Profile of Admissions to An Acute Dialysis Care Unit

H-K Goh, E J C Lee

ABSTRACT

The profile of admissions to an acute dialysis care facility of the National University Hospital Renal Centre, Singapore was studied in an attempt to identify the needs of these patients so that admissions may be possibly reduced.

All patients above the age of 18 years who were admitted to the dialysis centre in the National University Hospital for dialysis between 1 Jan 2000 and 31 Mar 2000 inclusive were studied.

A total of 124 patients were studied. Almost all the patients had end stage renal failure. The commonest cause of end stage renal failure was diabetic nephropathy (58.8%). There were a total of 157 admissions. Most of the admissions were associated with end stage renal failure (96%). Vascular access problems caused 40% of all admissions and 68% of all multiple admissions.

The data suggest that a dialysis facility in a multidisciplinary acute hospital needs to meet the requirements of mainly patients who are already in end stage renal failure, those who have vascular access problems and those who have diabetes.

Keywords: end stage renal failure, diabetes mellitus, dialysis, vascular access, Singapore

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INTRODUCTION

Dialysis care is an important component of renal care resources in any renal unit. It provides for dialysis care for hospitalised patients who require dialysis but do not warrant intensive care monitoring. Patients who need intensive care and monitoring as well as dialysis are usually cared for in intensive care units.

While early dialysis units catered for the needs of patients who had acute reversible renal failure, today many such acute care facilities treat patients who 1) have end stage renal failure but have not been hitherto diagnosed as having renal failure; 2) are already on chronic dialysis but need hospitalisation for an intercurrent illness or; 3) have acute reversible renal failure with no concurrent multi-organ failure. Modalities of dialysis provided are determined by dialysis access availability and co-morbidity. The relative unpredictability of the demand for these services makes them more expensive to staff and operate than chronic dialysis facilities. It is therefore important that the profiles of patients using these facilities are studied so as to optimise the utilisation of the acute dialysis facility.

OBJECTIVE

We therefore undertook a three-month prospective study of the profile of admissions to the acute dialysis care facility of the National University Hospital (NUH) Renal Centre, Singapore, in an attempt to identify the needs of these patients and to see if there were factors that could be identified to reduce admissions to the facility.

PATIENTS AND METHODS

Patients

All patients above the age of 18 years who were admitted to the acute dialysis centre in the Renal Centre for dialysis between 1 Jan 2000 and 31 Mar 2000 inclusive were studied. Only patients who *did not* need intensive care monitoring were admitted to the centre. The following data were collected: age, sex, ethnic group, cause of renal failure, indication for dialysis, and mode of dialysis provided.

Admissions

Where a patient was only admitted once during the study period the admission was considered as single. If a particular patient had more than one admission during the study the admission were considered as multiple.

Causes of renal failure

These were categorised as:

a) **Acute Renal Failure (ARF)** – these patients had no history of renal disease/dysfunction before admission. All had no other major organ failure.

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b) **End Stage Renal Failure (ESRF)** – these were patients who had a history of progressive irreversible renal failure that needed renal replacement therapy to sustain life. These were further categorised into the following:

1. Diabetic Nephropathy
2. Presumed chronic glomerulonephritis (small kidneys with smooth contours on ultrasound examination, proteinuria of at least 1 g per day, haematuria, but no renal biopsy).
3. Glomerulonephritis -proven on renal biopsy
4. Hypertension
5. Polycystic Kidney Disease
6. Nephrolithiasis
7. Others

Indications for dialysis

These were categorised as:

a) Renal failure related

b) Non-renal failure related

Renal failure related indications were when one of the following was present:

1. Uraemic problems (acidosis, hyperkalaemia, and fluid overload).
2. Vascular access problems – these included malfunctions, infection and bleeding problems of arterio-venous fistulae, grafts, and double-lumen catheters.
3. Cardiovascular problems – these included haemodynamic instability and or chest pain during outpatient dialysis.
4. Others – these included other renal failure related problems needing hospital admission but not mentioned above, e.g. elective parathyroidectomy for secondary or tertiary hyperparathyroidism.

Non-renal failure related indications included all other causes for admissions that were not directly related to the renal failure such as non renal failure related elective surgery, gastroenteritis, and pneumonia.

Co-morbidity

This referred to clinically significant medical conditions that were present in the patients other than the cause of the renal failure. These were hypertension, ischaemic heart disease, cerebrovascular disease and diabetes mellitus.

Modes of dialysis

These were acute haemodialysis and acute peritoneal dialysis.

Table I. Patient characteristics.

Patient characteristics		
Age (mean +/- SD) years	58+/-	
Male: female	58:66	
Ethnic group	No:	%
Chinese	69	56
Malay	37	30
Indian	13	10
Others	5	4
Total	124	100

Table II. Cause of renal failure in End Stage Renal Failure patient.

