REGULAR DIALYSIS TREATMENT AT NEWCASTLE UPON TYNE
Problems of an Embryonic Regional Service

R. W. ELLIOTT, B. A. CLARKSON, D. N. S. KERR, C. I. MASSEY,
G. A. SMART, J. SWINNEY, R. ULDALL and R. WILKINSON

Royal Victoria Infirmary, Newcastle upon Tyne, Great Britain

Historical
Regular dialysis treatment (RDT) began in Newcastle in December, 1963. A two-bedded room provided for the purpose at the General Hospital was carrying its maximum load of patients (6) by autumn 1964 and thereafter additional patients were treated at the acute renal failure unit (Royal Victoria Infirmary) and shared facilities with the acute patients. In these unsatisfactory circumstances the results achieved by spring 1965 were well below those reported from Seattle and several other centres but were sufficiently encouraging to justify the establishment of a regional RDT service. The first stage in this programme was the provision of a RDT centre in Newcastle for simultaneous treatment of 5 patients, in July 1965.

Present arrangements
Because no suitable accommodation was available in the main hospitals, the RDT centre was set up at Rye Hill—a small hospital recently vacated by the ENT department. The

Fig. 1. Plan of RDT centre at Rye Hill, Newcastle upon Tyne.
operating theatre and its ancillary rooms were adapted with minimal structural alterations to provide two dialysing rooms, a tank room, preparation rooms, offices and recovery rooms. In-patient facilities will be provided in the remainder of the hospital at a later date, and provision has been made for the setting up of a laboratory (Figure 1). The design has many glaring defects, particularly the separation of the patients into two dialysing rooms—but major structural alterations in this old, solid building would have been prohibitively expensive.

Patients are admitted to the Royal Victoria Infirmary for initial assessment and they start dialysis on the Chron-a-coil for 12 hours twice a week. On transfer to Rye Hill they are treated with the Kiil dialyser (37 °C, single pass) for 12 hours twice a week (Fig. 2, 3).

![Fig. 2. Improvised dialysis supply unit in the tank room at Rye Hill.](image)

For the moment many services, including medical cover and all laboratory investigations, are provided from the two main hospitals situated 2 and 3 km, from Rye Hill. As there are no resident medical staff at Rye Hill all patients with complications return to the acute renal failure unit for in-patient care and supervised dialysis.

**Staffing**

Although emergency work can be spread over a fairly large staff, day-to-day medical supervision is provided largely by two doctors and emergency calls have become uncommon after the first two months of operation.

The nursing establishment for 15 patients is 7 trained nurses and 3 technicians. Our greatest difficulty has been recruitment of reliable night staff to permit overnight dialysis. Married women with children, who are most easily recruited, have understandable difficulty in attending with the regularity demanded by a RDT unit.
Finance

Rye Hill was equipped mainly from voluntary funds (Evening Chronicle Kidney Research Fund). About £ 12,000 was spent on conversion and equipment of the centre.

Running costs are borne by the National Health Service through the Regional Hospital Board and the Board of Governors of the Royal Victoria Infirmary. For the first year the cost per patient at Rye Hill has been projected as £ 1200 when the centre is full (higher if it is running below capacity). This figure includes nursing and technical salaries but excludes many hidden costs—medical salaries, engineering, laboratory and other services, lighting, heating, water and depreciation on capital equipment. Most published estimates of the cost of hospital RDT appear to us unduly optimistic.

Policy re: Homotransplantation

Separate facilities for homotransplantation and for dialysis before and after operation have been set up at the General Hospital. On the basis of a very small experience we are convinced that patients on permanent RDT should be segregated from those in preparation for homotransplantation.

Selection of patients

All our patients have been aged 46 or under. No other formal selection has been made; patients have been accepted when we could take them and refused when we could not.

Results

A well selected patient is one aged 18–45, without very long-standing hypertension (e.g. not more than 5 years), with no evidence of gross vascular disease (e.g. angina pectoris) and no systemic disease likely to affect other vital organs. We accepted two children aged 13 by default when their acute renal failure (cortical necrosis, Henoch-Schoenlein syndrome) failed to recover. We have subdivided our patients retrospectively into five groups; the results in each group up to September, 1965, are summarised in Table I.

