis		4,200			4,000	12,000
Minimum care haemodialysis				9,800		

1. Consumables per patient only.
2. All costs excluding capital, but including staff, consumables, and so on.
3. All costs including capital, adaptation costs, CAPD inpatient support, and so on.

Source: Steele (1988), Appendix 9, p 85

Table 10: Estimated modality costs for renal units in South East Thames RHA based on projected activity, 1987/88

Modality	*Unit (costs in £s per patient per year)*					
	A	*B*	*C*	*D*	*E*	*Regional average*
Home dialysis	8,871	9,1e2	25,583	7,840	6,664	8,766
Hospital dialysis	13,845	11,068	22,363	17,997	15,893	15,930
CAPD	6,788	13,731	14,050	9,890	6,037	9,522

Source: Steele (1988), Appendix 10, p 86

and can only be made sense of through detailed local investigation of each unit. Similar results are found in other regions using routinely available cost data.

Without clear and consistent rules for costing modalities, discrepancies are bound to arise and these may explain many of the reported cost differences. The first prerequisite for truly comparable costs is that all renal centres include the same set of costs; the second is that modalities are defined in a consistent way. Thus, costs should include, as a minimum, capital equipment, staff, consumables and training, and should probably include the general medical inpatient costs of renal services. Certain modalities are likely to embrace a more heterogeneous range of activities than others and care should be taken to agree useful definitions of the approximate treatment package associated with a particular modality. For example, minimum care dialysis can vary considerably in content and location. Minimum care dialysis undertaken in the hospital setting can bias the reported overall costs of the hospital dialysis programme downwards.

The variable content of modalities has hampered the attempt by South East Thames RHA to develop standard, region-wide, costs for each treatment mode. The problem is to define the expected nature and level of care for each modality given the patient mix to be managed. Wing (1989) has pointed to the impossibility, as he sees it, of moving to a system of standard prospective payments for each renal modality without defining what is meant by 'standard care' for each patient type. The regional average cost may embody inefficiently high or low levels of inputs. But without some knowledge of activity in relation to the outcome of care between units, it is impossible to justify any particular level of cost as a 'standard'. Nonetheless, even in the absence of unit-specific outcome data, defining appropriate or 'standard', reimbursable care for different modalities and patient characteristics could be undertaken by developing lists of indications for the use of different modalities based on the literature, which could then be used by expert panels of physicians to rate the treatment of cases on appropriateness grounds and to set standards of care (Park, Fink, Brook, and others 1986).

Comparing efficiency between units

Once the cost and modality definitions are clear and data are properly collected, the cost variations between units are more likely to reflect genuine differences in resource use. However, these variations do not automatically signal differences in efficiency between units. Modality cost differences between units can be caused by a large variety of interlocking factors such as the relative balance between modalities in the workload of the unit (one modality can affect another's costs); the age, severity, social and personal characteristics of patients; research and teaching activity; the physical lay-out of the unit, and so on. It is particularly important also to have information on the levels of activity, costs and outcomes of transplantation in a unit before reaching any assessment of the efficiency with which dialysis is provided. Differences in modality costs can also be brought about by variation between units in the level of care given to similar patients. Without data on the relative outcomes from each dialysis modality of the different degrees of lavishness and parsimony practised by units (allowing for case severity, and so on), it is impossible at present to be sure what level of costs is appropriate and should be the objective of budget managers. Similarly, in the future under a provider market, it is difficult to see how the purchasing agent will be able to choose sensibly between the renal units available, given that there are large cost variations but no knowledge of what causes them or what consequences they entail for patient survival and quality of life.

Costing further expansion

In Chapter 3, it was stated that many units were approaching their maximum physical capacity. Without physical expansion at the hospital, none of their programmes could expand significantly. A number of units are therefore likely to face very high marginal costs for even small increases in the number of patients treated. For renal budget managers in the future, it will be important to be able to identify the cost steps involved in further expansion, either to justify extra allocations under a process of regional funding, or to cost services appropriately in a provider market. Thus, units need to be able to identify marginal costs as well as more conventional average costs if they are to estimate the costs of increased acceptance rates or, indeed, changes in internal policies. Again, there is little evidence that renal units currently have access to these data. Funders will also require access to similar information otherwise resources will not be directed efficiently to those units where marginal costs are likely to be lowest, taking into account patient accessibility and quality of care.

Conclusions

In his survey of budget management in renal units, Steele (1988) concluded:

> Most budgetary systems at the moment are historical records of expenditure rarely offering the opportunity to practice real financial management.

According to many consultants, even this is an overstatement, since all those surveyed by Steele felt that there was a tremendous need for greater accuracy in the expenditure statements they received. Most consultants said they wanted to be budget holders and to manage their own bundle of resources, but complained that this was not possible without accurate, timely and clinically relevant expenditure data. There was little evidence that financial data were systematically reviewed by clinicians or that managerial decisions within units were influenced by them. To remedy some of these deficiencies there is a need to:

1. clarify the scope of renal unit budgets and the costs to be included in cost comparisons (for example, the

overspill costs of renal units into inpatient general medicine);

2. clarify the managerial powers to be given to renal unit budget-holders to change patterns of resource use (for example, nursing staff inputs);

3. reach agreement on costing methods and conventions and on the approximate resource profile of each modality;

4. produce timely budget and expenditure reports in a range of forms corresponding to the specific management task in hand (for example, marginal costs for looking at activity changes);

5. ensure that the budget is more than a projection of likely expenditure, but includes an integrated set of financial and non-financial objectives for the unit over the relevant time period, agreed between the clinical staff, the hospital management and the funding bodies.

These sorts of local changes may have at least as great an impact on improving efficiency as the experiments currently underway in budget setting through either regional planning or a competitive provider market. Chapter 6 sets out some of the detailed internal operational changes which units may pursue to improve efficiency within this context. The National Audit Office has also recently produced a good practice guide to the setting and monitoring of budgets in the NHS which is appropriate to renal units (National Audit Office 1989).

5. PLANNING THE MIX OF PATIENTS TO BE TREATED USING A SIMULATION MODEL

Ruth Davies

Planning services in a changing environment

The number of patients who are under treatment for ESRF by dialysis or transplantation continues to increase. Over the past decade, changing treatment methods have improved patients' prospects of survival while enabling increasing numbers of older people to be accepted on dialysis/transplant programmes (for example, CAPD from the late 1970s and cyclosporine A from the mid 1980s). In order to contain the increasing expense, most UK health authorities have attempted to limit costs or, more directly, to control the provision of services.

The government's white paper on the future of the NHS (Secretaries of State 1989) indicates that in the future services will not only have to be costed and budgeted but also marketed by the service providers who may be competing for the 'custom' of the different districts within their locality. The onus will, therefore, be on the renal units to price their services and to specify the treatments, treatment policies and facilities on offer. They will thus have to ensure that the promised treatments can be provided at the agreed price.

Renal units already need detailed planning information to keep within cost limits. The proposed new system will create even more pressure to price patient care and to budget services. Many uncertainties in renal medicine affect such estimates. Patients frequently have to transfer from one type of long-term treatment to another. New treatments may affect both costs and patient survival. Furthermore, fluctuations in the demand for treatment will presumably affect a renal unit's income and hence its ability to provide services for existing patients. Planning models are needed to indicate how patient numbers are likely to change and to evaluate the probable effects of these uncertainties: for example, to determine the point at which further expansion of activities can only take place with new buildings and/or additional staff.

Simulation is a particularly useful technique for modelling systems which exhibit uncertainty. Simulation models have been developed to describe the activities of renal units both at local level (Davies 1985a) and at national level (Davies and Davies 1978b). The major benefits of simulation (Davies 1985b) over other predictive techniques are that it can:

1. use information about individual patient characteristics such as age and treatment history;

2. describe resource constraints on treatment availability such as the matching of kidney donors with prospective recipients and the limitations on the availability of unit dialysis places;

3. provide workload information to facilitate costing;

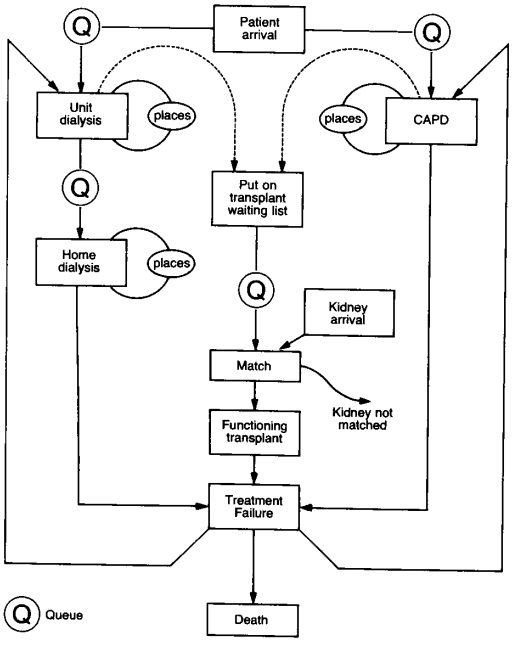
4. be easily adapted to reflect abrupt or gradual changes in the demand for treatment, treatment practice or policy.

This chapter describes a simulation model that has been developed for use in planning renal services at both local and national level. The development work on the model was supported financially in the first two years by the Medical Research Council. The model provides information which will be particularly useful for developing and evaluating plans in the context of the complex contractual arrangements which will exist after the implementation of the government's white paper (Secretaries of State 1989).

Description of the simulation model

Figure 11 shows the way the model describes the progress of patients through the treatments: unit haemodialysis, home haemodialysis, CAPD and the transplantation of a cadaver kidney. On each occasion that a simulated patient reaches a decision point, the choice of activity and the length of that activity are sampled from probability distributions.

Figure 11: Progress of patients through the simulation model



Once the program has determined that a 'patient' needs a particular treatment, the program checks to see whether that treatment is available. If it is, the 'patient' will start the new treatment immediately. If not, in certain circumstances, the program may allocate an alternative treatment (for example new 'patients' for whom there are no unit dialysis places may start treatment on CAPD). Otherwise the 'patient' is put on a waiting list. In Figure 11 these are shown as queues. The simulation ensures that once 'patients' are on the transplant/dialysis programme, they are never without treatment.

'Patients' waiting for home dialysis, for example, continue unit dialysis until their homes are ready. 'Patients' with a failed transplant return to their former mode of dialysis treatment regardless of the constraints on those resources (for example, extra beds or machines may have to be temporarily made available to accommodate them). 'Patients' on the transplant waiting list continue dialysis treatment until a suitable kidney becomes available.

Other versions make different assumptions and include other features of dialysis/transplant programmes such as: live-related transplantation, transplantation as the initial treatment for some patients and minimal or self-care dialysis.

Figure 12: Input required and output produced from the simulation model

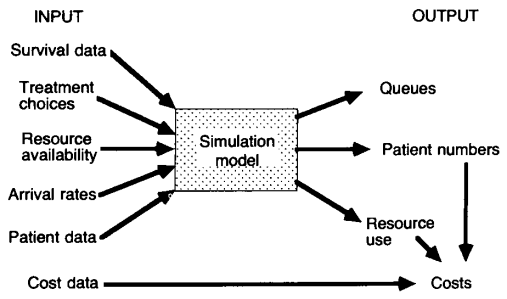


Table 11: Details from a computer printout of the data entry for resource availability, arrival rates and initial conditions for district health authority 'x'

Maximum resources available

Unit	*Home*	*CAPD*	*Kid/Yr*
39	130	999	46

Arrival rate in year

Ages:	*0–15*	*16–64*	*65+*
	3	79	6

Initial conditions

Ages	*Unit*	*Home*	*CAPD*	*Graft*
0–15	1	1	3	4
16–64	30	95	59	173
65+	2	3	10	2

	On transplant WL	*Others suitable for transplantation*
0–15	3	2
16–64	90	43
65+	12	5

Input to the simulation model

The simulation model requires survival data, information about resource availability and treatment choices and current numbers of patients (see Figure 12). The data is entered either directly from the keyboard or analysed from an existing database at unit, regional or national level.

Table 11 shows an example of resource use and initial conditions data from a health district renal unit (referred to as district 'x'), used in some simulation runs. The survival data were based on an analysis of the 1986 EDTA registry file.

Simulation input may be varied to show the effects of different treatment methods or planning policies on the output.

