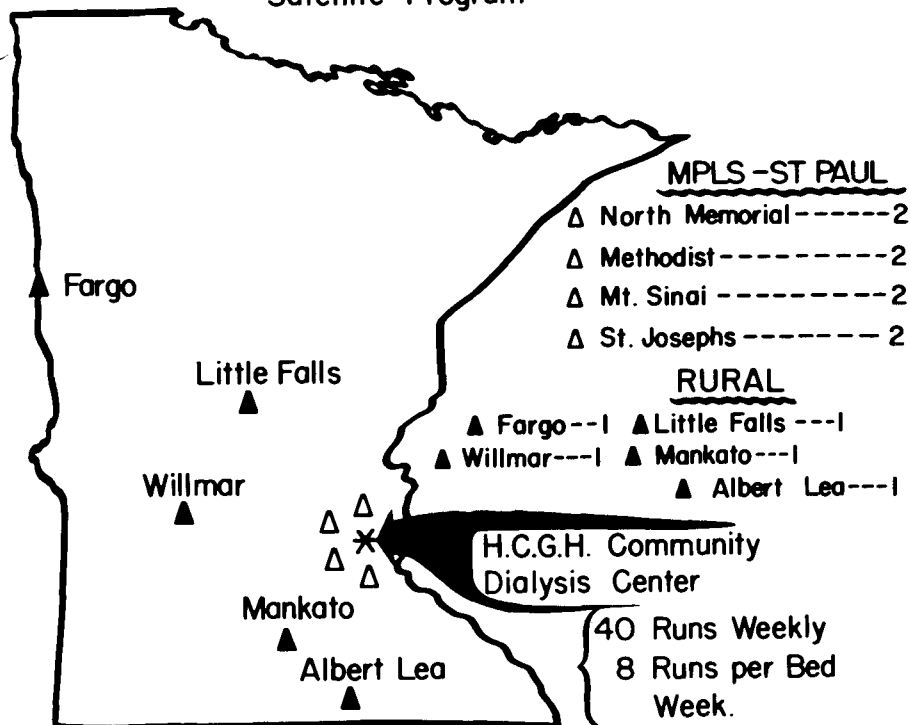


CHRONIC RENAL DIALYSIS

Satellite Program



A Satellite Program for Chronic Renal Dialysis

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A U.S. Public Health Service grant made possible the establishment of a demonstration chronic hemodialysis center at Hennepin County General Hospital in 1965. A central Dialysate delivery and monitoring system utilizing Kiil dialyzers, was installed in a renovated five bed patient area. Maintenance treatments with the central unit were initiated on 14 patients in April of 1966. The unit functioned not only as a chronic dialysis center, but also as a holding facility for those patients awaiting cadaver renal allografts.

The small size of the unit severely limited the number of patients who could be maintained while awaiting renal allografts. Patients who rejected renal allografts also needed dialysis facilities. Since unattended overnight home dialysis had recently been proven feasible in selected patients, it was postulated that hemodialysis could be

safely administered to less highly selected patients in local hospitals by trained nurses under the supervision of local physicians. Such a "satellite" hemodialysis program was developed.

This program consisted of a parent center (Hennepin County General Hospital) and several private hospitals throughout the state. The parent center provided patient selection, financing, initiation of treatment, cannula revision, and management of serious complications. A training and back-up facility for the satellites and a consulting service for the local physician, who assumes responsibility for the satellite unit, is also contributed by the center.

The financing of such a program represents a significant problem in that irrespective of changes in his financial status, the obligation to continue treatment, once a patient is begun on therapy, is implicit in a program of chronic dialysis. In the establishment of a satel-

lite program, financial support was a major consideration.

Welfare officials of the state of Minnesota were approached with the proposal for satellite dialysis and, after independent studies to establish their roles in the overall treatment and rehabilitation of patients, they concluded that they could participate in this program. Federal funds, available to develop rehabilitation facilities in private hospitals, were provided by the State Department of Vocational Rehabilitation. Under the Medical Assistance or Aid to the Disabled programs (Title XIX) of the Department of Public Welfare, candidates for chronic dialysis could receive benefits if they qualified by established administrative criteria.

Private hospital insurance is used whenever possible, and the remainder of the medical expense is paid by the "spend-down" mechanism. The Minnesota State Medical Society appointed a subcommittee of its Welfare Medical Advisory Committee on the request of

the Commissioner of the Minnesota Department of Welfare to serve in an advisory capacity to the Department of Welfare and the Department of Vocational Rehabilitation on matters pertaining to patients with chronic renal disease.

