Review of Ten Years’ Home Dialysis

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Introduction

It is 10 years since the first home haemodialysis took place in Europe and now would seem a suitable time to review this treatment born of necessity. The concept of home haemodialysis was introduced by Scribner (Curtis et al, 1965) and Merrill (Hampers et al, 1965), in the U.S.A., and Shaldon (Bailloid et al, 1965), in Europe to cope with the demand for regular dialysis treatment. At that time dialysis was usually carried out for 14 hr twice weekly and in order to allow rehabilitation during the day, overnight dialysis was practised. This led to the development of monitoring systems. Few people foresaw at that time what a major contribution home dialysis might make in the management of chronic renal failure.

When I read the first paper on home dialysis to this meeting in 1965 (Bailloid et al, 1965), I emphasised the need for careful selection of patients and families and indeed, in 1966 (Bailloid et al, 1966), stated that as a result of initial experience, concrete evidence of marital harmony was required before acceptance of patients. I would never make such a naive statement today! After the initial years of trying to select patients (Moorhead et al, 1969) experience combined with adventure and necessity encouraged us to accept all types and varieties of patients. Sometimes it was with regret, but often we had impressive results. Thus, age limitations, absence of secondary diseases, marital status and suitable homes have been discarded and replaced by a policy of making dialysis fit the individual patient and home rather than moulding all patients into a set pattern.

Technical Aspects

Generally, the technical aspects and equipment have changed very little since the introduction of automated self-sterilising dialysate producing machines with monitoring (Moorhead et al, 1969). However, we have increased the burden on the patient by the introduction of additional monitors for use with internal fistula. Because of various economic and logistic factors we are still using the Kii dialysers. Some patients are provided with the more efficient multi-point dialysers allowing dialysis hours to be reduced from 30 hr to 24 hr weekly.
De-ionisers have replaced water softeners in a few homes. A portable dialysis kit for short-term use has been devised to allow patients to dialyse virtually anywhere.

**Blood Access**

A major improvement has been the introduction of the internal fistula to replace the external shunt (Baillod et al., 1969). Its value is illustrated by the number of limbs utilised for blood access in 189 patients. One hundred and two patients with only one limb explored had a fistula from the beginning, while of the 66 patients in whom two limbs had to be used 52 started with a shunt. This also applies to 15 patients who have had three limbs used and 6 patients with all four limbs explored. We are convinced that good blood access reduces morbidity and therefore have applied meticulous operative technique and care in the teaching of self-needling. The need to implement self-needling for patients was emphasised by the realisation that the extent of our outbreak of hepatitis in 1969 resulted from staff doing needling when fistula dialysis was first introduced (Knight et al., 1970). Since self-needling, no further cases of hepatitis have occurred in either staff, patients or relatives.

**Medical Aspects**

Medical aspects have also changed very little in recent years. We still control blood pressure by persistent moderate ultrafiltration, sodium restriction and dietary control only (Moorhead et al., 1969; Craswell et al., 1972). The dialysate sodium is now 138 mEq/l and the calcium has been raised to 3.75 mEq/l. Blood transfusion is reserved for actual blood loss only (Crockett et al., 1967). Diets have been made more liberal. Bone disease remains symptom-free although it is progressive (Tatler et al., 1973).

**Training and Dialysis Responsibility**

Our most radical changes of policy have occurred in the area of training and dialysis responsibility (Baillod, 1971). To achieve full rehabilitation the patient himself must be responsible for his own physical and mental health. The concept that the family or spouse could or should be responsible for the patient was a mistake. Self-dialysis alone, or with voluntary help from family or friend is our present policy. Problems of equipment, dialysis and medical matters are discussed directly with the patient himself, who has to take responsibility for those persons helping him. In the case of children and young adolescents both the patient and a parent are taught, but not necessarily together. The parent takes responsibility.

The extent to which our methods work in practise are demonstrated in Table I.
TABLE I. Home Dialysis — Who does the Work? (15 Patients Live and Dialyse Alone)

<table>
<thead>
<tr>
<th>Division of work</th>
<th>Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patients doing all aspects</td>
<td>40%</td>
</tr>
<tr>
<td>Patients doing more than 80%</td>
<td>31%</td>
</tr>
<tr>
<td>Equal sharing with helper</td>
<td>20%</td>
</tr>
<tr>
<td>Less than 50% work</td>
<td>9%</td>
</tr>
</tbody>
</table>

85 patients self-needle
6 patients not self-needling (5 spouses – 4 nurses) (1 parent)

Fifteen patients live alone and as such are entirely independent, and the majority of the other patients do almost everything for themselves. Only six out of 91 patients do not self-needle their fistula. The confidence patients have in their own abilities and the equipment is reflected in their sleep patterns. Forty-five percent are able to sleep well, a further 32% sleep lightly, tending to wake at intervals throughout the night. Unfortunately 23% of patients are unable to sleep.