Table 12: Report from the renal simulation program showing patient numbers and activities after two years of simulated time for district health authority 'x'

Patient numbers by treatment mode and risk category

	0–15	*16–64*	*65+*	*Total*	*95% confidence*
Y Gft	1	34	1	36	5.8
M Gft	5	175	4	185	12.2
Unit	2	36	3	40	2.1
Home	2	98	3	104	16.1
CAPD	5	126	7	138	15.9
Sbtot	15	468	19	502	11.3

Excess demand for treatment since previous report

	Mean	*Max*
New patients queueing for haemodialysis	0	1
New patients queueing for CAPD	0	2
Patients waiting for a transplant	170	179
Number of unit places stretched to accommodate existing patients	1	3
Home machines with transplant patients	21	24

Numbers of selected events since previous report

New patients started on haemodialysis	13
New patients started on CAPD	32
New patients on second choice dialysis	25
Patients transferred from CAPD to haemo	8
Patients transferred from haemo to CAPD	9
Patients restarted on dialysis after failed graft	10
Patients newly established on home dialysis	18
Number of grafts performed	23
Number of cadaver kidneys unused	0
Number of deaths	15

Y Gft = patients with graft less than one year old
M Gft = other patients with functioning grafts
Unit = patients on unit haemodialysis
Home = patients on home haemodialysis
CAPD = continuous ambulatory peritoneal dialysis

Output from the simulation model

The output from the simulation model provides average results for each time period showing: information about the effects of the constraints on resources; the numbers of patients on different treatments; and their resource use and activities (see Figure 12). For example, using data from district health authority 'x', Table 12 shows a set of three tables printed out at each six month time period, from a five year simulation run (taking 25 minutes to run and an average of 40 repetitions).

As decisions and treatment times are sampled from distributions, several repetitions with each set of simulation input are needed to provide good estimates of average predictions. Numbers from individual units are bound to vary from these averages, however accurately they are predicted, because it is never possible to tell exactly when individuals are going to get a transplant, fail on treatment, or die. Confidence limits are thus produced to indicate the probable extent of the variability. The larger the unit, the more accurate the figures are likely to be.

As indicated in Figure 12, patient numbers and activity data can be costed. Furthermore, the confidence limits indicate the extent to which a budgeting system must allow for fluctuations from the predicted average numbers.

Using the simulation model to examine different scenarios

The simulation model is useful for helping an authority with a renal unit (in either the present or the proposed future administrative structure) to examine the implications of many different scenarios, for example:

1. engaging in a commitment to treat patients from a district whose patients they have not treated before;
2. losing the 'custom' of a district which had formerly used their renal services;
3. returning trained haemodialysis patients to minimal care instead of home dialysis;
4. accepting increasing numbers of elderly patients onto the programme;
5. improvements in transplant matching and survival;
6. a change in the availability of kidney donors.

These may be explored with different treatment mixes and policies. For example, the input to the simulation of district X was varied to show the effect of three different levels of resource provision on three different scenarios. The resource levels were: facilities remaining as now (see Table 11); no constraints on the availability of haemodialysis or CAPD; and limited haemodialysis but twice the availability of kidneys for transplantation.

The scenarios were: first, continuing with existing average arrival rates (see Table 11); second, the unit contracted to provide services for a further district requiring places for ten extra patients a year; and, third, the unit contracted to provide for the extra ten patients and services for an additional 50 patients already on renal/transplant programmes elsewhere.

Table 13 shows the results from the nine combinations of resources and planning requirements at two years. Figure 13 displays two of the combinations, showing the extent to which an increased transplant rate would reduce the pressure on dialysis facilities.

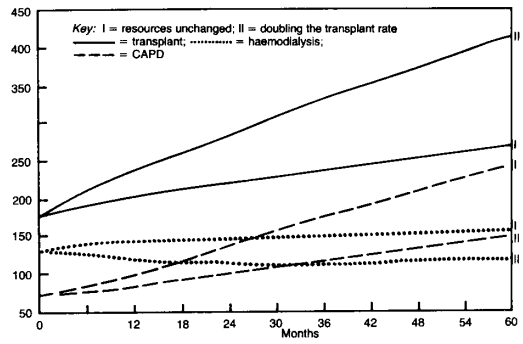
Practical implications of the use of the simulation model

The simulation model was made available on the EDTA registry VAX machine in 1988 but, since then,

Table 13: Predictions from the renal simulation program of numbers of renal patients after two years in district health authority 'x'

		Resource provision		
Demand for services	*Patient numbers*	*As now* *I*	*Unlimited haemodialysis* *II*	*Double transplants* *III*
A	Graft	221	221	287
Admission rate	Unit dialysis	40	70	39
as now	Home dialysis	104	128	74
	CAPD	138	88	102
	Total	502	506	502
B	Graft	221	221	288
Additional 10	Unit dialysis	40	77	39
admissions per year	Home dialysis	105	134	75
	CAPD	154	93	117
	Total	520	524	519
C	Graft	234	234	301
Additional 50 patients	Unit dialysis	40	78	39
at start and a	Home dialysis	120	151	91
further 10 per year	CAPD	170	104	131
	Total	564	567	563

Figure 13: Patient numbers in district health authority 'x' under two different resource assumptions (resources unchanged and doubling the transplant rate)



a microcomputer version has been developed which can handle as many as 5,000 patients – adequate for any region in the UK. More powerful versions are being developed for 386 machines to handle even larger numbers of patients.

The main practical requirement for using the model is not so much hardware as having people who can understand and carefully plan simulation runs in advance. As the model is very flexible, thought and time need to go into setting up simulation runs. Obviously, the model is only as good as the data on patients, treatment choice, resource constraints and costs which go into it. Furthermore, the results have to be interpreted and their implications thought through carefully before they are valuable in taking management decisions.

Using the simulation model for budgeting

In order to budget renal services, renal units need to predict patient numbers, plan related services and look at the implications and costs of different treatment policies on those services. The simulation model provides the data about the numbers of patients on different treatments and activities for costing. The effects of different treatment options, the provision of buildings (such as unit dialysis facilities) and their related services, and the effects of deliberately changing the catchment areas may be evaluated, costed and compared.

Once policies have been chosen, simulation predictions enable those planning services to monitor activities and costs as time progresses. The simulation can be run again and the policies reassessed at any time that the options or costs change.

6. EFFICIENCY ISSUES IN THE OPERATIONAL MANAGEMENT OF RENAL UNITS

Introduction

The pursuit of efficiency in renal units has, hitherto, been undertaken for the most part by renal consultants and other unit staff with relatively little direct contribution from hospital managers. Renal units have tended to be viewed as largely independent entities within the hospital where they are sited. This has arisen primarily because of the status of renal services as regional specialties, to a large extent planned and funded by the RHA. Thus, renal physicians are unusual in having experience of the 'business management' of their units, which is not commonly found among other consultants. They have long had to negotiate activity targets and funding with RHAs, deal with purchasing from private suppliers and raise money from charities. However, they tended to undertake this work without training and without appropriate information systems in a highly autonomous and, at times, idiosyncratic way. The objective of this chapter is to set out the scope of the internal management task in the renal unit and to describe some of the opportunities for improving resource use. It is argued that the integrated management of units is currently hampered by the lack of adequate management information systems, unhelpful divisions of responsibility for different aspects of resource management and the tendency to tackle management problems in a fragmented and *ad hoc* manner.

Three forces are operating to change this relatively unsystematic style of management: developments in the method of funding renal units which may weaken the direct links between renal consultants and regional officers (see Chapter 2); the increasing complexity of the management task facing renal units (see Chapters 3 and 4); and the trend throughout the NHS following the introduction of general management to make clinicians more accountable for their resource use and to incorporate them in the mainstream of hospital management. In many hospitals, clinical work is beginning to be explicitly managed and clinicians trained to take on this task. One example of this is the trend in certain hospitals, most notably Guy's Hospital, London, to appoint consultants as either clinical directors or divisional managers responsible for managing the budgets of individual consultants.

The idea of having clinical directors at consultant level, each responsible for a coherent area of clinical activity, usually a specialty, was derived from the clinical management system developed at the Johns Hopkins Hospital, Baltimore, a leading teaching hospital in the USA. At Guy's, which was the first hospital in the NHS to introduce such an arrangement, there are 13 clinical directors, all of whom are members of the hospital management board, (Buxton, Packwood and Keen 1989). The role of the clinical director is to ensure that the views and needs of consultant colleagues are taken account of in the management of the hospital, to negotiate workload and funding with individual clinical firms and to hold and manage the budget for the specialty. This means that individual consultants will normally deal with their clinical director over any management issues before matters are taken to a higher level. The attraction of an arrangement of clinical directorates for the general manager of the hospital lies in the fact that it provides a series of clear channels of communication between clinicians and general managers and it entails senior consultants sharing many of the tasks which previously managers had to undertake alone, such as attempting to balance the resource demands of each firm against the hospital's likely income. Schemes based on the notion of clinical directorates are viewed with general unease by renal physicians who are reluctant to see their autonomy reduced and anxious that their independent sources of funding from charity and endowments should not be apropriated by other specialties.

However, it is becoming increasingly difficult for renal consultants to cope with an expanding clinical and managerial role without changes in the organisation of renal unit management. Steele (1988) identifies two broad options by which renal units could become more closely linked to the general management of the hospital: the first would be for renal consultants to hand day-to-day managerial functions, such as purchasing, personnel management, financial management, and so on, to the appropriate managers within the hospital and to concentrate on strategic and clinical issues; the second would be to develop a better management support system within the renal unit so that the traditional pattern of relatively autonomous renal unit management could persist into a new era. The second option would appear to be more compatible with a system of internal hospital management based on clinical directorates, with senior members of the consultant staff playing a major role in management. The first option tends to imply the more conventional pattern of two parallel systems of clinical and non-clinical management headed by consultants and 'managers' respectively. In either case, change implies some reduction in the autonomy of units and a concomitant increase in the systematisation of unit management. At present, many consultants are uncertain of the management roles and responsibilities of the RHA, DHA, hospital and the renal physician. This confusion is symptomatic of a transitional period in which the straightforward separation of the regional specialty from the management of the hospital is under attack, but has not yet given way to a coherent alternative.

The next section describes the current arrangements for the internal management of renal units and identifies some of their principal limitations. It then goes on to identify the main areas where efficient internal management of renal units can improve resource use (for example, the use of equipment,

consumables and purchasing). The chapter concludes with some broad recommendations for change.

Current management arrangements in renal units

The system of management

It is still rare for renal units to have an identifiable individual, clinical or non-clinical, who is designated as the renal manager. In Steele's study of ten units in 1988, only St Bartholomew's Hospital in London had a renal manager. There are more examples of hospitals with non-clinical specialty managers in which the manager for general medicine also has responsibility for the renal unit (for example, Freeman Hospital and Royal Victoria Infirmary, Newcastle). The role of these managers is to manage the budget, prepare development bids, collate and interpret activity data and represent the consultants to unit management.

In most units, the formally identifiable part of the management of the unit appears to take place through meetings of some or all the members of the multidisciplinary team of staff who contribute to patient care in the unit. These meetings are almost invariably chaired by a renal consultant. Units vary in the frequency of such meetings and their subject matter. Meetings range from weekly or monthly to 'infrequently' according to Steele (1988). Attendance also varies greatly even when similar subjects are under discussion. In some units, weekly review meetings on the progress of individual patients include all professional staff in the unit; in others, only consultants and senior clinicians are involved. It is rare for meetings concerning the management of the unit, as opposed to individual patients, to include members of hospital staff from outside the renal unit, such as the acute unit accountant or general manager. Management groups appear to have arisen piecemeal and tend to reflect the working styles of individual consultants. Thus, for example, at St Thomas', the management group responsible for monitoring expenditure against budget in the renal unit grew out of a 'hardware working party' convened to take decisions about the purchase of equipment and to protect individual members of staff from excessive sales pressure from commercial companies. Monthly expenditure statements (excluding nursing costs) for the unit are discussed by a group comprising the consultant and administrative, technical and nursing staff representatives. In this case, the monthly production of data by the hospital finance department structures the frequency of meetings.

Management information

It is relatively uncommon for those responsible for the internal management of renal units to have access to information from an integrated management information system which incorporates and links clinical (audit), financial and activity data. There are considerable quantities of activity and financial data collected within the hospital, and locally within units, often on computer. However, very little effort seems to have been made to identify the management information needs of consultants and others running renal units and to set up some form of regular, key-item reporting. In this respect, renal units are probably no worse than many other parts of NHS hospitals.

The computer systems which exist within units could, in general, be used more fully than most are. Systems tend to have been installed separately for clinical, financial or activity monitoring purposes, but never for all three functions. However, existing local systems could be developed for costing, budgeting and performance monitoring in addition to their present more limited uses. Steele (1988) argues that if consultants were using their own systems and felt that they 'owned' them and generated the performance and financial information contained within them themselves, they would regard managing the budget in a more positive way. At the same time, the data from local systems would be more likely to be accurate, relevant and timely. However, money and programming skills would be required to change existing computer systems and to help their users develop them in ways which would assist efficient unit management. Small steps have been taken in this direction in a minority of renal units.

Efficient resource use in renal units

It is extremely difficult to compare the overall efficiency of renal units and derive management lessons from such comparisons with the information currently available. Comparisons are complicated by differences in patient characteristics, unit capacities, unit facilities, accounting conventions, and so on. However, each unit offers a rich fund of experience and ideas about ways of saving money and improving the efficiency with which resources are used, since each unit has at some time had to manage increases in demand within tightly constrained resources (see Chapter 3).