Causes of renal failure	Number of patients (%)
Diabetic nephropathy	70 (59)
Presumed chronic glomerulonephritis	32 (27)
Biopsy proven glomerulonephritis	8 (7)
Hypertension	5 (4)
Polycystic kidney disease	3 (3)
Nephrolithiasis	1 (1)
Total	119 (100)

Table III. Prevalence of co-morbidity in 124 patients with end stage renal failure.

Co-morbidity	Prevalence (%)
Hypertension	85
Ischaemic heart disease	49
Cerebovascular disease	10
Diabetes mellitus	3

Note: a patient may have more than one co-morbidity.

RESULTS

Patient characteristics

1) Demographics

A total of 124 patients were studied. Of these, 47% were male. The mean age was 58.1 years, with the range of 21 to 80 years old. The majority of patients were Chinese (55.6%), 29.8% were Malay, 10.5% Indian and 4% others (Table I).

2) Causes of renal failure (Table II)

The commonest cause of renal failure was end stage renal failure. This was found in 119 (96.0%) of the 124 patients. The commonest underlying cause in this group of patients was diabetic nephropathy, which was found in 70 (58.8%) patients. Presumed chronic glomerulonephritis was found in 32 (26.9%) patients while biopsy proven glomerulonephritis was the cause of end stage renal failure in 8 (6.7%) patients. Hypertension, polycystic kidney disease and nephrolithiasis were found in 5 (4.2%), 3 (2.5%) and 1 (0.8%) patients respectively. Only 5 (4.0%) patients had acute renal failure.

3) Co-morbidity

In patients with end stage renal failure, the commonest co-morbidity was hypertension, which was found in 105 (85%) patients. Ischaemic heart disease was found in 61 (49%) and stroke in 12 (10%) patients respectively (Table III).

Admissions (Fig. 1)

There were a total of 157 admissions. The five patients with acute renal failure were only admitted once during the study period. Of the remaining 152 admissions that were associated with patients with end stage renal failure, 94 (62%) were single admissions while the remaining 58 (38%) were multiple admissions.

Indications for dialysis (Table IV)

The indications for dialysis in the admissions were examined in three patient diagnosis groups. The three patient diagnosis groups were:

a) Acute Renal Failure (ARF)

b) End Stage Renal Failure, with only a single admission (ESRF - single) (Table IV).

c) End Stage Renal Failure, with multiple admissions (ESRF - multiple) (Table IV).

In all five patients admitted for acute renal failure the indications was acute uraemia. In the ESRF – single admissions group, uraemia related indications – present in 42/94 (45%) of admissions, were the commonest indications for dialysis. Non-renal failure related indications accounted for 32/94 (34.0%) of admissions. Access and cardiovascular problems, were the indications in 12 (12.8%) and 4 (4.3%) admissions respectively.

In the ESRF – multiple admission group, access problems were the commonest indication for dialysis, being found in 30/58 (51.7%) admissions. Only 14/58 (24.1%) and 10/58 (17.2%) of admissions were for non-renal failure related problems and uraemia respectively.

If only admissions for end stage renal failure related indications were considered (Table IV), 52/106 (49%) of total admissions were for uraemia related indications. Access related admissions accounted for 42/106 (40%) admissions. In the patients with multiple admissions the commonest cause for admission was access problems accounting for 30/44 (68%) admissions. In the group with single admissions, uraemia related indications were the commonest. This was found in 42/62 (68%) of single admissions (Table IV).

Table IV. Prevalence of co-morbidity in 124 patients with end stage renal failure.

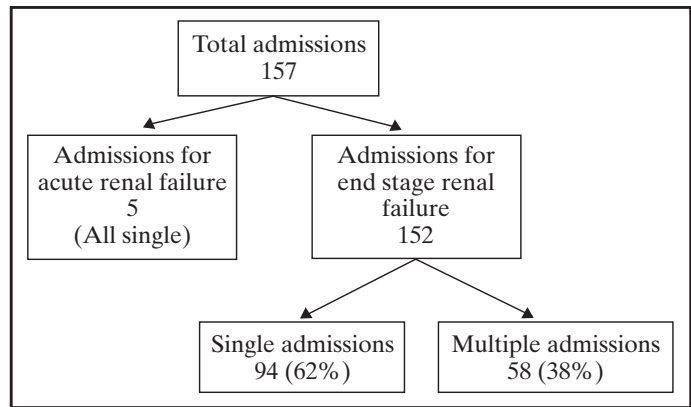|	ESRF – single admissions	ESRF – multiple admissions	Total
Renal failure related			
Uraemia related	42 (68%)	10 (23%)	52 (49%)
Access problems	12 (19%)	30 (68%)	42 (40%)
Cardiovascular problems	4 (6.5%)	2 (4.5%)	6 (5.5%)
Total	62 (100%)	44 (100%)	106 (100%)
Non-renal failure related	32	14	46
Total	94	58	152

Fig. 1 Category of admissions.

