# A History of Renal Services in Brunei Darussalam

**Jackson TAN, Shaukat ZINNA, Ranganathan DWARAKANATHAN, Sherlock CHIN Syhe Lock, Peter Loy de Villiers HART**
**Division of Renal Medicine, RIPAS Hospital, Bandar Seri Begawan, Brunei Darussalam**

## BACKGROUND

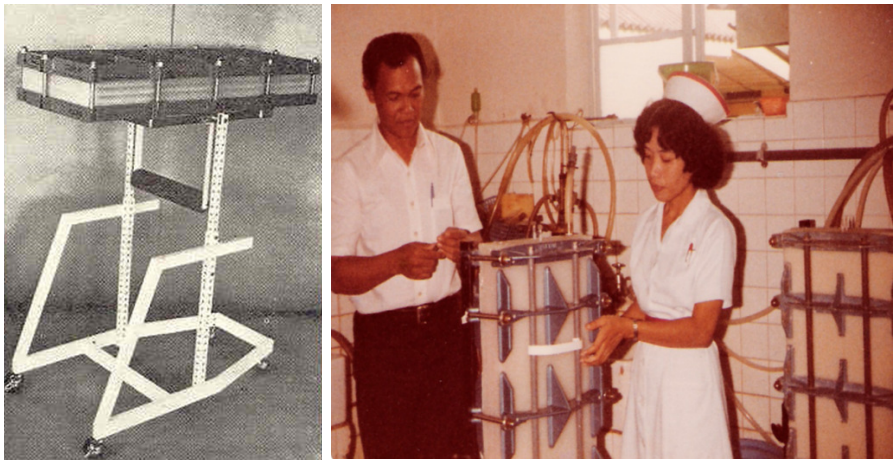
The renal services in Brunei have existed since the late 1960s. Patients who had End Stage Renal Disease (ESRD) were treated with conservative medical management until the introduction of renal replacement therapy (RRT) on the 18th September 1968. Since the introduction of RRT, the renal services have expanded and proliferated in the ensuing decades to accommodate the growing ESRD population in the country. More than 2000 Bruneian patients had received RRT in the form of haemodialysis (HD), peritoneal dialysis (PD) and renal transplantation in the last four decades. This article attempts to provide a summary of the history of the department of renal services through published historical records, departmental archives and personal communications with key members of the renal services.

### Dialysis in the 1960s and 1970s

A government decision was taken to set up HD facility in the country in 1967. [1] Due to the lack of local expertise at that time, both the consultant in charge and the prospective first dialysis patient received initial HD training in the renal department of the Royal Free Hospital in London, United Kingdom. Brunei's first HD unit was situated in a small makeshift area in the Brunei General Hospital. Single-patient Dylade model B proportioning machines (Figures 1) with heat sterilisation and Kiil dialysers were used for HD. The dialysate concentrate was supplied from the United Kingdom, but due to the remoteness of the country and unreliability of freight services (up to ten days for supplies to arrive), emergency supplies were occasionally manufactured by the local hospital pharmacy from dry crystals. [1]

HD patients were dialysed thrice weekly for 10 hours each time. To enable the maximum number of patients to be dealt with by a given number of proportioning machines, over half of the patients had be dialysed at night. Interestingly, the policy at that time required patients to manage their own dialysis and to be independent of the nursing and medical staffs. Patients could get technical support or medical help in the hospital in the event of a mechanical breakdown or emergency through telephone communication. The selection policy for patients was very stringent and required patients to be compliant and independent. The main criteria was that

**Correspondence author**: Jackson TAN
Division of Renal Medicine, RIPAS Hospital
Bandar Seri Begawan BA 1710, Brunei Darussalam.
Tel: +673 2242424
E mail: drjacksontan@yahoo.co.uk



**Figs. 1: a) The dialysis machine used when dialysis programme started in Brunei Darussalam, and b) staff preparing a dialysis machine.**

the patient should accept unreservedly that dialysis treatment was necessary for survival and it had to be continued indefinitely. There was a bias towards including male patients and breadwinners of the family. Patients who were less educated or had tenuous belief in western medicine were generally excluded due to tendencies to not comply with treatment and to resort to village medicine.