Efficient use of equipment

Efficient use of equipment can make a major contribution to the overall efficiency of a renal unit (Kenward 1989). Different patterns and extent of use of machines have direct implications for staffing levels and *vice versa*. According to a survey of haemodialysis units in the UK undertaken in September 1983, most units (85 per cent) appeared to be using a system of two shifts per 24 hours for six days of the week (Fuller 1984). There was a general view that between four and six hours' dialysis three times weekly was the requirement of most patients. Despite having the equipment to dialyse for more of the time, no unit was operating four shifts in a 24-hour period. Only 15 per cent were operating with three shifts. The principal explanation put forward for this was the inability of units to obtain further resources for an expansion in nurse staffing. It was suggested that if staffing constraints could be eased, a practicable maximum use of machines would be a pattern of six days' dialysis with up to three shifts per 24 hours, providing that average dialysis times did not exceed

six hours. Steele (1988) argues that a similar pattern is still generally regarded as the feasible maximum utilisation of machines. Each station would, therefore, support six patients, including an allowance for the temporary care of home dialysis or CAPD patients who have experienced problems in managing on their own.

Current practice in renal units still indicates wide variation in the intensity of use of equipment. For example, the Oxford renal unit reported running three sessions daily, seven days a week, from 8.00am Monday to 5.30am Sunday morning, with an additional shift from 12 noon on Sunday to 8.30pm the same day for six patients and any emergencies (Steele 1988). The Royal Victoria Infirmary, Newcastle, operated a four shift system daily. However, such intensive use of capital equipment is not universal (Davison, Read and Lewins 1984). On occasions, some units have only been operational three days a week. While the taken-for granted explanation for under-utilisation of machines tends to be staff shortages, Steele (1988) found that only two out of the ten units he studied gave staff shortages as a constraint on increased use of dialysis machines.

A further aspect of the efficient use of haemodialysis stations relates to the decision to keep numbers of stations routinely empty to meet problems in home dialysis and CAPD patients. Some level of cover is required for these patients, but there is a suggestion that many units may be over-generous in this respect, thus wasting resources on unused, but staffed, facilities.

The variable use of dialysis machines between units suggests that units should look carefully at whether there is identifiable need for further haemodialysis time and, if so, investigate ways of expanding machine use at least cost, taking account of patient convenience. This involves critical review of the pattern of working and the number and type of staff required to manage the workload. It may be possible for some units to increase the intensity of machine use without increasing staff costs; in other cases, the introduction of more shifts a day may only be possible with an increase in staffing. Overall, Kenward (1989) predicts a trend towards more but shorter shifts because of changes in clinical requirements and the need to maximise efficiency. These developments are likely to have a significant impact on staffing needs.

Staffing needs

Staff requirements in renal units should, in theory, be directly influenced by changes in clinical practice but, in reality, the level and mix of staff has not always been altered in response. Shift systems and staffing ratios tend to be historically set and have not altered as lengths of dialysis have fallen. On the other hand, the proportion of older, sicker patients being accepted for dialysis has steadily increased in the last decade and this may lead to a requirement for a higher or unchanged level of staffing. Staffing issues can be a sensitive area which directors of renal units may wish to avoid tackling, but staff costs, staff deployment and the appropriate balance of medical, nursing, technical, administrative and social work staff may be too important to ignore.

1. *Medical staff* Kenward (1989) describes a general trend in renal units for medical staff to spend less and less time on the routine care of patients on nurse-operated, hospital haemodialysis. Kenward (1989) argues that the role of medical staff in hospital haemodialysis today is primarily to feed new patients into the hospital haemodialysis system which should be very largely run by nurses. By contrst, CAPD is continuing to occupy a substantial proportion of medical staff time in renal units, along with care of acute cases of renal failure and the management of complications of all kinds. According to Kenward (1989), although the work of medical staff is changing, there is no evidence that units could manage with fewer medical staff. However, the recent policy initiative in *Hospital medical staffing: achieving a balance* (Steering Group for Implementation 1987) to expand consultant posts and reduce the number and hours of junior hospital doctors, coupled with the increased emphasis on providing senior out-of-hours medical cover, are likely to lead to a need to recruit more consultant nephrologists.

2. *Nursing staff* By contrast, Kenward (1989) challenges current nurse staffing levels and what he perceives to be a lack of management of the nursing budget. He argues that the recent real increase in NHS nurse salaries through the national regrading exercise, the sheer size of the nursing budget and changes in clinical practice should compel units to look afresh at the old questions of staffing levels and whether cheaper non-nursing staff can be substituted for a proportion of the nursing staff in hospital dialysis units without affecting the quality of care. In addition, it is argued that dialysis has become a more straightforward procedure with modern methods and equipment, reducing the need for trained renal nurses. Furthermore, it is argued that the nurse staff time required for training home haemodialysis patients is now rapidly falling as the proportion of home dialysis patients drops and that this should be reflected in staffing levels (Kenward 1989). On the other hand, units are tending to accept sicker and older patients than a decade ago.

Overall, therefore, the pattern of demand for nursing and equivalent staff input to units is changing in relatively complex ways which call for the proper management of one of the largest single components in the renal budget. Marginal adjustments to historically set nursing establishments through natural wastage may no longer be an adequate response to the changing clinical workload and the need for greater efficiency.

Kenward proposes that nephrologists should seriously consider reviving the role of the artificial kidney assistant (AKA) to work under senior nurse supervision to undertake the same sorts of tasks which the relatives of home dialysis patients are trained to carry out. It is not strictly necessary to employ trained renal nurses to put patients onto

haemodialysis, insert fistula needles and take them off at the end of a treatment session. This approach implies employing fewer nurses in total, but more higher paid, specialist nurses to supervise and direct the work of an expanded cadre of non-nursing, care staff. Appropriate job descriptions and lines of accountability would need to be established if non-nursing staff were to be used on any scale. If AKAs were to work alongside nurses, accountability should be to the clinical nurse manager. Kenward's views are at considerable variance with the policies of commercial dialysis operators in the UK, such as CDS and Unicare, both of which have adopted a policy of employing only trained renal and intensive therapy nurses and, instead of looking for cheaper substitutes, using these nurses flexibly, increasing responsibility levels and managing with fewer staff per dialysis station (see Chapter 7).

Kenward (1989) also raises the issue of whether units should offer a night shift given the 28 per cent premium on salaries payable to night nursing staff. The alternative to four six-hours shifts including a night shift would be a system of three shifts over an extended working day, or four shorter shifts each day reflecting the ability to undertake shorter dialysis than in the past, with no night shift (after midnight) in either case. Kenward calculates an annual saving of £100,000 on the nurse staffing budget in his unit (serving a population of 750,000) by providing three shifts, six days a week without a night shift and abandoning the Saturday night-Sunday morning shift. One drawback to any proposal to abandon the expensive night shift is the fact that its existence enables a minority of dialysis patients to continue to work full-time during the day and still fulfil family obligations without interference from their dialysis programme.

As well as deciding whether to run a night shift, units also have to consider the appropriate frequency and length of dialysis sessions which each patient requires each week. Most units work on the basis that the majority of dialysis patients require between four and six hours' dialysis, three times weekly, with variations for individual cases. However, there has recently been debate about the relative merits of thrice weekly versus twice weekly dialysis for routine patients. Twice weekly dialysis has been proposed as a way of economising on dialysis time and as a possible means of eliminating a number of shifts. However, there appears to be a clear trade-off between the number of treatment sessions a patient receives each week and the length of each session for successful dialysis and therefore, the length of shifts which need to be provided.

Changes in the number and length of shifts have obvious implications for the number of nurses and/or non-nursing equivalents required to run a unit. However, quantifying the effect of different shift patterns on the requirement for staff, also requires information on the number of haemodialysis stations and the number of dialysis days per patient per week. In Kenward's unit in South Cleveland, two formulae were devised to calculate the number of stations needing to be staffed and, thereby, the potential nursing workload (Fuller 1984):

1. $\dfrac{\text{Number of haemodialysis stations} \times \text{shifts per 24 hours} \times \text{days of dialysis per week}}{\text{Dialysis days per patient per week}}$

   = Total number of haemodialysis stations available for use per week

2. $\dfrac{\text{Actual number of occupied stations} \times 100}{\text{Available number of stations}}$

   = Occupancy rate

The second step is necessary since assuming 100 per cent occupancy would leave no places for back-up to the home dialysis programme, patients temporarily off CAPD and transplant failures requiring to return to haemodialysis. Account also needs to be taken of the effect of modern shorter dialysis on shift patterns.

Although the Cleveland formulae are helpful in estimating the actual number of stations which will have to be staffed under a particular shift regime in any particular time period, they do not provide any guidance for the final step required to calculate nurse staffing needs – that is, to determine the optimal ratio of nurses and other equivalent staff to occupied haemodialysis stations. This ratio tends to be set historically with incremental adjustments based on operating experience. However, this calculation can only be validly made with information on the effect of different staffing levels and input mixes on the standard of care offered to haemodialysis patients and their subsequent outcomes. This requires potentially controversial research, experimenting with varying staffing levels and mixes of staff, which has not yet been undertaken on any scale in the UK. Any experiments should arguably take into account the effect of staffing changes on patient satisfaction and the morale of the remaining staff. In certain respects, the nurse management practices of the private sector renal units now operating in the UK may provide helpful insight for NHS units trying to assess the appropriate level of nurse staffing. For example, Chris Cooper of Community Dialysis Services (CDS), an American firm now providing dialysis services at a unit in the UK, claims that CDS was able to reduce nursing costs without affecting the quality of care by using its nurses more flexibly than the NHS (Cooper 1989). This involved offering various permutations of part-time work and nurses undertaking tasks such as stock control, ordering consumables and simple equipment maintenance.

3. *Technical staff* A number of factors have led to a reduced need for technical support to renal units. Firstly, home dialysis has fallen as a proportion of the dialysis population from 64 per cent in 1979 to 42 per cent in 1983 as a result of the progressive introduction of CAPD. Since CAPD does not require expensive kidney machines, this has reduced the maintenance work of technicians. Secondly, there has been a trend towards sharing proportionating units between stations. Again, this should have reduced the requirement for technicians. However, to date, there is little evidence that this has been reflected in the number of technicians employed in renal units (Kenward 1989).

There may be savings to be made on renal budgets in this area and the possibility of contracting out the maintenance of machines to outside specialists should not be overlooked.

4. *Administrative staff* As the range of tasks undertaken by renal nurses expands and as clinical nurse specialists are increasingly appointed to run renal units, the role of administrative staff in renal units may come into question where their job descriptions overlap with those of senior nurses. Kenward (1989) argues categorically that the role of the renal administrator is shrinking rapidly. However, this is to take a one-sided view of the changing nature of the tasks facing renal units. As budget-setting and efficient resource management become increasingly important, it is at least as plausible to imagine that administrative staff will pass a proportion of their day-to-day administrative responsibilities to nursing staff while expanding their involvement in more strategic, managerial functions relating to areas such as expenditure monitoring, budgeting and cost improvements.

5. *Social work support* Social workers attached to renal units are experiencing greater demands on their time as higher proportions of elderly and socially disadvantaged patients come onto dialysis. Kenward's (1989) view, based on his experience of the South Cleveland renal service, is that the social needs and welfare benefit rights of dialysis patients have generally been inadequately served and the quality of life of chronically ill patients has suffered accordingly. He makes a case for an increase in the level of social work input to renal units funded from savings made in technical and administrative staff, and argues that if trained social workers cannot be found for this task by the local authority, additional nursing staff could be recruited, retrained and deployed to carry out some of this work. Again, the implication of the analysis is that the skill-mix required in renal units is changing and that traditional rigid distinctions between medical, nursing, social work and administrative tasks may have to become blurred in a quest for greater efficiency and flexibility.

Purchasing equipment and consumables

Issues of internal efficiency relating to staffing are inevitably controversial, particularly questions of skill-mix and levels of nurse staffing; units have, in general, taken only modest steps to review staffing issues systematically. Considerably more attention has been given to the purchasing of equipment and consumables, since this does not necessaily involve disturbing practice within the unit and consumables form such an important proportion of dialysis costs. There is evidence of substantial variation in the prices of comparable consumables and equipment charges to renal units. This suggests that careful scrutiny of who undertakes the purchasing function and the nature of the relationship with suppliers could pay dividends.

However, it is regarded by experts in renal dialysis management in the private sector as at least as important, if not more so, to monitor and control the subsequent use of consumables by care staff and patients if costs are to be reduced in this area (Dibblee 1989). Renal units require a considerable amount of various sorts of equipment (haemodialysis machines, water treatment equipment, air detectors, syringe pumps, and so on) which has to be progressively replaced. There is controversy about how this should be organised and who should have the responsibility to make the necessary purchasing decisions and for which sorts of items. Widely differing policies operate from one region to another, reflecting different views about how to secure the best prices from manufacturers and the appropriate level at which different procurement decisions should be taken.