The selection of hospitals was on the basis of location and the interest of both medical and administrative personnel. The quality of laboratory service, administration, nursing and physician staff were among the factors considered. Upon acceptance of the program, a grant from the State Department of Vocational Rehabilitation was made to the hospital to establish a satellite rehabilitation dialysis facility. Nurses and technicians were sent to the parent center for training and a local physician was selected to supervise the unit. The installation of units was designed so that nurses could oversee the dialysis patients as well as perform other duties. Comprehensive serv-

ice contracts were arranged with the manufacturer, and an individual semi-automatic continuous monitoring fluid preparation and delivery machine* was selected for use in conjunction with the Kiil dialyzer.

Seven satellite units were established from September 1966 through March 1967. As of March 1968, 2,705 dialysis runs had been completed on 37 satellite patients. The parent unit services a total of 50 patients, 31 in satellites and 19 at the parent center. The parent center operates 24 hours a day, 7 days a week. The permanent center patients are treated at night with the central dialysis equipment. New patients and those with complications are dialyzed during the day with 3 single Mini II-A units.

Patients initially selected for the hemodialysis program were primarily on a first come basis. However, in accordance with the recommendations of the Minnesota State Advisory subcommittee on Dialysis, more rigid selection criteria have been employed with major considerations to rehabilitation potential, age (55 or less), type of renal disease, major medical complications, and willingness to cooperate. A committee of six physicians at the parent center makes the final decision for acceptance to the program.

A comparison study of clinical results revealed no essential difference in the response to treatment of satellite and center patients on dialysis for six months or more. Dialysis in all units is performed under uniform procedure. General guidelines are established for the management of complications.

All patients are instructed to follow a 60 gram protein diet. In those patients with significant hypertension, a 2 gram sodium diet is prescribed. Patients with excessive interdialysis weight gain are restricted to 1 liter of fluid a day.

Routine laboratory studies in the center and satellites are performed on a weekly and monthly basis. Duplicates of satellite laboratory data, flow sheets, complications and rehabilitation results are sent to the center. All information is tabulated and entered in a master patient log where it is reviewed by a center physician and nurse.

The arterial cannula survival is 6.0 months for satellite and 6.7 months for center patients with venous cannulae surviving an average of 5.5 and 5.8 months respectively. This calcula-

tion is based on total patient treatment months divided by total cannulations. Diminishing flow, clotting, infection, septic pulmonary emboli, aneurysm formation and erosion of overlying skin comprised the list of reasons for cannula revision.

Nurses or physicians perform the declotting procedure. Two episodes of cerebral insufficiency during declotting were exhibited; however, both episodes were transient without residual neurological deficit.

Transfusions of packed cells are administered for symptomatic relief of anemia. In patients with angina pectoris or during pre and post-operative periods a higher hematocrit level is maintained.

Sodium restriction and hyponatremic dehydration are the primary treatment for hypertension. At some time during their course of dialysis anti-hypertensive medications were necessary in most patients. In those patients with diastolic blood pressures that could not be maintained below 110

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mm of mercury and those with post dialysis orthostatic hypotension associated with antihypertensive therapy, bilateral nephrectomy was performed in an attempt to control blood pressure. Control has been more readily established in all ten patients.

Deionized or softened water and delivered dialysate with calcium concentration of 5.0 mg/100 ml is used in all units. The average serum calcium of patients after 6 months of dialysis was 9.3 mg/100 ml. Eight patients have had a significant problem with renal osteodystrophy. The findings of low serum calcium, high alkaline phosphatase, and evidence of bone demineralization on x-ray without subperiosteal bone reabsorption occurred in four patients. These patients were treated with Vitamin D and phosphate binders. No pathologic fractures occurred.

High serum calcium and alkaline phosphatase and x-ray evidence of

osteitis fibrosa prompted subtotal parathyroidectomy for tertiary hyperparathyroidism in four patients. There has been complete radiologic healing of the bone lesions in the two patients with the least bone disease. Multiple pathologic fractures were exhibited by the other two patients. Following surgery, bone pain diminished and callus formation appeared at old fracture sites; however, 4 to 6 months post-operatively, new pathologic fractures occurred. A subtotal parathyroidectomy was performed for acute hypercalcemia in one patient who had no evidence of bone disease on x-ray. All five patients had hyperplastic parathyroid glands but no evidence of adenomatous change.

Sensory neuropathy was evident or demonstrated in four patients prior to the institution of dialysis. While they were being maintained with peritoneal dialysis, two additional patients progressed to paraplegia. These patients have improved dramatically with the use of twice weekly hemodialysis. Each has mild residual bilateral foot-drop. Patients with complaints of paresthesia or weakness, or evidence of impaired nerve conduction, have had the length and/or frequency of their dialysis increased. A 4 to 8 week period has shown improvement of sensory deficits.

Hepatitis, upper gastrointestinal bleeding, pericarditis, and osteomyelitis comprised the miscellaneous problems dealt with.

Hemodialysis has been proven to be a life saving procedure. In an effort to serve more people, satellite hemodialysis has been demonstrated as an effective method of treatment. Comparison studies between satellite patients and those treated exclusively in the parent center are similar in all parameters.

*Milton Roy Mini II-A