

Strategic and tactical considerations in setting up a maintenance dialysis programme from Sydney Hospital – 1966–1978

Stewart, J.H. (2009) Historical Reflections: Strategic and tactical considerations in setting up a maintenance dialysis programme from Sydney Hospital – 1966–1978 *Renal Soc Aust J* 5(2) 54–56

Submitted December 2008 Accepted March 2009

Abstract

This paper describes the early years of nephrology at Sydney Hospital, from the first acute dialysis in 1958 through to home and satellite dialysis programmes in the 1970s. The commitment in these years of people with kidney disease, nephrologists and nurses, together with the support of the Sydney community, provided life-saving treatment for many suffering from kidney disease.

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Background – 1962–1966

Following 20 years of economic depression and world war, renal medicine flourished in the 1950s. Kidney biopsy and dialysis were introduced, and transplantation immunobiology became a fruitful field for laboratory research. From 1958 there was a single artificial kidney in New South Wales, an Alwall at Sydney Hospital, reserved for treating life-threatening reversible renal failure, but dialysis capacity was expanded in 1962 by a second machine for Sydney Hospital, a Travenol ‘tank’ kidney, and Dr David Jeremy’s appointment to start a renal service at Prince Henry Hospital.

Both services immediately came under pressure from the number of cases then presenting with acute-on-chronic renal failure, chiefly in young or middle-aged women with renal papillary necrosis from heavy daily consumption of aspirin, phenacetin and caffeine (APC) powders. In this condition, renal papillae, often infected, detach causing pelvi-ureteric obstruction, pyonephrosis and septicaemia, a medical emergency. However, good long-term recovery was the rule if treated promptly by relief of obstruction, antibiotics and dialysis.

The experience of these years proved invaluable in expanding infrastructure and developing expertise in the clinical workforce, quite apart from highlighting the need to prevent the most frequent cause of renal failure in Australia.

Initially, vascular access for haemodialysis was by iliac venous lines inserted percutaneously by the Seldinger technique, which replaced catheters surgically inserted via the long saphenous vein in 1963. However, with introduction in 1963 of the stiff Teflon catheter, which could be inserted through an abdominal wall cannula, peritoneal dialysis gradually replaced haemodialysis, partly because it could be set up within an hour by the registrar on duty. Using high-glucose dialysate, both hyperkalaemia and pulmonary oedema could be brought under control more rapidly than was possible with haemodialysis. The flexible, but non-compressible, silastic (Tenckhoff) peritoneal catheter, requiring a surgical operation for its insertion, replaced the stiff catheter for all but emergency dialysis in the mid-1960s, from which time peritoneal dialysis also was used for interim maintenance dialysis of patients without established vascular access.

Key Words

history, kidney, renal, nursing, dialysis, transplant

During this period, a few patients started maintenance dialysis at the Queen Elizabeth (Adelaide), Royal Melbourne, and Prince Henry (Sydney) Hospitals, and several received cadaveric or living-related kidney grafts. At Sydney Hospital, we were reluctant to start a programme until able to accept for treatment all medically suitable patients, as judged by the standards of the time. To achieve this, ready access for our patients to an active transplant programme was essential.

Hospital-based maintenance dialysis, 1966–1970

In 1965, the Board of Sydney Hospital determined to set up renal transplantation, a project that came to fruition in 1967 (Mahony 2009). The Travenol twin-coil artificial kidney was reserved for preparing patients for transplantation, and in the year before the first transplant operation it provided twice-weekly, 8–10 hour dialysis for 10 patients, 2 at a time, each using one of the twin coils.

The Brescia-Cimino radio-cephalic arterio-venous fistula was employed from late 1966 for all except the first few home dialysis patients by our surgeons, Brian Storey and Ross Sheil (appointed in 1967). Thereby we avoided all the disadvantages associated with the Quinton-Scribner external arterio-venous shunt (thrombosis, infection, protection against inadvertent disconnection, restrictions on bathing, venous stenosis requiring re-siting).