In South East Thames, the purchase of all replacement renal equipment is centrally controlled by the regional medical officer and the regional scientific officer, on the basis that commercial companies are primarily interested in securing bulk orders since these are more profitable than deals with individual units and that this is reflected in lower prices. A policy of regional purchasing is also justified on the grounds that the regional supplies department can collate and update information on prices and specifications so that each unit does not have to duplicate this activity. Some renal consultants are prepared to accept a centralised policy as long as costs are in fact minimised by bulk purchase. However, for such schemes to work well, certain conditions have to hold: the region has to have access to good quality, clinical and technical advice; renal physicians in the region need to agree among themselves which sorts of equipment and consumables they wish to use; and the scheme has to be adequately funded. Wing (1989) argues that the South East Thames policy for the replacement of dialysis machines was hampered by funding shortages, since the RHA reaped the advantage of bulk purchase of a proportion of the necessary equipment, but did not fulfill the planned replacement programme in full, thus leaving individual units to negotiate the purchase of small amounts of equipment from a position of weakness.

In contrast to South East Thames, South Western RHA encourages a policy under which units purchase their own equipment on the grounds that consultants cannot agree on standard items; that consultants are, in practice, able to negotiate better prices; and that central purchasing leads to inconvenient, bureaucratic procedures (Steele 1988). In some regions, there are 'mixed' policies, in which equipment is purchased by the RHA while consumables such as dialysers and lines are purchased either by the renal unit or the local DHA.

Although there does not appear to be any hard evidence about whether a centralised or a devolved policy is preferable, many consultants believe that their superior knowledge of their own working practices and of the way in which equipment and consumables can be deployed, together with that of their staff, mean that they are in the best position to obtain competitive deals with suppliers and that purchasing

decisions should, largely, take place at unit level. Consultants are, not surprisingly, critical of systems which they perceive to be bureaucratic and involve regional and district hospital managers and supplies specialists. If budget setting and budgetary management are increasingly expected of clinical directors of renal units, it would seem appropriate that unit directors be given the authority to make purchasing decisions on which they can subsequently be held to account. This should not, however, be a pretext for renal consultants to avoid formal procedures for assessing rival bids from suppliers (for example, through competitive tendering exercises). Steps must also be taken to quantify the costs and benefits of a flexible devolved system as against the potential economies of scale of a centralised system which may be less flexible.

In the context of a unit-level, devolved approach to purchasing, questions still arise as to which staff group within the unit should take the lead in recommending the purchase of specific items of equipment and consumables. Kenward (1989) argues strongly that unit directors should be allowed the freedom to negotiate the purchase of proportionating units based on their clinical experience and knowledge of the market. He recommends that the purchase of dialysers and blood lines for haemodialysis should be the responsibility of the senior nurse in the renal unit on the basis that the nursing staff have the best day-to-day understanding of which dialysers are clearing effectively and which are capable of re-use if the unit practises dialyser re-use. Questions of biocompatible membrances should be dealt with after discussion with the medical staff. Kenward (1989) contends that decisions on the purchase of consumables for CAPD should be undertaken by the medical staff because they make a major input to the care of the CAPD patients.

However, recent experience in Belfast suggests that efficiency considerations do not stop with decisions by medical staff on the type of fluids to be bought and the stock which each patient should hold. At Belfast City Hospital, a pharmacist with special responsibility for the CAPD service was appointed to organise the supply of fluids, eliminate wastage and counsel patients on pharmaceutical aspects of their treatment, thus relieving medical and nursing staff of tasks which had come to interfere with their work in training new patients for CAPD and home dialysis (Mawhinney, McMullan and Mulgrew 1989). In the process, a new contract was negotiated with the supplier to include delivery of CAPD fluids directly to patients' homes and tying in the purchase of dianeal fluids directly with intravenous solutions. Overall, the pharmacists involved contend that direct savings to the renal budget of approximately 5 per cent were possible in the first year of the scheme.

Use of consumables

Efficient resource use within renal units depends on using equipment intensively, staffing appropriately and negotiating favourable rates with suppliers, and on the way consumables are used. There is some scope for improvements in the use of consumables during dialysis. A number of commercial firms have specialised in providing NHS units with management support specifically in the control of consumable use by patients dialysing at home, on the basis that the majority of day-to-day dialysis costs go on consumables. Table 14 gives an example of the consumables' costs of a typical five-hour hospital haemodialysis session (Kenward 1989). Blood lines and dialysers dominate the consumables, accounting for approximately 60 per cent of the costs. Thus, it would seem logical to begin by looking at ways of reducing these costs before targeting the other disposables.

The costs given in Table 14 are based on single use of dialysers and blood lines. Re-use of dialysers has reduced in UK as the price of dialysers has fallen in real terms. In other countries, notably the USA, there has been far greater interest in re-use. However, conscious of the high cost to the NHS of these consumables, a number of centres re-use dialysers and lines and it is claimed that considerable financial savings can still be made, particularly when both are re-used. Other operators have disputed this (Dibblee 1989). It has been estimated in the Oxford renal unit that each dialyser can probably be used at least three times with a possible average of six times. Home haemodialysis patients are generally trained and encouraged to re-use dialysers where possible, but hospital units tend to practise discard dialysis claiming that they do not have the staff time to devote to re-use. The staff time required to prepare dialysers and lines for re-use has to be taken into account in calculating any savings generated, as well as possible effects on the use of saline and so on during dialysis with a recycled dialyser. A new machine for processing used dialysers, the Renatron, is currently being tested in the Oxford renal unit. It may automate the process to the point where the staff time argument against re-use evaporates, although again the merits of automating re-use have been disputed (Cooper 1989).

There is considerably less scope for rationalising the use of the other disposables listed in Table 14. The dialysis concentrate comprises almost 20 per cent of

Table 14: Running costs for a five-hour treatment using a single proportionating machine

Product	*Cost per treatment*	*Cost per week*	*Cost per year*
Blood lines	5.89	17.67	918.84
Priming set	0.75	2.25	117.00
Fistula needles	0.70	2.10	109.20
Dialyser	6.40	19.20	998.40
Concentrate (6 litres)	3.78	11.34	598.68
Syringes	0.32	0.96	49.92
Heparin	1.52	4.56	237.12
Saline	1.00	3.00	156.00
Dessing pack(s)	0.45	1.35	70.20
Power	0.50	1.50	78.00
Total	21.31	63.93	3333.36

Source: Kenward (1989)

the consumables cost, but its use is largely a function of the length of dialysis required by the patient for satisfactory clearance and cannot easily be altered. However, a few renal units have attempted to tackle this element of cost by producing their own haemodialysis fluids. It is possible to undercut the commercially available product in this way, but only after investment in the necessary equipment. The cost of the equipment can only be adequately recouped by selling fluids to other units, since the quantities consumed in a single unit will rarely be sufficient to support economical production. According to Kenward (1989) there was little potential to make savings on saline, heparin or dressings, or any of the other haemodialysis consumables. This contrasts with the views of a number of commercial companies which provide stock management services to dialysis centres to aid in the control of product usage. It is argued that since approximately two-thirds of home dialysis and CAPD costs are accounted for by consumables, controlling the way patients use consumables at home plays a major part in overall cost control in renal units (Dibblee 1989). Patient training and feedback to patients of the costs of the products they have used are the main methods employed to control costs.

FP10 prescribing

A number of renal units attempt to reduce their consumables costs by encouraging the GPs of patients on CAPD to prescribe CAPD fluids on form FP10, thus shifting the costs from the cash-limited hospital budget to non-cash-limited family practitioner services (FPS) expenditure. FP10 prescribing has also been used for cyclosporine and it is possible that erythropoietin prescribing could be shifted to FP10. Wing (1989) accurately describes this as a 'budgetary counterfeit', since no actual savings to the NHS are made and there is no evidence that FP10 prescribing is cheaper than hospital prescribing. Indeed, the opportunities for bulk purchasing by hospital units suggest that the opposite may be true. In addition, the lack of constraints on FP10 prescribing may lead to excessive prescribing under this scheme. From the unit, district or regional perspective use of FP10 prescribing may appear to reduce costs and improve efficiency. From the viewpoint of the NHS as a whole, this is highly unlikely. However, the current perverse incentive is for units to attempt to shift costs using FP10. Units which do not use FP10s can, unfairly, appear excessively costly and, by imputation, less efficient than their comparators which pass on their costs to the FPS.

It is unclear what effect the introduction of indicative drug budgets for GP practices under the government white paper will have on FP10 prescribing of CAPD fluids and cyclosporine (Secretaries of State 1989). Working paper no 4, *Indicative prescribing budgets for general medical practioners*, states that, 'the presence on a practice list of a patient or patients in need of unusually expensive medicine' will be taken account of in the setting of indicative drug budgets for practices (Department of Health 1989b, para 2.4). This suggests that GPs may be able to argue that CAPD expenses are a legitimate extra expense to be allowed for in setting their drug budgets. On the other hand, the introduction of indicative drug budgets will mean that FPS pharmaceutical expenditure is no longer open-ended. Regions will each year receive a block allocation to cover the cost of all prescriptions within their FPCs (Department of Health 1989b, Para 2.1). This will discourage the perverse incentive to shift costs from hospital to FPS budgets. In the same vein, the fourth working paper also states:

> The Government's long-standing policy is that the doctor who has clinical responsibility for a particular aspect of a patient's care is also responsible for prescribing any necessary drugs to treat that aspect. Where clinical responsibility is shared, it is for the doctors concerned to decide who should prescribe. (Department of Health 1989b, para 2.3)

In the case of a patient on CAPD, it would seem likely that the intention of the white paper is for the nephrologist who accepted the patient for dialysis, who placed the patient on the CAPD modality and who continues to have responsibility for the patient's renal condition, to prescribe fluids and drugs from the renal unit budget.

Clinical support services

The ability of a renal unit to maximise the use of its equipment and staff on behalf of patients is also dependent on the existence of effective collaborative arrangements with other clinical specialties in the same hospital, such as pathology, psychiatry, surgery or urology. The availability of general surgical or urological expertise is particularly crucial for efficient operation of a unit. It is necessary for a renal unit to be able to call on such skills in the investigation, assessment and long-term management of many dialysis patients. Patients starting dialysis require surgery involving the insertion of arterio-venous fistulae or catheters into the peritoneal cavity. These devices require adjustment or replacement periodically. One unit reported to Steele (1988) that the surgical specialties were unable to offer the renal unit sufficient support for the smooth running of the dialysis programme.

One possible solution to this problem, congruent with contemporary thinking on efficient clinical resource management within hospitals, would be to extend the renal unit budget to include a realistic element to meet the surgical costs of the dialysis programme. In this way, the nephrologists could contract with the surgeons for a specific level and type of surgical support and control the necessary funds. Such a development would require and would fit in with an exercise to provide estimates of the full costs of RRT including 'overspill' costs and to set renal unit budgets accordingly, either under a conventional system of regional funding or under a provider market. Under a provider market, the renal unit would have to ensure that the prices it charged would also enable it to 'purchase' the necessary clinical

support services to enable it to provide the contracted level of dialysis services.

Conclusions

Renal physicians have a relatively long history of responsibility for the management of a wide range of human and other resources because of their positions heading largely self-standing units serving a regional or supra-district catchment. There seems little doubt that the demands placed on renal units in the future (for example, to take on more patients within existing resources) will intensify and that the emergence of a provider market for specialised tertiary services in the NHS will require units to give greater attention to the systematic and integrated review of their activities and costs. Unit directors and their staff have already produced and implemented many efficiency-oriented innovations. However, these have tended to be fragmented and *ad hoc*, reflecting the particular preoccupations of clinical staff or the problems encountered by chance in day-to-day working. This arises at least in part because directors of renal units are rarely able to call on the management support and information systems requisite to the scale and complexity of their management tasks. There is scope for developing the existing computerised information systems in units to assist with this. More could also be done by renal consultants to exchange their ideas and experience in areas such as reuse policies, staffing and so on.

In part, too, there is some evidence that cost-reducing or efficiency-improving changes within units are hampered in many units by a fuzzy or unhelpful division of management responsibilities between staff groups, coupled with an administratively convenient, but clinically meaningless, demarcation between different budgets. For example, three important areas for efficient management are hampered by the division of managerial authority and/or conventional budgeting assumptions: equipment and consumables purchase, nurse staffing in relation to the number of shifts and the availability of clinical support services. In the field of equipment and consumables purchasing, both regional and local purchasing arrangements exist, sometimes side-by-side, with little hard evidence on their relative advantages and disadvantages. Reform of nurse staffing in renal units has been discussed over a long period, but to little effect, since in many cases, either nurses are outside the immediate control of the director of the renal unit, or the expenditure on nursing is of no concern to the nephrologist because it falls on the general nursing budget of the hospital and not against the unit budget. The availability, or lack of availability, of clinical support services again depends on a clear understanding of who is empowered to summon the necessary resources. One possible way forward would be for the renal unit budget to be extended to include an allowance for these services which could be 'purchased' by the unit director as required. Again, the implication is that efficient internal management of renal units depends on including the appropriate range of resources within the renal unit budget, establishing clearly who is responsible and accountable for deploying those resources and providing the renal unit manager with the necessary information on cost and activity for effective decision-making.