RESULTS

The work done in the Department is represented schematically in Figure I. Between 1963 and 1974, 199 patients started treatment, their ages ranged from 4 to 65 years. Home haemodialysis was introduced in 1964, and by 1965 all patients were accepted on the assumption that they would proceed to home dialysis. One hundred and fifty-eight patients including 15 children under the age of 15 (Baillod et al, 1972) have carried out home dialysis. Ten home patients have returned to hospital for mixed medical and social reasons. In 1968 transplantation using cadaver donors with tissue typing was added to the service. Forty-six home patients have received transplants of whom 18 returned to home dialysis after transplant failure. Nine other patients remaining in the unit were also transplanted, of whom four returned to hospital dialysis.

In 1972 because of economic and administrative problems associated with home adaptations and the increasing demand for treatment a home peritoneal dialysis programme was started. Basic principles were used to devise simple, easily-operable equipment which was produced by our own workshop. Some older, and some less able patients remain on this programme. Others progress to training for home haemodialysis when their home adaptations are near completion.

Of the 24 patients never on home dialysis the majority were taken on before it was introduced, or died before home treatment could be established. Only four
patients proved too difficult to send home. All had extreme social problems, being either homeless, or handicapped by inability to speak English. Forty patients have died, 13 whilst still on hospital dialysis, 18 from the home treatment group and 9 following transplantation. Seven deaths have occurred actually in the home, but only four were directly related to a dialysis treatment. Two of these deaths were technical from "hard-water syndrome" and two were ischaemic cardiac arrests. Our present patient responsibility is 95 home haemodialysis, 23 transplants, 11 home peritoneal dialysis, 7 training and 16 permanent hospital patients.

Our results are plotted as a survival curve, Figure 2. The line represents the predicted survival based on (weighted) least squares of the first 48 months.

Figure 2. Survival curves. The line represents predicted survival based on weighted least squares for the first 48 months survival of all patients, regardless of mode of treatment.
survival. Survival rates for home dialysis and all patients do not differ significantly but are better than predicted, being 76% for home dialysis at eight years and 69% for all treatments at ten years.

It is not sufficient simply to show that patients can survive, but more important to ask is "what does survival mean to the patient?" The quality of life, medical and social, is dependent on the patient's ability to repeatedly perform the treatment efficiently. Technical errors are likely to occur when the patient is at a low physical and mental state. This leads to further errors resulting in serious medical complications. The majority of the experienced patients lead a relatively trouble-free life provided they receive adequate support and expertise, particularly on factors such as good blood access, equipment servicing, training and communications.

Rehabilitation can be assessed by work achievements, and in applying overnight home haemodialysis techniques it is assumed that all patients are able to work full time. Twenty-nine of the current home haemodialysis patients improved their work prospects; they frequently had to change jobs and withhold information about their medical condition until they had proven both their ability and reliability. Nineteen patients, three of whom were in top executive posts, did not receive their expected promotion and some experienced reduced earning capacity, often due to changing jobs. Only seven have employment problems or chose not to work. Nine of 17 housewives are working full or part time, some having taken up work after starting dialysis. Full-time education for the children has not proved a problem and College and University students have completed their courses successfully.

Twelve young patients have married since starting treatment and two have divorced and remarried. The re-marriages appear to be very stable, the patients being particularly well rehabilitated. There is no doubt that the introduction of dialysis into the home highlights any previous family problems. Many of these are of a transient nature but we know of 15 patients over the past 10 years who have had major marital problems. Nine of these have brought their difficulties to the unit, but others have coped with separations, without the doctors being aware, whilst carrying on home dialysis.

Problems

There is an impression that the majority of the problems come from a minority of patients. For example analysis of the telephone record book, in use 24 hr/day, over a 3-month period reveals that 18 out of 93 home patients needed to make more than 5 telephone calls for advice or help. Of these only four patients made more than 10 calls. The remaining 75 patients required either little or no help. The fact that the highest number of calls were technical emphasises the point that a major source of difficulties is equipment and not necessarily the patient.

An average of 10 to 12 hospital dialyses per year per patient has remained
constant. The majority of admissions are for medical or surgical reasons, such as non-renal systemic disease and bronchitis. Patients rarely make lethal technical mistakes at home. An error results in their appearance at the hospital requiring out-patient advice or hospital admission.

Home dialysis is not achieved without some cost to all involved, and when failure occurs, fortunately for only a minority, what is the price that must be paid? The patient suffers ill health, loss of work or reduced income, and anxiety. The family experiences anxiety, disruption and invasion of home life. To the hospital, the comprehensive renal service suffers from diversion of staff and expertise, whilst new patients may even lose their lives or suffer increased morbidity. The State loses money.

Staffing

The nature of staff increases to cope with the increasing numbers of patients, illustrates the pattern of the work (Figure 3). Nursing and particularly medical staff have shown a relatively low increase reflecting the value of increased experience in dealing with previously unknown medical problems and the establishment of efficient routines. Expansion has occurred in occupations such as technicians, an administrator and a home-dialysis nurse. Recent increases have been in clerical staff only, further emphasising the routine nature of the work.

Figure 3. Staffing of the Department since 1964. The dot represents the introduction of additional staff and the number following is the total number of staff available in each category.