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Early in 1968, we replaced the old-style 'tank' machine with 4 Travenol RSP artificial kidneys for which space was created by enclosing a verandah of the renal ward. Until the mid-1970s, in-centre dialysis was employed only as interim treatment for those awaiting transplantation. Dr Krishna Mani was responsible for this service until 1970, the first step towards an auspicious career in Indian nephrology.

Of inestimable consequence, was the initiative by the Nightingale School of Nursing to run two 6-month renal courses each year from 1968, giving theoretical instruction (much of it from Dr Mani) and practical experience in the general renal, dialysis and transplantation wards. From that time we could be sure of high quality nursing staff whose leadership in delivery of our renal, particularly dialysis, service was the strength of the maintenance dialysis programme thereafter. This allowed us to introduce home dialysis and to open satellite dialysis units away from the teaching hospital environment without direct medical supervision, the single most important strategy that guaranteed the quality and sustainability of an economically efficient state-wide dialysis service.

By these means we were able, just, to achieve our objective of accepting all medically suitable patients presenting with irreversible renal failure, as judged by the standards of the 1960s. At first these were: fit for transplantation, aged less than about 50 years and not diabetic! Almost immediately, we realized that these standards were unduly restrictive, but the manifest success of our renal replacement programme, greatly helped by the positive attitudes and advocacy of our early patients, was such that the hospital authorities allowed gradual expansion of dialysis, notwithstanding its high cost. This latter was addressed in a small way by re-use of the Travenol twin-coil dialysers.

Home dialysis and dialysis

research, 1970s

Peter Morris, a Sydney timber merchant, presented with near end-stage renal failure to Belding Scribner's unit in Seattle, where long-term haemodialysis had first been shown to be practicable in the late 1950s, and home haemodialysis was conceived. On his return to Australia, Peter went to the Royal Melbourne Hospital in 1967 for training under Dr John Dawborn, who had trained in Seattle. No sooner was Peter back in Sydney than he became an advocate for home dialysis. Thelma Neilsford-Jones was chosen to conduct patient training, which was sited initially in a separate ward area at Sydney Hospital. Peter gained the support of Lions, and in 1970 a commitment by many Sydney and country clubs each to raise funds for one artificial kidney. As a result, we had about 20 Drake Willock machines available for individual patients by late 1970.

Meanwhile, the Sydney Hospital Board agreed to find off-site premises for home dialysis training, finally settling on the recently closed nursing school at St Luke's, a small hospital in King's Cross. The Hospitals' Commission approved funding provided that patients would be accepted from all NSW renal units. Thus, the Sydney Dialysis Centre, with Thelma Neilsford-Jones (from 1974, Liz Yuill) in charge, was ready to take its first patients in September 1970, not a moment too soon!

Serological testing for Hepatitis B had been introduced by the Red Cross Blood Transfusion Service for patients on the transplant waiting list from July 1970, at which time Sydney Hospital had a single positive. In August, several more patients became antigen-positive, and we knew that only firm action would prevent an epidemic that would also endanger staff. Re-use of dialysers was stopped, and no new patients were taken into, and none transferred out of, the hospital haemodialysis unit until all antigen-positive patients became non-infective. No further patients were infected, but for

the rest of 1970 all new patients had to go to the home dialysis programme.

In 1972, home dialysis became so much more straightforward with introduction of the Cordis Dow hollow fibre dialyser, which was only marginally more expensive than the Travenol twin coil, and could be re-used at home so long as patients were placed on low-dose aspirin to reduce clotting in the fibres. Hence the end of Kiil boards, and with them, a change from long, slow dialysis twice weekly, 8–10 hours often with no blood pump and preferably overnight, to shorter, faster dialysis three times per week. Anaemia was the most serious clinical problem, and hyperphosphataemia was the most serious biochemical abnormality at this time, the partly because of a parsimonious policy for transfusion and prescribing high-dosage aluminium-containing phosphate binders.