7. THE ROLE OF THE PRIVATE SECTOR IN THE PROVISION OF DIALYSIS SERVICES: GENERAL ISSUES AND THE WELSH EXPERIENCE

Introduction

From its inception, the NHS has had close relations with the private sector in health care. The vast majority of NHS equipment, pharmaceuticals and other consumables are supplied under contract by commercial companies. Since 1979, successive Conservative governments have promoted the contracting out of ancillary and support services (for example, catering, cleaning, estate management) through competitive tendering exercises involving bids from private companies and in-house staff. The rationale for this policy was that private companies were more likely to be able to offer non-clinical services more cheaply than direct labour organisations since they were accustomed to operating in a competitive market. In addition, it was believed that the experience of competitive tendering would improve the management of non-clinical services when provided directly by NHS staff.

Until the mid-1980s, the government's policy of encouraging contracting out in the NHS was confined to ancillary and support services. However in 1985, Kenneth Clarke, the Minister of State for Health, drew attention to the opportunities which were available for health authorities to contract out patient care to private hospitals in situations where this might prove either more efficient or a more timely source of care pending developments in the NHS (DHSS, 1985). Although this was interpreted by critics as a radical policy departure, the NHS had long relied on private and voluntary sector provision for a restricted range of services, most notably certain psychiatric services, abortions and sterilisations. As a result of ministerial encouragement, many health authorities have subsequently used private hospitals to provide clinical sevices with particular emphasis on elective surgery, such as total hip replacements, for which substantial waiting lists exist in the NHS. More recently, there have been moves in a number of districts to privatise paramedical, diagnostic and investigative services, such as pathology laboratories, where workload is increasing rapidly. This is the subject of controvesy between those who argue that it reflects mere dogma in the absence of hard evidence that commercial services are better or cheaper and those who contend that private laboratories are cheaper and better managed (MacDonald 1989).

It is certainly true that comparatively little is known about the relative cost and efficiency of public and private providers of most clinical services in the UK. The recent NHS white paper seeks to establish a 'provider market' in NHS provision which opens up a wide range of clinical services to the possibility, at least, of private sector competition. Inherent in the government white paper, *Working for patients*, is the view that it matters little whether an NHS service is provided in the public or private sector as long as the most efficient supplier is chosen and the service remains wholly tax-funded and free at the point of use (Secretaries of State 1989). The separation of health care funding from provision in this way will require NHS purchasing organisations (RHAs and DHAs) to develop new skills in clinical contract specification and negotiation; contract management, monitoring and quality assurance; and the general regulation of private providers and standard-setting for public and private providers. Although there are arguments in principle and in theory both for and against the private provision of publicly-funded health care, it is reasonable to assume that a decision to accept an in-house tender or opt for private provision requires rigorous comparison of costs and benefits in individual situations. There is unlikely to be an 'iron law' governing contracting out. However, one advantage of the competitive tendering process which usually accompanies contracting out is the way in which tendering, if properly undertaken, should compel the purchaser to include some specification of the quality of service which is required. This should be of benefit regardless who wins the contract.

In renal services, experience of private sector direct provision of services predates the white paper and the 'provider market'. In the dialysis field, commercial interests are long established through the provision of machines, dialysis fluids, blood lines, drugs and other disposables. However, a new dimension in the relationship with the private sector became apparent in the mid-1980s as commercial companies moved from supplying NHS dialysis units and in some cases helping units with financial information and stock management, to the direct provision of dialysis services. The first private dialysis units were set up in Wales in 1985 as part of a Welsh Office programme to increase the size of the dialysis service in the Principality. The Welsh Office policy initiative, the operation of the commercial dialysis units in Wales and their subsequent academic evaluation are described in the remainder of this chapter.

Welsh Office policy on renal services

Background: treatment levels

The current level of RRT in Wales is similar to the UK as a whole. However, in the 1970s it tended to lag behind developments elsewhere in the UK. In 1980, the number of new patients accepted for renal replacement therapy in Wales was 22.5 per million, the fourth lowest out of 17 regions in the UK, compared with 24.6 per million in the UK as a whole. In Wales, as in the UK, rationing of RRT was a marked feature of provision and under-referral was

common. In 1980, Wales had two main renal centres in Cardiff and Rhyl serving a population of 2.8 million. These units specialised in home dialysis. The stock of patients was 118.9 per million, placing Wales in the middle of the UK regional league table, but only one patient over 65 years and 4 diabetics were receiving treatment (Wing, Broyer, Brunner, and others 1982). Even in the mid-1980s, there were considerable variations in the chances of receiving RRT within Wales depending on where patients lived, and no proper facilities anywhere for long-term, maintenance haemodialysis. The Welsh Office was aware of the inadequacies in facilities for RRT in Wales and was determined that Wales should have facilities for ESRF at least as good as those in the best provided English regions. Accordingly, policies were developed in the early 1980s to begin to remedy some of these weaknesses.

Policy for subsidiary renal units

In December 1983, the Welsh Office announced proposals to increase dialysis facilities in Wales to provide for about 50 new patients per million population per year. To achieve this it was decided to open a new eight-bed main renal dialysis unit at Morriston Hospital in Swansea to improve patient accessibility in South West Wales (McGlinn 1989). This was to be accompanied by an assessment of the need to provide additional 'subsidiary care centres' in more sparsely populated parts of Wales to improve local access and help increase the number of new patients treated. Following an appraisal of options it was decided to establish pilot schemes at Carmarthen in West Wales and Bangor in North Wales.

In April 1985, a main renal unit was opened in Swansea with a subsidiary renal unit (SRU) at Carmarthen which opened in October 1985. In August 1985, the Bangor SRU was opened with Rhyl acting as its main renal unit. The SRUs were to provide in-centre, self-care or nurse-assisted haemodialysis to a wide range of NHS ESRF patients who, for a variety of reasons, wished to attend and/or were referred by their consultant to the units. Patients were to be initially assessed at the main renal unit and transferred to the SRU for subsequent dialysis as directed by the NHS consultant. It was not envisaged that the SRUs would develop into main renal units and overall clinical responsibility was to remain with the consultant director of the appropriate main unit. Patients requiring hospitalisation for complications and those needing surgical treatment in connection with dialysis were to be dealt with at the main renal unit.

The Welsh development programme for dialysis worked on the assumption that the main renal units would operate wholly within the NHS, but that SRUs could be run by the public, voluntary or commercial sectors under contract to the NHS. Ministers saw in the expansion of renal dialysis services an opportunity to open up the health care market to experienced commercial and other operators in situations where they could demonstrate the ability to provide a cost-effective service. The general view in the Welsh Office was that the commercial and voluntary sectors had the potential to deliver particular types of health care in specific circumstances, and might be in a position to cooperate successfully with the NHS (McGlinn 1989). In line with this policy of a 'mixed economy' in health services, which predated the white paper by five years, the Welsh Office invited proposals from NHS, voluntary and commercial organisations which had experience and had expressed an interest in operating a SRU. Potential operators had to show how they could staff, operate and manage the SRU, what prices they would charge and what proportion of the capital costs they would bear, based on minimum estimates of the demand for SRU dialysis prepared by the Welsh Office. In 1984, after appraisal of the eight tenders from public, private and voluntary organisations, the Secretary of State awarded the contract for Carmarthen to Community Dialysis Services Ltd (CDS) and for Bangor to Travenol Laboratories (Unicare).

The two pilot SRUs attracted a great deal of attention since they were the first private provision for ESRF in the UK. At each site, the private contractor was to provide a dialysis service which included the building, equipment, consumables and all staff except medical staff and, in return, the NHS, via the DHA, was charged an agreed fee for each dialysis session. The Welsh Office regarded the venture as experimental and commissioned a clinical and economic evaluation to assess the cost-effectiveness of the SRUs and to recommend how best to develop RRT facilities in Wales in the future. An evaluation report was completed in February 1989 covering the first three years of the two SRUs (Smith, Cohen and Asscher 1989). It became clear, however, while the evaluation was underway, that additional facilities would be required to support the expansion of services at the main renal unit for South East Wales. Despite the fact that the evaluation was carried out ostensibly to influence future policy, the Secretary of State decided in May 1987, following an assessment of options, to expand provision in South East Wales by establishing two more SRUs. Tenders were invited for SRUs at Cardiff and Merthyr Tydfil ahead of the results of the research. Both SRUs went to Travenol Laboratories (Unicare) on contract to the NHS and were due to open late in 1989.

Impact of the dialysis expansion programme and subsidiary renal units, 1984–1989

The number of new patients accepted for dialysis in Wales inceased dramatically after the inception of the two SRUs and the new main unit at Morriston Hospital, Swansea. In 1984, the number of new patients accepted was 31.4 pmp. This increased progressively to 60.4 pmp in 1987 and has continued to rise to 62.0 pmp in 1988. Similarly, the stock of patients increased substantially (up by 66 per cent) in the same period (Smith, Cohen and Asscher 1989). This has been due to the combined effects of increases in activity at all the Welsh renal units, not just the SRUs, although a major contribution has come from the SRUs. The patient profile changed, with more

elderly and diabetic patients overcoming the hurdles of adverse selection as supply increased. The balance of modalities altered as hospital haemodialysis and CAPD expanded.

The expansion policy aimed to increase the total level of treatment and to reduce geographical disparities in the use of dialysis. As expected, the provision of three entirely new units in areas not previously served has distributed the patient population more widely. Major steps have been taken in reducing geographical inequalities in accessibility and use. There is a far higher chance that patients in North and South West Wales, particularly the elderly, will be referred to their 'local' renal unit than before 1985, when distant patients tended not to be referred by GPs and general physicians.

Operation of the commercial subsidiary renal units in Wales

Unicare subsidiary renal unit, Bangor, North Wales

Unicare Medical Services holds management contracts for five renal units in England and Wales after competitive tendering exercises, and has been providing dialysis services from its first commercial centre in Bangor since August 1985. To date, the company's contribution has been to specialise in the provision of relatively small renal units on hospital sites, in places whose population would not justify a main renal unit. However, the units are not minimal care dialysis units, but provide a full haemodialysis service.

At Bangor, Unicare is paid on the basis of the number of sessions delivered and operates on what the company calls a 'full-care basis' – that is, the commercial centre is obliged to provide a dialysis service to all the patients it is contracted to serve and has to staff its units accordingly (Dibblee 1989). However, the Unicare unit is not contracted to provide surgical services (for example, access procedures) which can be expensive in individual cases. Unicare employs qualified registered general nurses (RGNs) only, on the basis that when complications arise non-nursing staff lack the confidence and competence to cope. This contradicts the view expressed by Kenward (1989) that there may be considerable scope in renal units for the deployment of non-nursing staff under the supervision of senior renal nurses to manage routine dialysis (see Chapter 6).

Unicare has rejected dialyser re-use for its units after its own research showed that it was not cost-effective. But these results may, in part, reflect Unicare's position as a manufacturer of dialysers as well as a user in its own units. There has been considerable interest, especially in the USA and elsewhere, in the claimed savings to be made by dialyser re-use (see Chapter 6). The unit has its own acute renal service during the hours when the unit is open. To date, Unicare units have concentrated on providing home and unit haemodialysis at what they believe to be relatively low cost compared to NHS alternatives.

Table 15 summarises the activity to date of the two earliest Unicare centres. The Bangor unit is a stand-alone unit on the DGH site; the Ipswich unit is located in a converted, redundant, Nightingale ward within the main DGH building. However, both units operate in the same way, providing mainly home and hospital haemodialysis to an unselected patient population. Dibblee (1989) argues that the Unicare units are highly productive with a very high ratio of three patients to each haemodialysis station in comparison with a ratio of less than two patients to a station in similar NHS units. This is despite the fact that the numbers of deaths and acute sessions indicates that the commercial unit has not been treating a selected, relatively healthy, group of patients.

Table 15: Cumulative activity at two Unicare dialysis centres as at March 1989

Activity	*Bangor (opened August 1985)*	*Ipswich (opened July 1987)*
Total number of patients treated	90	58
Dialysis sessions	5,560	2,191
Acute sessions	119	30
Transplants	7	7
Deaths	20	7
Current patients	19	19

Source: Unicare (1989)

Community Dialysis Services (CDS) subsidiary renal unit, Carmarthen, West Wales

Community Dialysis Services (CDS) entered the UK market at the same time as Unicare in 1985 when it secured a contract from Dyfed Health Authority to run a SRU at Carmarthen, providing a full haemodialysis service in West Wales to serve an area previously lacking a renal unit.