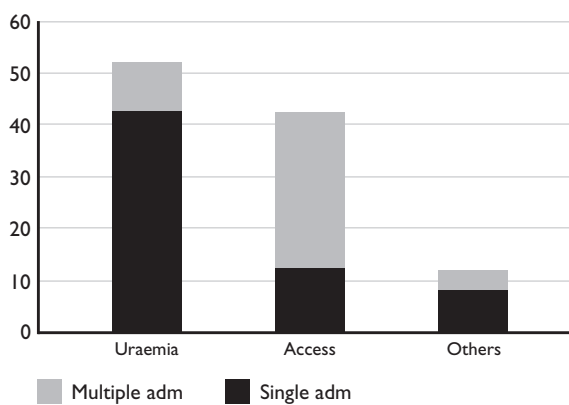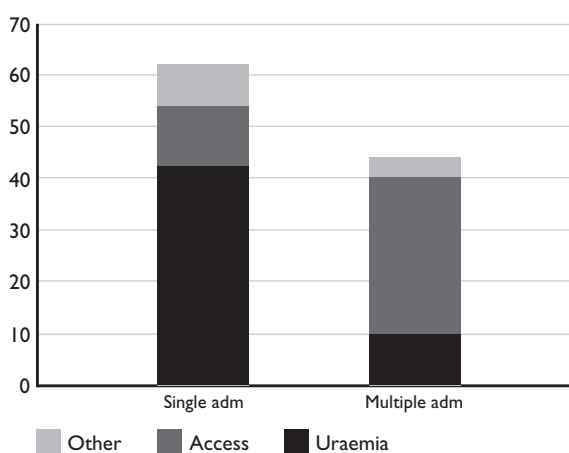**Fig. 2** Frequency of admissions with different indications for dialysis.

Fig. 3 Frequency of different indications for dialysis in patients with end stage renal failure single vs multiple admissions.

Modes of dialysis

Ninety-two percent of acute dialysis sessions performed were haemodialysis. The mean number of dialysis sessions per admission was 3.5 times per admission (range one to 28).

DISCUSSION

Dialysis care is a critical component of the nephrology service of most major acute care hospitals. The provision of care in this type of unit is costly and therefore the reasons for admissions to the facility should be studied to see if the reasons for admissions could be prevented.

In this study the majority of admissions were due to end stage renal failure, vascular access problems and diabetic patients. These accounted for two-thirds of total admissions. Of these admissions, about half were for uraemia related indications while another 40% were for access related problems. The frequency of admissions for uraemia suggests that many patients were admitted without prior diagnosis of end stage renal failure and initiation on dialysis was done on an urgent basis. Several studies have shown that late referrals for initiation of dialysis is associated with a higher mortality rate and increased hospital admissions[1-9]. If therefore chronic dialysis could have been electively planned for, and dialysis initiated electively, hospital admissions may have been prevented. Vascular access related problems accounted for 40% of total admissions for end stage renal failure related problems and 68% of multiple admissions. Many of these admissions were for re-establishing failed accesses. Recent studies have suggested that careful surveillance of accesses may predict access failure and potentially acute temporary access may be obviated[10,11]. This suggests that perhaps access monitoring and elective revisions or recreations may be able to obviate the need for hospital admissions for acute access creation and dialysis. Diabetic nephropathy was the cause of renal failure in more than half (58.8%) of the end stage renal failure patients. Diabetics therefore place a significant demand on acute dialysis facilities. Diabetics have been found to have higher risks of access failure, hospitalisation rates and mortality than non diabetics[10,12-15]. The cause for this is not clearly understood and is probably multifactorial. Nevertheless with the increasing incidence of diabetic nephropathy[16], the problems of this group of patients in acute dialysis care certainly need to be addressed.

Acute renal failure was the cause of only 5 (3.2%) of the total admissions. This low figure probably reflects the relative infrequency of dialysis requiring isolated acute renal failure in current nephrology practice. In our institution as in most others, the association of severe acute renal failure with multiorgan failure is usually managed in an intensive care unit. This study therefore clearly shows that admissions to the dialysis care facility were mainly caused by problems associated with end stage renal failure. These problems were uraemic complications of late referrals for initiation of dialysis, diabetes and problems of vascular access. It suggests that to reduce admissions to the dialysis facility, attention should be paid first to the early diagnosis of impending renal failure with planning for renal replacement therapy and consequent elective initiation of chronic dialysis. Secondly a comprehensive vascular access management program which identifies failing accesses and electively provides for a replacement will obviate the need for acute central catheter insertions and dialysis in the acute dialysis units. Finally the diabetic patients have to be studied carefully to try to minimise the cause of their high complication rates in chronic dialysis patients.

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