Scribner arteriovenous shunts were inserted and revised by nephrologists. These were inserted in the legs of patients. Fibrous stenosis, infection and thrombosis were frequent complications of these shunts. As there was no specific dietary service at that time, basic principles of renal diet like control of sodium, limitation of fluid and the avoidance of excesses were established through constant reminders by doctors and nurses. Generally speaking, over-hydration of patients was not common due to the humid weather condition of the country and good fluid compliance; the average intra-dialytic weight gain

**Fig.2: The renal team (Dato Peter Hart (fourth from the left back row), Dato Hussain Daud (first from the right back row), nurses and a renal patient (man second from the left, front row).**

**Table 1: The demographic and details of the first five ESRD patients.**

| Sex | Age | Occupation | Diagnosis | Complications |
|---|---|---|---|---|
| Male | 42 | Doctor | Polycystic kidneys | Hypercoagulable state requiring warfarin, osteodystrophy |
| Male | 20 | Livestock inspector | Chronic Glomerulonephritis | Skin sensitisation to chlorhexidine, recurrent shunt infections |
| Female | 29 | Housewife | Chronic Glomerulonephritis | Pulmonary tuberculosis, hyperparathyroidism, endometriosis |
| Male | 27 | Businessman | Chronic Glomerulonephritis | Idiopathic epilepsy |
| Male | 44 | Public works department foreman | Chronic Glomerulonephritis | Thrombophlebitis |

was only 0.5 kg. Patients were allowed to choose their own dialysate with the appropriate potassium concentrations to best suit their diet. Anaemia was managed with intravenous iron infusion and patients were advised to maintain high protein intakes (about 1g/kg/day) to ensure adequate haemopoesis.

The first patient was a 42-year-old Taiwanese doctor with polycystic kidneys (Figure 2). He was a foreign national working in Brunei and his role in the community was deemed important enough for the government to take the necessary steps to set up a dialysis unit to ensure continuity of his services to the community. Over the course of the next four years, only four other patients were included into the programme. Table 1 summarises the details of the first five patients. [1]

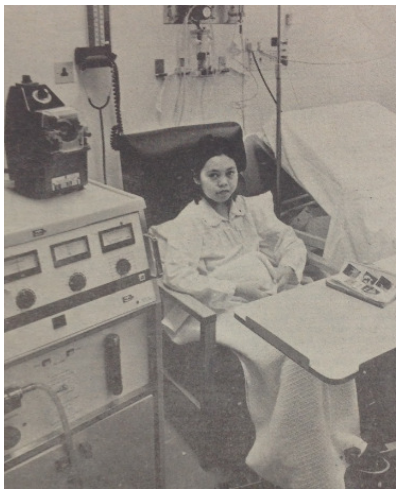
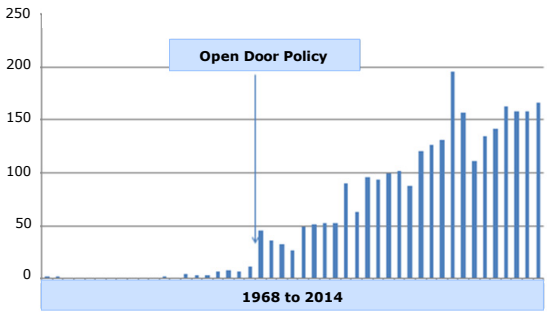


**Fig. 3: The first Bruneian to have a renal transplant (Ho Beng Geok) in 1978.**

As the unit developed and staff's confidence improved, cases of acute kidney injuries and poisonings were successfully managed in the subsequent years. The stringent eligibility criteria for the chronic HD programme meant that patients' numbers could be kept manageable and staff and resources were not overwhelmed. Intermittent Peritoneal Dialysis (IPD) was occasionally employed for short-term dialysis but was only used for acute patients or patients who were not able to tolerate HD for various reasons. IPD was deemed as the second choice therapy because of the high technical difficulties and infection rates during that time. From our archives, only 12 patients were started on dialysis up to 1980.