CDS is a wholly owned subsidiary of an American company, Community Psychiatric Centres (CPC). CPC operates 45 acute psychiatric hospitals, seven in the UK and the remainder in the USA, and its subsidiary CDS operates 84 renal dialysis units, 83 in the USA and one in UK at Carmarthen.

The CDS unit in Carmarthen is run on a full-care basis like the Bangor SRU. The contract terms state that CDS is paid on the basis of the number of dialysis sessions actually delivered. However, if patient numbers fall below a minimum, very low level, the contract for both SRUs provides for a basic payment regardless of the number of sessions. Unlike Unicare, CDS re-uses dialysers, which reduces costs to the health authority. CDS does not currently re-use blood lines in Wales, although this is done in the USA.

Like the Unicare units, the CDS unit is not contracted to provide surgical procedures required for dialysis. These costs are borne directly by the NHS at the nearest main renal unit. The Bangor unit, like the Carmarthen unit, is on a DGH site. The NHS provided the land and the private sector provided the building and all the necessary equipment to fulfill the

terms of the contract. Equipment was purchased after consultation with the NHS nephrologist responsible for the patients on the unit. CDS recruited, and trained where necessary, all the staff for the Carmarthen unit with the exception of the medical staff who remain employees of the NHS. This approach is supported by CDS and the Welsh Office so that referral rates, workload and clinical policies can be dictated by the NHS.

All dialysis is nurse-supervised, as in the Unicare unit. Nursing staff are recruited from the NHS with renal or intensive therapy training. This is not regarded by CDS as poaching scarce NHS-trained staff, since the staff are being recruited to care for NHS patients exclusively. CDS offers staff its own terms and conditions and does not follow NHS practices. Nursing staff, for example, are better paid than in the NHS and are entitled to earn performance-related bonuses. However, this is in recognition of different conditions of work, including longer hours, less leave, more flexible working requirements and different pension arrangements. Staff are expected to undertake any tasks which may be required in the unit. Their jobs are far less rigidly defined than in the NHS in an effort to keep costs down. The Carmarthen unit also offers attachments for NHS nurses in fields such as intensive care and acute renal dialysis to gain further knowledge and experience.

CDS provides all consumables and takes responsibility under its contract for arranging all routine pathology tests. Services such as catering, cleaning, building maintenance, and so on are contracted back to the health authority. The CDS unit also provides medical records and waiting list and activity data to dovetail with the systems prevailing in the West Wales Hospital, Carmarthen.

The Carmarthen unit is registered as a private acute hospital and subject to official twice-yearly inspections by the health authority. In addition, the NHS consultant responsible for the patients dialysed on the unit monitors the standard of treatment on a day-to-day basis. CDS positively encourages health authority members and staff from the hospital management to visit the unit whenever they wish.

CDS negotiated a seven-year contract in 1985 based on projected workload assumptions published by the Welsh Office. These indicated that after three years the unit would be serving eight or nine patients. In practice, the Carmarthen unit's total had reached 21 patients by March 1989. The CDS contract at Carmarthen and the Unicare contract at Bangor were priced by the companies with the objective of recouping fixed and variable costs based on lower patient numbers than have been treated. As a result of the higher workload, CDS now shows a surplus at Carmarthen since reimbursement under the terms of the contract is on a per treatment basis (Cooper 1989).

The NHS needs to be reasonably confident in its projections of patient numbers before negotiating commercial tenders since volume is extremely important in assembling a commercially realistic tender for a private provider of dialysis. Where the workload cannot be confidently predicted or easily controlled, but where the NHS wishes to fund a commercial provider on a fee-per-treatment basis, it might be better for the NHS to negotiate a higher price at a lower throughput to recognise the effect of capital investment and equipment depreciation then to lower the level of reimbursement as workload increases.

The need for careful evaluation of commercial NHS dialysis services

Both the commercial operators of dialysis units in the UK appear eager to expand their share of NHS dialysis and are confident that they can outstrip, or at least equal, the NHS units for quality at the same or lower cost. They are confident that, if and when NHS units are properly costed on a comparable basis, including capital charges and depreciation, and all new dialysis units are put out to competitive tender, the commercial sector will be shown to be more competitive (Cooper 1989). They base their optimism on their experience in cost analysis and consumable cost control methods, their flexible use of staff and their willingness to allow clinical policies in commercial units to be determined by NHS consultants.

The commercial operators have demonstrated in Wales that they have the specialised logistical and managerial skills to operate small dialysis units providing a full dialysis service and can show how they achieve this. They have also won a number of relatively open, competitive tendering exercises to provide specific new services in specific locations in England and Wales. However, the empirical question of whether, and in what circumstances, commercial operators are superior to the NHS, either in terms of cost or quality, cannot be resolved simply by accepting the claims of one sector or the other. Nor can it be judged from the results of tendering against what could have been rivals without the necessary experience or cost data to be competitive. More rigorous evidence is required, for example, on the costs, patient survival and patient satisfaction in truly comparable public and commercial units. It may be that the commercial sector will emerge as the provider of choice for small, subsidiary units while the NHS continues to provide the large, main dialysis centres. But it is impossible to be sure at this stage.

The differences in the scope of the services provided by the commercial and NHS units, the financial incentives inherent in the method of payment of the commercial units and the opportunity for cost shifting, will all influence the overall costs, the efficiency of contracting out and the validity of cost comparisons. For example, the CDS unit at Carmarthen and the Unicare unit at Bangor are both reimbursed retrospectively by the local health authority for dialysis sessions provided. There is therefore a real financial advantage to them if the number of patients and sessions per patient increases. The NHS consultants retain full control of the referrals and pattern of treatment, but they are not subject to any systematic budgetary discipline. Furthermore, the commercial units are not responsible for the treatment or the costs of treatment of dialysis patients who develop inner-current problems requiring inpatient treatment.

They are paid simply on the basis of the numbers of dialysis sessions provided to the patients referred to the unit by nephrologists. Such patients are returned to the main renal unit by the responsible NHS consultant when complications develop and the main NHS unit bears the cost until the patient is fit to resume dialysis. In this case, there is no direct financial incentive for the commercial provider to ensure that complications do not arise, except that the patient will miss some dialysis sessions and this will reduce the income to the unit unless other patients can be substituted. However, similar arrangements exist between subsidiary and main renal units when both are in the NHS; patients who develop complications are normally referred to the main renal unit and the subsidiary unit is funded to provide a dialysis service only.

The evaluative research commissioned by the Welsh Office between 1985 and 1989 offers the only rigorous evidence available in the UK to date for assessing the relative merits of NHS and commercial dialysis operations in a more systematic way. This evidence will be summarised in the remainder of the chapter.

Evaluation of renal services in Wales with special reference to subsidiary renal units

The Welsh Office regarded the setting up of the SRUs as a pioneering, pilot scheme. An academic evaluation was carried out between 1985 and 1989 by Dr W G J Smith and Professor A W Asscher of the Department of Renal Medicine, University of Wales College of Medicine, Royal Infirmary, Cardiff and D R Cohen, health economist from the Department of Management and Legal Studies, Polytechnic of Wales, Pontypridd.

Objectives of the evaluation

The objectives of the evaluation were:

1. to establish the change in number and profile of patients treated for ESRF following the introduction of subsidiary renal care;

2. to determine if the geographical inequalities in the provision of treatment were reduced;

3. to define the clinical benefits of SRU dialysis by descriptive analysis, and if numbers permitted, to compare its cost effectiveness with that of CAPD, home haemodialysis and traditional hospital haemodialysis;

4. to compare the cost of SRU contract dialysis with a comparable NHS unit;

5. to make recommendations regarding the future development of SRU facilities in Wales and in other areas of the UK.

The results of the study are summarised very briefly in the sub-sections which follow (Smith, Cohen and Asscher 1989).

Clinical benefits of subsidiary renal units

The SRUs provide a haemodialysis service to a broad mix of patients with varying degrees of medical and social problems, typical of the general run of patients receiving hospital haemodialysis in main renal units in Wales. There was little difference between the SRU patients, the hospital haemodialysis patients at Swansea and the CAPD patients at Cardiff. Neither SRU could be regarded as a minimal or limited care unit. Each SRU was fully integrated into the NHS through the medical supervision and clinical policies of the consultant in charge. The main indications for selecting SRU care were that patients were not suitable for home haemodialysis or lived close to the SRU. All patients appeared satisfied with the SRU facility and preferred the shorter journeys and more informal atmosphere at the SRUs.

SRUs appeared to provide an effective haemodialysis service, but had not become significantly involved with CAPD. Although quality of care was not directly assessed in the study, there appeared to be no objective difference between NHS haemodialysis and the two commercially run centres.

A considerable benefit to the Welsh Office was the speed with which the two private operators were able to get their units into operation. Six months after signing contracts, the two SRUs were dialysing patients.

Table 16: Comparative costs of different forms and providers of dialysis

	Bangor (Unicare) SRU HD	*Carmarthen (CDS) SRU HD*	*Swansea (NHS) MRU HD*	*Cardiff (NHS) Home HD*	*Cardiff (NHS) CAPD*	*Bradford (NHS) HD*
Cost per patient year[1]	16,291	14,476	15,702	10,221	7,109[2]	12,075
Cost per dialysis session	104	93	101	66	–	77
Contract price per session[4]	87	87	–	–	–	–
Cost per QALY over 5 years[3]	17,549	15,594	17,452	9,292	6,731	–

Notes:
1. Prices based on financial year 87/88.
2. CAPD costs include training, exclude hospital admissions: total CAPD cost-per-patient-year including all admissions – £8,196.
3. Assumes 100% survival. Cost/QALY will be higher or lower than cost/patient year depending on the time profile of costs. Home HD and CAPD incur higher costs in year one in relation to subsequent years. The cost/year for hospital based treatments are constant with time.
4. Contract price does not include costly items such as medical manpower and transport.

Source: Smith, Cohen and Asscher (1989), Table 10.1, p 163

Costs of subsidiary renal unit dialysis compared with other methods

Comparative costs were calculated for providing a dialysis service to patients assigned to different modes of dialysis at the two SRUs, the main renal unit at Swansea, the Cardiff home haemodialysis and CAPD programmes and, for comparison with the privately run SRUs, the NHS satellite unit in Bradford (Table 16). The costs included capital expenditures expressed as annual equivalent costs, but did not include total health care costs. Access surgery and inpatient admissions for complications, for example, were not included. There appeared to be no evidence from the Smith, Cohen and Asscher (1989) study that commercial haemodialysis was cheaper than NHS haemodialysis. The difference in cost-per-patient-year between Bangor (£16,291) and Carmarthen (£14,476) was due to extra medical supervision and higher transport costs at Bangor. The cost-per-patient-year at the main renal unit at Swansea lay between the two SRUs. The Bradford costs for centre haemodialysis were lower than the Welsh units, primarily because the Bradford unit was run by nurses as a satellite, with no medical supervision of dialysis patients. Home treatments, as expected, cost the least, with CAPD considerably cheaper than home haemodialysis. CAPD remained the cheapest, even when an overestimate of the cost of hospital admissions for peritonitis was included. Although the costing methods are not fully comparable, this result differs from the conclusions of the earlier costing by Mancini (1983). In Mancini's study, hospital haemodialysis was consistently the most expensive modality, but CAPD emerged as more costly than home dialysis when the costs of inpatient admissions, outpatient attendances and drugs were included (see Chapter 1, Table 6). The difference between the results of the two studies may reflect recent reductions in infection rates among CAPD patients.

Cost-effectiveness of subsidiary renal unit dialysis compared with other methods

The relative cost-effectiveness of the dialysis regimes offered at the Welsh units was expressed in the form of costs per quality adjusted life year (QALY) to identify, as far as possible, the most efficient method of dialysis. The QALY was chosen as a common unit of output and QALY gains calculated following the methodology developed by Rachel Rosser, Paul Kind and Alan Williams (Rosser and Kind 1978; Kind, Rosser and Williams 1982). Since the patients were not randomly assigned to the five programmes which were under comparison, matching criteria were formulated in an attempt to compare like with like. However, the method is not ideal. There were no significant differences in health status of patients in the five programmes on dimensions of disability and distress. The costs per QALY (Table 16) show little difference between main renal unit and SRU hospital haemodialysis, but suggest that home treatments, especially CAPD are more efficient for patients who can manage them. Smith, Cohen and Asscher (1989) state '... it would make sound economic sense to invest more in these modes of therapy.'

Comparison of commercial subsidiary units with a NHS satellite unit

An attempt was made to locate a NHS dialysis unit fulfilling similar functions for similar patients which could be compared on activity and cost with the two commercial SRUs. The Bradford satellite renal unit run from the main renal unit at St James' Hospital, Leeds was chosen as the nearest comparable facility. However, the Bradford unit has no medical supervision and tends to treat fewer high risk patients than the SRUs. Nonetheless, it was found that the two privately-run SRUs treated more patients and undertook more dialysis sessions than Bradford with similar staffing levels, emphasising the more flexible use of nursing manpower in the commercial unit (Table 17). However, the NHS unit was considerably cheaper (Table 16), largely because no medical supervision was provided on site, reflecting the healthier patients and the greater reliance placed on the main renal unit in Leeds. However, the basic contract prices charged by the two commercial firms for a dialysis session in 1987 (£87), which excluded all medical costs, were still greater than the cost of a session at the Bradford NHS unit (£77) which had no medical supervision.