From the time of the decision, by the Whitlam government in 1974, to fund from Federal sources all home dialysis, which came to include continuous ambulatory peritoneal dialysis (CAPD), there was no resource constraint on patients entering the home programme.

Peter Farrell, fresh from post-doctoral research in medical engineering at McGill, was appointed in 1973 to the academic staff of the University of New South Wales, and to the Sydney Dialysis Centre. With his leadership and advice, the quality of our dialysis treatment steadily improved, a research programme into the pathophysiology of uraemia was started in 1975, and CAPD introduced in 1978. Despite our reservations about the low clearances achievable (about 6 ml/min), CAPD proved a boon – at last we had the capacity to accept all new patients and a treatment that maximized the independence of patients who could not manage haemodialysis at home.

Laboratory-based clinical research into the endocrine and metabolic consequences of end-stage kidney disease and dialysis was started by Drs Gordon

Stokes (renin-angiotensin system) and Leopold Dintenfass (blood viscosity) in 1968, Professor Solomon Posen's team (renal bone disease) in 1970, and Drs Lloyd Ibels, Georgina Crawford and Elliot Savdie (dyslipoproteinaemia), from 1973.

In the 1970s, Sydney tap water required no purification other than a 1 micron filter. However, our technicians, John Regan and Bruce Morley, later David Coutts, checked the water composition for all country patients, and sometimes added reverse osmosis or, rarely, deionization (this was first used to remove zinc from water stored in a new galvanized tank). Fluoridation caused no discernible problems, and we had only one case of dialysis dementia, in a patient from northern New South Wales. From the late 1970s when aluminium salts were introduced for water purification, reverse osmosis was generally used.

Satellite dialysis centres, from 1976

Inevitably at this time, patients from country New South Wales had to travel for treatment to Sydney, at considerable cost and inconvenience. From 1968, Krishna Mani, then John Mahony, provided a close consultative and out-patient service to the Royal Newcastle Hospital, in liaison with Dr John Duggan, their senior physician. However, the size of Newcastle and the population of the

Hunter Valley and northern New South Wales mandated a fully equipped and staffed, independent renal unit, which we persuaded the Hospitals' Commission to site at the main hospital. This project came to fruition with the appointment of Dr Ranjit Nanra as Director in 1973. From that time, patients living in the northern third of New South Wales were assured of ready access to high quality renal service.

In 1975, there was no dialysis service west of Concord Hospital, greatly to the disadvantage of the more than half of our patients who lived in western Sydney. Derek Howes, CEO at Blacktown Hospital, with foresight and enterprise that characterized so many hospital administrators with whom we dealt in those years, offered a building in the hospital grounds, and nursing staff whom he enrolled in the Sydney Hospital renal course in 1975. Thus, the first truly satellite dialysis centre, a 6-place unit, was opened in early 1976, with Fran Duncan in charge and Kay Clinick as her deputy, while John Mahony was chosen to provide medical supervision from Sydney Hospital. Their wise policy to maximize rehabilitation and self-sufficiency paid handsomely in terms of the health and well-being of patients fortunate enough to be dialysed at Blacktown. Satellite centres in the larger provincial towns, supervised locally by general physicians with training in renal medicine, generally followed this model.

Reflection

Good fortune played no small part in the success of our early dialysis programme. The kidney, in addition to its manifest appeal as an organ for rational clinical study, proved to be the first to have its function replaceable by an artificial device, and the first to be successfully transplanted. As a result, some of the best medical graduates became our registrars. The specialty also offered opportunities and, ultimately, a satisfying career to ambitious and resourceful nurses.

We also must remember the esprit de corps of our first patients, who put up with much inconvenience and stress, largely without complaint, and of the strong backing our efforts received from the community as a whole. It was at that time we realized how generous and reasonable were the people of Sydney, without whom neither cadaveric transplantation nor home haemodialysis would have got off to such a flying start, and how supportive country communities were towards those among them who were laid low by renal failure.

Reference

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