The first Bruneian patient to receive renal transplantation was a young lady with chronic kidney injury from glomerulonephritis. who was sent to The London Royal Free Hospital, United Kingdom in January 1978 under the sponsorship of the Brunei government. The patient was a 17-year-old local lady (Ho Beng Geok) who received a kidney from her sister (Figure 3). In the ensuing years, eligible ESRD patients continued to be sent by the




| Time period | New patients |
|---|---|
| 1968-1975 | 6 |
| 1976-1980 | 6 |
| 1981-1985 | 25 |
| 1986-1990 | 133 |
| 1991-1995 | 233 |
| 1996-2000 | 442 |
| 2001-2005 | 567 |
| 2006-2009 | 599 |
| 2010-2014 | |

**Fig. 4: The incidence of renal replacement therapy (RRT) patients since the start of the renal dialysis programme to the present day.**

Brunei Government to foreign centres for renal transplantation due to the lack of local facilities and expertise.

**Dialysis in the 1980s and 1990s**

This period saw an explosion of the RRT population, particularly after the initiation of the open door policy in 1985 (Figure 4). Prior to 1985, patients with chronic diseases (especially diabetes mellitus) were not included into the programme. There was a gradual change in the public perception of RRT in this generation with better acceptability and integration of patients into the community. The role of nephrologists has evolved from keeping patients alive to improving quality of life of patients. This was usually achieved by the judicious use of modern dialysis technology and treatment regimes. The emergence of erythropoietin therapy in the 1980s has revolutionised the treatment of anaemia and improved patients' well-being. This has enabled patients to work and become less dependent on family and hospital support. The table below illustrates the growing numbers of incident RRT patients during this period especially after the embracement of the open door policy and the introduction of erythropoietin therapy. Between 1980 and 1999, 735 incident patients were commenced on dialysis.

HD facilities which were previously limited to the Brunei General Hospital (from 1968 to 1983) and RIPAS Hospital (from 1983 to current) were expanded to the Sumbiling Dialysis Centre (1990 to 1994), Kiarong Dialysis Centre (1994 to current) and Rimba Dialysis Centre (1998 to current). The expansion of the RRT population meant that stable patients were mobilised and dialysed away from acute hospital HD facilities to peripheral satellite dialysis centres with minimal medical supervision. Rimba Dialysis Centre, which has the capacity to dialyse 50 patients per shift, was also built to accommodate various essential facilities like administrative offices, health promotion unit, peritoneal dialysis unit and outpatient clinics.

Continuous ambulatory peritoneal dialysis (CAPD) was introduced in 1993. By the end of five years, 32 patients were commenced on CAPD, of which 23 were converted from HD. [2] Within 10 years, the number of CAPD patients grew to 65 (or 19% of the existing RRT population). [3] The rapid expansion

of the CAPD population was fueled by the reduction of cost of CAPD fluid and accessories and the expansion of the trained support services. The move to expand PD was also driven by nephrologists to enable patients to self-care and improve quality of life.

The government continued to sporadically send eligible ESRD patients for overseas renal transplantations. Commercialised transplantations (kidneys acquired from transplant tourism) from India and China also made up a significant proportion of the Brunei transplant population. Although commercialised transplantations were not sanctioned and approved by the services, these patients were entitled to receive transplant medication and follow up treatment in Brunei Darussalam. Table 2 illustrates the number of transplants over the last 20 years.

**Dialysis in the 1990s and 2000s**

The open door policy for RRT has expanded to not only include patients with chronic diseases but elderly and terminal patients as well. This is evidenced by the increasing pool of prevalent dialysis patients that is disproportionate to the increasing population of the country. In a ten year period between 2002 and 2011, the dialysis population increased from 281 to 545 patients. In the same time period, the population of Brunei increased from 340,800 422,700. This corresponded with an increase of 94% of the dialysis population compared to the 24% increase in the general population over the same time period. [4] This growing numbers of RRT patients has necessitated the services of additional HD centres and expansion of existing HD centres, particularly in other districts. As a consequence, the Kiarong dialysis centre (1994 to current), Temburong dialysis centre (2008 to current) and Tutong dialysis centre (2012 to current) were built to accommodate for the HD needs of the country. Existing HD facilities at RIPAS Hospital and Suri Seri Begawan Hospital (SSBH) were also expanded and upgraded to cater for patients with increasingly complex co-morbidities.