Thus, the Welsh SRUs offer centre haemodialysis to a wider range of patients and more high-risk individuals, but at greater cost than the most nearly comparable NHS unit. Smith, Cohen and Asscher (1989) argue that both the Carmarthen and Bangor units are, in practice, providing decentralised dialysis services which are very similar to those of many main renal units for a wide range of patients. If this is a fair reflection of activity in the two SRUs, a more appropriate, though not ideal, comparison may be with dialysis costs at the main renal unit at Morriston Hospital, Swansea. The costs-per-patient-year and per QALY given in Table 16 indicate that one commercial unit appears to be cheaper and more cost-effective than the NHS unit and the other more expensive and less cost-effective.

Table 17: Comparison of productivity of an NHS satellite unit and commercially run subsidiary renal units, 1987

	Bradford (NHS) Satellite	*Carmarthen (CDS) SRU*	*Bangor (Unicare) SRU*
Number of stations	5	10	6
Number of dialysis sessions	1384	2021	1736
Number of patients	10	20	17
Nursing staff (WTE)	4	4.5	5

Notes: Dialysis sessions in Carmarthen and Bangor include holiday patients and 'acute' dialysis but these represent a very small proportion of the total number of sessions.

Source: Smith, Cohen and Asscher (1989), Table 9.3, p 149

Conclusions and commentary on the Welsh evaluation of subsidiary renal units and commercial dialysis

The cost and cost-utility comparisons possible in the evaluation did not show that commercial haemodialysis was either cheaper or better quality than NHS provision in the case of the Carmarthen and Bangor developments. However, it is difficult to generalise about the merits of public and commercial sectors from one study. The costs and prices charged by commercial operators will depend on the specific service requirements and expected patient numbers, together with the operator's perception of the degree of competition likely to be present in the market. For example, the successful commercial tenders for the third and fourth SRUs at Cardiff and Merthyr Tydfil, due to open in late 1989, came in at a lower price per session than the earlier contracts, perhaps reflecting stiffer competition from NHS tenderers. Furthermore, the data available in the study do not allow a comparison of the survival and quality of life of similar patients entering SRUs, main renal unit haemodialysis, CAPD or home haemodialysis; nor is it possible to look at the question of which sorts of dialysis or operator regime are best suited to which sorts of patients.

The evaluation team recommended further expansion of RRT in Wales and gave a top priority to further development of CAPD facilities as a way of increasing the proportion of elderly patients accepted for dialysis and providing dialysis in the most cost-effective way possible. It is uncertain whether this recommendation will be implemented or whether further haemodialysis will be provided at the two new, commercial SRUs scheduled to open at the end of 1989.

Overview

The private sector has an established record in the UK of providing useful management support services to NHS CAPD and home dialysis programmes in the form of product control and financial information. Its more recent involvement in the direct provision of dialysis services in a small number of renal units contracted to health authorities, initially in Wales and now in England, is inevitably a more controversial development. For some observers, the main question is whether commercial concerns can operate within but apart from the mainstream of the NHS without undermining the principles on which the NHS is founded. For others, the question is, straightforwardly, one of relative cost and, if data permit, relative cost-effectiveness. The evidence from the Welsh Office experience with commercial dialysis and from the parallel academic evaluation (the other commercial renal units in England are less well documented), indicates that commercial providers can be integrated successfully, on a small scale, into patterns of dialysis care directed by the NHS without producing harmful tensions. On this evidence, a potential market for future commercial ventures exists in other areas of the UK under-provided with RRT facilities and not just for centre haemodialysis. There is no practical reason why contract services cannot be considered for home dialysis and minimal care units as well as centre haemodialysis.

However, the relative cost and cost-effectiveness of commercial contract versus NHS-provided dialysis has not been, and could never be, definitively determined by the limited experience in Wales. Commercial operators may perform better in particular circumstances for particular services, given the variable quality of NHS management and financial systems, but health authorities would still be well advised to avoid making simplistic, general assumptions about the strengths and weaknesses of the public and commercial sectors and to take each situation on its merits. Table 18 outlines some of the potential pros and cons of contracting out services in the context of competitive tendering to demonstrate the complexity of the process.

Tender specifications, criteria for judging tenders and systems for monitoring contracts have to be carefully drawn up otherwise the benefits of competition may be illusory. Important decisions have to be made concerning the scope of the services to be included, the contract period and the fee structure in any contract if perverse incentives are to be minimised. For example, should a contract cover a specific mode of dialysis, a complete dialysis programme, or an entire ESRF service? Should the contract be for a specific number of treatments, the care of a defined or projected number of patients, or a service to a population irrespective of the actual patient numbers? If the contract embodies the principle of fee-for-item-of-service should there be a simple tariff based on average costs, or a sliding scale depending on the volume of activity in relation to the operator's likely fixed and variable cost structures?

For example, the Carmarthen and Bangor contract price was tendered based on an estimate of trends in patient demand given by the Welsh Office and the contract allowed the contractors to charge a flat-rate fee per dialysis session. The contract did not make the commercial operator liable for the cost of related procedures such as access surgery or the costs of managing complications requiring a hospital admission. The growth rate in patients accepted by the NHS and referred to the two SRUs has far exceeded the projected level as the Welsh Office has allowed an 'open-door' policy to develop. As a result, the number of sessions provided has been greater than expected. Since the price per session was calculated to provide a reasonable rate of return on a lower throughput, the commercial operators have probably obtained a better rate of return on their investment than they had expected. Not surprisingly, they have been happy to continue to respond willingly to the increases in demand and Welsh Office spending on dialysis has risen steeply. The contract is for seven years and has no provision for renegotiation of the contract price.

This example demonstrates some of the pitfalls of contracting in the context of uncertain future demand without carefully constructing the contract to allow for periodic review. Furthermore, the fixed fee per session mode of reimbursement in this contract offers

Table 18: Potential advantages and disadvantages of contracting out clinical services to the commercial sector

Potential Advantages	*Potential Disadvantages*
Cash savings and/or better VFM (as long as quality can be assured) because of private sector features: 1. rational use of labour – greater flexibility in mix, level and task allocation; 2. freedom from capital constraints; 3. opportunity to specialise in management of particular services.	Very little evidence on relative efficiency of public and private sector provision of same service for same patients. Cost comparisons are not straightforward (eg, apportionment of joint costs – teaching, research etc). Resources 'saved' may not have an opportunity cost – may not be able to be usefully used for any other purpose or even if they could, this might not produce cash savings to offset cost of contracting out. Risk of commercial 'loss leaders' followed by price increases ('provider capture') in which public monopoly is replaced by private.
Greater speed of implementation as fewer planning constraints/ rigidities.	Trade union resistance.
Opportunity for NHS to cope flexibly with short-term excess demand/ underspends by using spare capacity in private sector.	Difficulty of reverting to in-house delivery if problems arise if savings have been made (eg, staff sacked).
Contract-setting allows more sensitive review of performance than possible in conventional NHS.	Contract specification and tendering is not costless since it takes management time and contracts require continuous monitoring.
Competition/threat of competition sharpens up NHS providers (eg. better costing, more imaginative service provision).	Requires careful choice of payment method (eg, per treatment, per patient, per patient 'success' etc) and setting of prospective reimbursement rate.
Need for regulation/ standard setting provides impetus to similar activities in NHS.	Difficult to regulate services not directly provided. Problems of defining quality just as difficult as in public sector. Cost and outcome data become commercially sensitive/confidential, inhibiting open comparisons of VFM. Increases competition for scarce staff trained in public sector.

no incentive for the operator to find ways of minimising the number of treatment sessions required by patients, unlike the situation under global budgeting which is often found in NHS renal units. Instead, the theoretical incentive is to encourage the NHS nephrologist to expand the programme and the number of sessions while deploying the minimum feasible number of staff. This may increase the overall cost of the programme without necessarily obtaining best value for money, as Wing (1989) recognises in his assessment of the clinical practices likely to be associated with different schemes of reimbursement. Similarly, the operator is not financially penalised by patient complications, because when these become costly, requiring inpatient treatment, the contract allows for the patient to be transferred to the NHS main renal unit and charged against the main unit's budget. While this may have the advantage that commercial operators will not attempt to select out 'high risk' patients, it does encourage them, subject to the authority of the NHS consultant, to try to ensure that patients with complications are transferred at the earliest opportunity out of the unit.

The example of the Welsh Office contracts with the two SRUs at Bangor and Carmarthen suggests that it is facile to assert that the private sector, in general, is likely to be more efficient than the public sector, or vice versa, or that competitive tendering will always produce better services at lower cost than accepting in-house provision. The overall costs of the dialysis programme and efficiency of contracting out can vary greatly depending on the details of the structure of the contract and payment terms. Furthermore, the context in which contracting out takes place is not static. The implementation of the NHS white paper is likely to give the NHS far greater experience of competitive tendering and contracting in the future. The public sector will be allowed greater freedom to shift money between capital and revenue and will be permitted to raise capital commercially within certain limits. Self-governing hospitals will have the opportunity of employing and paying staff on their own terms to reflect the local labour market and their own objectives. Over time, the health service will also have access to better cost data as the resource management initiative is disseminated throughout the service.

All these factors will tend to make NHS providers more competitive. As the mixed economy of the provider market unfolds, NHS initiatives using commercial companies to treat NHS patients will gradually become commonplace. They will take place in a range of favourable and unfavourable contexts and health authorities are less likely to feel that they have to ensure that collaborative ventures are seen to succeed. The kudos of contracting out clinical services will diminish. There is a great difference between a high-profile, experimental, public-private collaboration providing a life-saving service on a rapidly expanding budget (which also has strong political and ministerial support) and the routine tendering of a wide range of services at health authority level within a strict cash-limit.

8. OVERVIEW, RECOMMENDATIONS AND CONCLUSIONS

Overview

This report has attempted to cover a wide range of current issues relevant to the funding and management of units for the treatment of ESRF with particular emphasis on dialysis. It is hoped that the report will, in some small way, contribute to the better management of ESRF centres. Although the report has raised far more questions than it has begun to answer, this is, in part, a reflection of the fact that it has been written at the beginning of what is likely to be a period of rapid change for renal services. Although there is no evidence that the government intends to alter national policies and targets for kidney dialysis and transplantation, the context in which those policies are realised is likely to change in a major way in the next few years. The 1989 white paper reforms of the organisation and management structure of the health service seem destined to reduce the autonomy of renal units in relation to funding bodies as they strive to meet their contractual requirements in a provider market. Therapeutic developments will continue to place additional pressures on unit budgets as more elderly and diabetic patients are deemed suitable for RRT and the demand to use erythropoietin and other quality of life-enhancing drugs on a wider range of patients increases.

The precise implications for the funding of renal services of the government's reforms are unknown at the time of writing. However, speculation which argues that nephrologists will be in a better position to press their claims for higher priority after the implementation of *Working for patients* appears premature. What seems clear is that renal units will enjoy less protected funding and the role of the RHA as a funder and direct purchaser of renal services may diminish. The RHA may, instead, concentrate on monitoring the quality and distribution of services resulting from the purchasing decisions of DHAs. It is not yet clear how regional specialties will develop in the new NHS. Hitherto, there has been a gradual and halting move by RHAs to develop methods of funding for renal units which are based less on historic costs and more on a reasonable level of funding for a given workload. This process has, so far, fudged the problem of linking funding not only to the quantity of work done but also to a consideration of what is done (appropriateness), how well it is done (quality) and to whom it is done (equity). Tackling these aspects of a funding methodology implies a far greater involvement by funding bodies in decisions about the pattern of treatment through negotiations over contracts and their subsequent monitoring.

It seems likely that the pattern of financial incentives facing units will become more explicit and more consciously designed to influence clinical decision-making and resource management in units in directions chosen by the 'purchasers' of health care (which might be DHAs rather than RHAs). Like other parts of the NHS, renal units will move to a system of contract-based funding. Contracts will specify the quantity of services to be provided over a defined period of time. Efforts will also be made by purchasers to include in contracts measures of the quality and appropriateness of the services delivered. There could conceivably be major changes in the location of services, and in patient acceptance practices, if previously remote and relatively under-provided districts were to be given a capitation-based, 'fair-share' of finance and the power to purchase an appropriate pattern of services for their population's needs.

The provider market for renal services is also highly likely to include competition from specialist commercial companies who appear eager to see all renal developments and the work of existing units offered for competitive tender on the open market. Specialist commercial operators running a substantial number of dialysis centres may have access to economies of scale not open to individual NHS units. This may encourage NHS units to consider establishing umbrella organisations to provide expertise in tendering, centralised purchasing and management support. Competition from the private sector, together with the move to contracting, represent a radical change in the working environment for directors of renal units.