TABLE I
Results December 1963 to September 1965

<table>
<thead>
<tr>
<th>Group</th>
<th>Number</th>
<th>Still on dialysis</th>
<th>Duration of dialysis</th>
<th>Deaths</th>
<th>Cause of Death</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1)</td>
<td>14</td>
<td>11</td>
<td>1 — 15 m (5–12 months)</td>
<td>3</td>
<td>Haemopericardium</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Subdural haematoma</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Unexplained</td>
</tr>
<tr>
<td>(2)</td>
<td>3</td>
<td>2</td>
<td>3.21 m.</td>
<td>1</td>
<td>Myocardial infarct</td>
</tr>
<tr>
<td>(3)</td>
<td>2</td>
<td>0</td>
<td></td>
<td>2</td>
<td>Subacute hepatitis**</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Septicaemia**</td>
</tr>
<tr>
<td>(4)</td>
<td>2</td>
<td>0</td>
<td></td>
<td>2</td>
<td>Lung haemorrhage</td>
</tr>
<tr>
<td>(5)</td>
<td>2</td>
<td>2</td>
<td>4.8 m.</td>
<td>0</td>
<td></td>
</tr>
</tbody>
</table>

* Now at Royal Free Hospital.
** Both patients miserable throughout treatment. Control of hypertension achieved only by severe clinical dehydration.
REGULAR DIALYSIS TREATMENT AT NEWCASTLE UPON TYNE

Group (1) Well selected by the above criteria.
(2) Long-standing hypertension and angina but no other vascular disease.
(3) Widespread atheroma and long-standing hypertension.
(4) With possible systemic disease (subacute nephritis): see separate demonstration.
(5) Children.

MAJOR PROBLEMS AND THEIR EFFECT ON FUTURE PLANNING

Staffing

The isolation of Rye Hill from a major hospital is a serious disadvantage. It cannot be a nursing training school so no junior nurses rotate through it; this eliminates a major source of trained staff since nurses tend to apply for posts they know.

Since there is no large reserve of nurses to cushion the effect of staff shortages, sickness and holidays are a particularly serious problem. We are convinced that new centres should be sited within the grounds of a major hospital.

Transport

Since we serve a wide area from a single centre, patients travel distances up to 90 km each way for dialysis. Public transport is insufficiently reliable, particularly late at night, to enable dialysis to run to a schedule and only a minority of patients have their own transport. A heavy burden has been placed on the ambulance service, which cannot increase indefinitely. We therefore favour the establishment of new RDT units of about 5 beds in the major population centres, rather than the expansion of Rye Hill. A regional plan is under development by the Regional Hospital Board (RHB).

![Map of Newcastle Regional Hospital Board area](image)

*Fig. 4. Map of the Newcastle Regional Hospital Board area, showing major cities. Black symbols indicate patients referred to the dialysis unit as possible candidates for RDT.*

The area covered by Newcastle RHB is shown in Figure 4. There is a large built-up area centred on Newcastle, housing about one million people. This could continue to be served
by Rye Hill. Other heavily populated areas lie along the valleys of the Wansbeck (about 25 km north), Wear (25 km south) and Tees (60 km south), and in West Cumberland (160 km west). Possible sites for establishing RDT centres to serve these areas include Ashington, Sunderland, Durham, Middlesborough, Darlington, Carlisle and Whitehaven. Suitable general hospitals exist in all these centres but none has an acute renal failure unit, so we anticipate some help being supplied from Newcastle in the early stages. We have, therefore, suggested that Sunderland should be the site of the first ‘satellite’ unit, which is now at the planning stage. It is a city of 200,000 inhabitants in a densely populated industrial area.

Rehabilitation
Our record of rehabilitation is disappointing—only half of the patients have returned to their normal employment. This is due to several factors—the need to dialyse some patients during the day because of shortage of night staff, the long distances travelled and preponderance of heavy industry in the area. These problems will be eased when satellite centres are opened.

An unexpected complication is that patients who take up part-time work (e.g. 3 days a week) incur financial hardship. They are deprived of sickness and unemployment benefit when working part time and are not even eligible for National Assistance. New legislation will be required if patients are to work to their full capacity.

Cannulation
The maintenance of shunts has been the largest drain on staff time and in-patient facilities. A considerable allocation of hospital facilities must be made for this purpose unless there is a dramatic improvement in results. The data in Table II are calculated on the assumption that cannulae often fail singly, that half of all shunts are inserted in the legs and that patients require 2 or 3 days admission for arm shunts and three weeks for leg shunts.

<table>
<thead>
<tr>
<th>Average cannula life (months)</th>
<th>Average number of beds occupied</th>
<th>Operative procedures per week</th>
</tr>
</thead>
<tbody>
<tr>
<td>8</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>6</td>
<td>4</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>6</td>
<td>4</td>
</tr>
</tbody>
</table>

In a large RDT centre an operating room for insertion of shunts becomes essential.