Automated Peritoneal Dialysis (APD) was introduced in 1998 to improve the acceptance and take up rate of peritoneal dialysis in the population. [5] APD, which was initially started as a trial involving 10 patients, enables patients to have a better quality of life with limited disturbances to patients' daily diurnal activities. Within five years of its introduction, APD has surpassed CAPD as the preferred mode of PD. A PD preference policy was declared by the renal services in 2012 to encourage uptake of PD amongst new and old ESRD patients. The move was motivated by

**Table 2: The number of patients who had undergone renal transplantations.**

| Time period | Government-sponsored patients | Self-sponsored patients | Total patients |
|---|---|---|---|
| 1993-1996 | 2 | 5 | 7 |
| 1997-2000 | 2 | 4 | 6 |
| 2001-2004 | 4 | 4 | 8 |
| 2005-2008 | 12 | 6 | 18 |
| 2009-2012 | 9 | 1 | 10 |
| All | 29 | 20 | 49 |

the belief that PD can provide long-term medical and psychosocial benefits to patients and financial gains to healthcare providers.

The Brunei Dialysis and Transplant Registry (BDTR) was created in 2011 to enable a systematic collection and collation of RRT data. [4] The chief aims of the registry are to obtain general demographic data of RRT patients and to determine disease burden attributable to ESRD. The registry has enabled the services to be benchmarked against the top registries in the world. [6] It is hoped that the registry can stimulate and facilitate research on ESRD and provide a digitalised archive to preserve the history of the department.

A living-related renal transplant programme was initiated in 2013 to provide treatment for patients in their local environment and to deter foreign commercialised transplant activities. Studies were conducted to assess the feasibility, sustainability and acceptability of such a programme. A nationwide survey conducted in 2010 revealed that 79% of 300 respondents were willing to donate their kidneys should the need arise and 60% preferred to have a local programme. [7] Another study showed that transplant patients had a superior quality of life when compared to HD and PD patients in Brunei Darussalam. [8] A local transplant survival study showed that graft and patient survival of foreign-performed transplant patients were on par with international standards indicating that local expertise in the country is capable of monitoring and treating long-term transplant patients. [9] The first renal transplant recipient was a 21-year-old girl with chronic ing-related kidney donation from her father.

## CONCLUSION

The Department of Renal Medicine, Brunei Darussalam has made great strides in progress over the last 40 years. The services can now cater for all treatment modalities of ESRD, and have achieved credible international standards. Future challenges should focus on stemming the CKD epidemic in the population and improving the quality of life and life expectancy of RRT patients.

### REFERENCES

**1:** Chin SS, Hart PL. Independent hospital dialysis in Brunei. Br Med J. 1971; 3:629-31.

**2:** Dwarakanathan R, Alwi IK, Aung H, Chin SS. Continuous Ambulatory Peritoneal Dialysis- Is it an adequate therapy for End Stage Renal Disease in small countries?. BIMJ. 1999; 1:281-5.

**3:** Dwarakanathan R, Yaakob HZ, Hadi H. Pattern of peritoneal permeability in continuous ambulatory peritoneal dialysis patients in Brunei. Perit Dial Int. 2003; 23 Suppl 2:S11-3.

**4:** Tan J. End stage renal disease in Brunei Darussalam - report from the first Brunei Dialysis Transplant Registry (BDTR). Ren Fail. 2013; 35:1101-4

**5:** Kamal I, Liew YP, Chowdhury S, Tan J. Automated peritoneal dialysis in Brunei Darussalam. BIMJ 2011; 7:72-7.

**6:** Tan J. Renal replacement therapy in Brunei Darussalam: comparing standards with international renal registries. Nephrology (Carlton) 2014; 19:288 -95.

**7:** Teo TT, HOssain MM, Zinna S, Liew YP, Tan J. Public opinion on renal transplantation in Brunei Darussalam. Transplant Proc. 2011; 43:3599-603.

**8:** Hon KY et al. Quality of life comparisons between patients on renal replacement therapy in Brunei Darussalam. Transplantation 2012; 94:806-7.

**9:** Tan J, Khalil MA, Tan SY, Khalil M, Ahmed D, Zinna S, Chong W. Outcomes of renal transplantation in Brunei Darussalam over a twenty year period (1993-2013). J Transplant. 2014; 2014:784805.