If NHS providers are to compete successfully, they will need better systems for capturing and linking cost, activity and audit-related information to use in support of unit management. In the past, it has frequently been unclear who should take the main responsibility for assisting units as regional specialties to plan, budget and manage their resources. As the roles of RHAs, DHAs and hospitals begin to be differentiated, and with the separation of funding from provision under a provider market, it seems clearer that the hospital where a unit is located will have the primary interest in ensuring that the renal unit is properly managed.

Renal units have a long history of making the best use they can of a visibly constrained budget and there is a considerable body of experience among staff in developing schemes to increase the number of patients treated without a commensurate increase in costs (for example, experiments with re-use of dialysers, shift systems and so on). However, there is great scope for this 'good practice' to be more systematically documented and disseminated between renal units. The initiatives themselves tend to be fragmented and *ad hoc* rather than part of an overall review of all aspects of the working of a unit. The interaction of changes in one part of a unit's activity on the costs of another are rarely discussed and quantified. Simulation models which treat the renal unit as a dynamic whole and which enable managers to test out the effects of different working strategies could be helpful in budgeting and in improving performance. However, nephrologists will probably need some support to adapt such systems to reflect the working of their

particular units and to find time to plan and run analyses. It is vital that any management information system and/or planning model is designed to be clinically meaningful. This means that clinicians will have to work jointly with other staff in specifying the data to be collected and the assumptions to be built into models. It is a commonly heard complaint that routine data collected in hospitals are often presented in ways which are irrelevant to practising clinicians.

The management and planning of budgets can be enhanced by having access to good information systems and a means of manipulating data on costs, activities and outcomes to assess the implications of external or internal changes. However, decisions have also to be taken about the range of financial and human resources which should comprise the budget of a renal unit and over which the unit director should have control. In general, to avoid undesirable 'gaming' and cost-shifting, budgets should be drawn broadly and accounting systems developed to assign the relevant expenditure to the appropriate budget. Most renal physicians appear to want freedom to decide on a day-to-day basis how resources should be deployed within their budgets. They express concern over the variation which exists between units in the scope of unit budgets and budgetary responsibilities and how these differences may bias comparisons of efficiency and cost between units.

For example, two areas which appear to cause problems are decisions about nurse staffing levels and the availability of surgical support to undertake access procedures. This is because unit directors rarely have any direct control over resources integral to the working of renal units. Greater control would necessitate a fundamental renegotiation of relationships with senior surgical and nursing colleagues, but this is probably desirable as units enter the provider market. Expenditure reporting as well as budgeting appears to vary considerably between units, and inevitably there are complaints that the costs of some units appear more favourable because a segment of their costs falls outside the particular accounting framework used at the hospital. Thus, there is a need within regions, for example, for a common agreement about the scope of budgets, about budgetary freedom and accountability and about accounting conventions if fair comparisons of performance are to be made. However, it remains to be seen how this will operate if renal units find themselves in competition with one another.

All the elements in the foregoing analysis of the changing context in which renal units will be operating in the 1990s (the move to contracting, competition with the private sector, the need for better information systems and budgeting and the requirement for measures of performance and so on) highlight the importance of developing the management of renal units. This in turn raises the question of whether or not renal units should appoint full-time, non-clinical managers whose job would be to handle all aspects of the running of the unit which did not impinge on the care of individual patients. The pressures on units and the growing complexity of the management function indicate the need for the commitment of the time and skill which a full-time manager would be able to bring to the task. It is doubtful if a clinician with a busy clinical workload can provide the sort of sustained analysis of all the activities of the unit required for its efficient operation. However, before any such appointments are contemplated, there would need to be some hard thinking about the division of responsibility and authority between the senior clinicians and the unit manager.

Recommendations for research and evaluation

A striking feature of the report is the extent of disagreement between 'experts' on the worthwhileness of undertaking a range of management practices designed to keep down costs without affecting the quality of dialysis services. Three areas particularly merit systematic research: dialyser and blood-line re-use; purchasing and use of consumables; and staffing.

Research is required in NHS units to determine whether or not re-use is a cost-effective policy and in what circumstances, given the difference in practice between the two private sector operators in the dialysis market (see Chapter 7). Similarly, a study could usefully be undertaken to attempt to estimate the likely relative scope for cost improvements through better consumables purchasing practices versus improvements in the subsequent use of consumables by dialysis patients. Given that unit directors frequently find themselves with limited time to devote to management issues, as opposed to direct patient care, it is important that efforts to improve efficiency or reduce costs are targeted on areas where there is a likelihood of a significant effect. The issues of staffing levels, staffing mix and task allocation would also benefit from properly evaluated experiments. The private sector operators endeavour to employ RGNs who are trained renal or intensive therapy nurses to staff their dialysis units. They do not use untrained staff, AKAs and so on. This is comprehensible in terms of their perceived position as newcomers in the provision of dialysis services in the UK and their consequent desire to reassure health authorities that the standard of their inputs to dialysis is at least as high, if not higher, than the NHS can offer. They are also open to regular inspection by the NHS and may wish to strengthen their position in case of any medico-legal actions by health authorities or consumer bodies. Nonetheless, they justify this policy on quality grounds and keep costs down by flexible deployment of staff and by asking their nurses to undertake a wide variety of nursing and non-nursing tasks. A contrasting strategy would be to use a blend of trained nurses and specialised, non-nursing support staff to make the most efficient use of resources. This sort of approach is discussed in Chapter 6 and has attracted the interest of NHS physicians (Kenward 1989). However, there appears to be little evidence about which strategy is likely to be the more efficient. It might be possible for a number of NHS renal units to collaborate to undertake experimental studies of the effects of different staffing regimes.

The scope for applied research which unit directors should be anxious to see funded, extends to more

directly clinical areas. Renal medicine in the NHS currently faces the familiar problem of justifying an increase in expenditure on RRT on the basis that new but expensive innovations, such as the use of erythropoietin, will substantially improve the quality of life of patients with ESRF. As a first step, nephrologists will need to show their colleagues in other disciplines that drugs like erythropoietin and other clinical developments (see Chapter 3) are effective (the initial trials suggest that this is now demonstrable); they will also need to be able to quantify the improvement in patient functioning and quality of life and compare it with the gains likely to be obtained by spending more on other new technologies. Is extra spending on erythropoietin justified ahead of spending the same resources on another programme or, indeed, on some other aspect of RRT? But it is unlikely that renal physicians will succeed in obtaining all the resources they might want so that they could offer erythropoietin, for example, to all the patients who could conceivably benefit, however well documented and astute their campaign. Some level of rationing of erythropoietin and other new technologies is likely to remain.

This leads to the second step in evaluation: the requirement to show which sorts of patients will benefit most from innovations such as erythropoietin given different levels of additional funding of the renal programme. At present in the NHS, rationing of expensive renal drugs like erythropoietin appears to follow fairly rational criteria based on clinical experience. However, if further finance is to be allocated to expand the number of existing patients who receive the new drug, or lengthen the period of time for which each patient receives erythropoietin, health authorities will expect nephrologists to make some estimate of the benefits to be gained. Nephrologists will also wish to consider the inevitable trade-off between securing additional funds to improve the quality of life of existing RRT patients and the benefits of expanding the size of the overall programme by, say, an investment in additional CAPD facilities for patients who currently receive no treatment and die. Research can help illuminate this painful decision, although ultimately the decision will rest on the judgment of health authorities and their purchasing advisers.

Conclusions

NHS renal units will face a challenging period over the next two to three years as they lose their protected status as regional specialties and enter the more rumbustious environment of the NHS provider market. Fortunately, renal units are probably better placed than many other parts of the health service to adapt to the new environment. They have long experience of running their own affairs on a tightly constrained budget and of making resources stretch to the utmost. In future, this style of management will need to be systematised and made more professional. Better information systems on activity, costs and outcomes which link together all the aspects of the work of renal units will become essential. Comprehensive unit budgeting and the measurement of performance against budgetary objectives will have to become routine. Lines of accountability and responsibility for resource deployment will have to be clarified and strengthened.

This report has raised the principal management issues which confront renal units. It has not offered facile solutions to complex problems. The hope is that it will act as a modest stimulus and a help to tackling the central problem of securing an equitable and efficient pattern of dialysis services in the NHS when the level of resources continually appears inadequate to the size of the task.

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APPENDIX: SEMINAR ON THE ECONOMIC MANAGEMENT OF END-STAGE RENAL FAILURE

Organised by the Department of Health at St John's College, Oxford

Programme

Monday, 20 March 1989; Chairman: Professor F W O'Grady, Chief Scientist, Department of Health

1pm	Lunch
2pm–2.30pm	Introduction and background: Dr R M Oliver, Deputy Chief Medical Officer, Department of Health
2.30pm–4pm	Regional funding: variations in methods of financial allocation within regions: Mr K Farrington, South East Thames RHA
4pm–4.30pm	Tea
4.30pm–6pm	How do units cope with increases in clinical workload and changes in treatment within constrained financial resources?: Dr R Wilkinson, Freeman Hospital
6.15pm–8pm	Dinner
8pm–9.30pm	Role of the private sector: Mr David McGlinn, Welsh Office; Mr C Cooper, Community Dialysis Services; Mr R Dibblee, Unicare Medical Services

Tuesday, 21 March 1989; Chairman: Sir Douglas Black

9am–10am	Renal units as budget holders: Dr A J Wing, St Thomas' Hospital
10am–11am	Planning treatment mix using a simulation model: Dr R Davies, Southampton University
11am–11.30am	Coffee
11.30am–12.30pm	Internal management efficiencies: support, information, procurement, staffing, efficient use of capital equipment: Dr D H Kenward, South Cleveland Hospital
12.30pm–1pm	Summing up: Sir Douglas Black, Chairman
1pm	Lunch

Suggested issues for discussion

I. Issues in regional funding

1. By what criteria are alternative arrangements to be judged?

a. maximising the workload achieved within given resources;
b. providing incentives to improve quality of care;
c. providing incentives to reduce costs of treatment;
d. geographical equity;
e. reducing uncertainty about future workload and/or resource availability;
f. making each kind of policy decision the responsibility of the people best placed to make that decision.

2. Against these criteria (and any others that might be added) what are the pros and cons of the following three archetypal arrangements, viz:

a. region sets priorities *between* regional specialties, and allocates a lump-sum of money, but has no other involvement;
b. region uses data on expected cost per type of case to determine a performance-related budget;
c. devolution to districts and the creation of provider markets.

3. What are the implications of these arrangements for budget-setting?

II. Budgets and costs

1. By what criteria are budgeting arrangements to be judged?

a. do they stimulate efficiency (that is, cost-effectiveness)?
b. do they provide equity (as between units or areas)?
c. do they make policy (and its resource implications) explicit?
d. do they facilitate month-by-month monitoring of performance?
e. do they match control to responsibility (and vice versa)?

2. To what extent *are* renal units ready and able to meet the preconditions for becoming budget-holders?

3. What are the implications of these arrangements for budget setting (again!)?

4. What relevant cost data do these systems generate, and what should be done to make inter-unit cost comparisons more useful?

III. Coping with change

1. In the face of changes in the demographic, social, economic and political pressures emanating from outside the health care system, and the changes in the technical possibilities for treatment emanating from medical science, which of the foregoing systems facilitates the most rational adaptive response (in terms of the objectives set out in section I, paragraph 1 of this briefing note)?

2. How have the problems of physical expansion been handled in the different systems, and is any one of them to be preferred from all the various standpoints?

3. How have the problems of internal priority setting been handled in the different units, and is any one of them to be preferred from all the various standpoints?

4. Is it easier to trace the consequences of changes in policy and/or practice in some systems than in others, and what are the key informational deficits that need to be made good?

IV. Internal efficiency

1. Are the non-clinical management decisions within units best handled by a clinical director or by a non-clinical manager? What are the implications for the relationships with hospital, district and regional management structures?

2. What systematic review occurs of the use of existing equipment, staffing and consumables, the optimum mix of the three, and whose responsibility is it to carry out such reviews and act on their findings?

3. At what level in the organisation should purchasing decisions of various kinds be made? How well matched are responsibility and control?

4. Is the budgeting system conducive or antipathetic to cost conscious behaviour by those responsible for renal units?

List of participants

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Dr Julie Bagnell, Yorkshire Regional Health Authority
Mr John Bailey, Department of Health
Dr L R I Baker, St Bartholomew's Hospital
Mr Ian Balmer, St Thomas' Hospital
Dr B Benson, Department of Health
Sir Douglas A K Black, Chairman
Dr J Douglas Briggs, Renal Unit, City Hospital, Nottingham
Mr C Cooper, Community Dialysis Services
Ms Karen Dado, Baxter Management Services
Dr Ruth Davies, Southampton University
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Mr Robin Dibblee, Unicare Medical Services Ltd
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