Future Needs

Looking to the future it would seem essential to start treatment earlier before the need for expensive intensive medicine. This more logical economic approach would prevent much of the physical and emotional distress seen in patients and their families. Patients could then be sent to a rehabilitation centre where they can be trained in self-dialysis and helped to resume a normal existence.
as quickly as possible. From the rehabilitation centre patients could continue their self-care at home. Limited care should be available for young adults about to leave home or for some single adults who lack any outside support. Patients who cannot or will not respond need a special unit with separate staffing, since these patients provide excessive work whether in the home or in hospital. Such individuals often have multiple social and family problems which compound to produce medical complications. Transplantation is an obvious necessity for all patients.

Comment

The development and application of new technology in medicine can seldom have realised such potential in so short a time. This rapid progress has entailed continuous application to both the central problem of patient treatment and the vital peripheral problems of the family, community medicine, social implications, education and finance. The treatment of the patient, while superficially highly specialised, has actually entailed a very general approach closely allied to modern practice in rehabilitation, community and social medicine, and the concept of using the hospital as a centre of expert knowledge rather than a storage unit for the chronic sick. Many of our mistakes were made on the false premise that all homes and families are basically the same. Flexibility is constantly needed to ensure that the treatment will fit into the home, rather than making the home fit the treatment.

References


Baillod, R A (1971) Journal of the Irish Medical Association, 64, 448


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Open Discussion

H CBURCK (Germany) There seems to be a discrepancy between your survival rate which you presented over a time of ten years and the survival rates which had been presented by the Registration Committee. We know from data of the Registration Committee, which couldn’t be presented today, but will be in the Proceedings, that the rehabilitation degree in Great Britain is also over the average limit in Europe. Would you accept the explanation that you have a higher degree of selection in your patients.

BAILLODD I am afraid I can’t really accept that we have a high degree of selection. Patients are treated whether they are selected after referral, or arrive as acute cases. Our approach to patients, and the way in which we handle them, may make the final difference. We do have failures. For example four patients couldn’t be put into the home. Some patients die before they can be admitted for treatment, but this is due to lack of space and facilities.

CHAIRMAN Dr Bailleod, may I put on record my admiration of the wonderful work you have done, in London, over the past ten years. Could I ask you to expand a little on this difficult area of transplantation arising in patients on home dialysis? Do you see transplantation as an outlet for people who are not tolerating or adjusting, in some way, to home dialysis? Or, do you see transplantation as second best. Do you see home dialysis as a holding ground until we get more transplants going?

BAILLODD I always ask the patients what they feel about transplantation and practically every patient is very keen. One or two ask whether it is advisable for them to have a transplant. However we put them all into the transplant pool. We believe that transplantation should be offered, but if it doesn’t work we transfer them back to home dialysis without undue delay. Transplantation is part of our renal-failure service.

V E ANDREUCCI (Italy) I understand that you have some patients who are doing peritoneal dialysis at home, but you intend to train them for haemodialysis.
Is there any reason for this switch from peritoneal dialysis to extracorporeal dialysis? In other words what do you think about peritoneal dialysis at home?

BAILLOD Peritoneal dialysis is probably a second-best treatment for the patients. We started the home peritoneal programme because we had difficulties in getting the homes ready for haemodialysis, and the hospital beds were getting blocked, so we devised a very simple method of home peritoneal dialysis, using very unsophisticated equipment. There were also a lot of older patients and some less able hospital patients who were transferred to home peritoneal. It is both a back-up and a permanent programme.

ANDREUCCI Are you using a Tenckoff catheter for peritoneal dialysis and a special machine? Do you have any problems with infections with peritoneal dialysis?

BAILLOD Yes, we use the Tenckoff catheter. We have had problems with infection, but this is getting less frequent. We are not using complex machines, just a simple clamping device with dialysate bags. These are hung up in multiples of six at a time, using bag combinations according to the weight-loss needed. Patients dialyse five times a week. It is a very, very simple system with no alarms, and patients act as their own monitor.

D G OREOPOULOS (Toronto) I would like to make a comment about home peritoneal dialysis. Our experience was similar. We started thinking it was second best, but now, with an experience of more than forty patients on home peritoneal dialysis, we found that it was as good as home haemodialysis. We are using a simple device, devised by Lasker. Our experience is that these patients are doing better than the hospital peritoneal dialysis, and their infection rate is lower. Their rehabilitation is comparable to those on a home haemodialysis.

BAILLOD I think that the patients that we have selected for home peritoneal are the less able patients, who may not be able to achieve the same standard as home haemodialysis patients.

OREOPOULAS I believe that when you start selecting patients who can do either type of dialysis they do as well on home peritoneal dialysis as on home haemodialysis.

BAILLOD We are very satisfied with them. They go to work and the results are good.

Dr. CATTELL (London) In assessing rehabilitation of the family unit, to what extent have you had problems in the children of patients at home. I am thinking in terms of adolescent and delinquency problems.

BAILLOD I do know one family with a large number of children where there are some very major problems with the children. A few of the children do resent the equipment, but haven’t shown any definite behaviour problems.