Newly diagnosed end stage kidney disease in a single centre in Sabah

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ABSTRACT

Aim: To study the epidemiology, clinical characteristics, vascular access, and the short term survival of ESRD patients initiated on dialysis from Hospital Queen Elizabeth (HQE).

Background: The number of patients with ESRD is increasing in Sabah, Malaysia. Most patients present late and some live in remote areas with difficult access to healthcare services. Many therefore present with potentially fatal complications.

Methods: All the newly confirmed ESRD patients who were initiated on renal replacement therapy (RRT) from 1 January to 31 December 2014 were included. The basic epidemiological and clinical data were collected. They were divided into three groups: Group 1 - those known to the medical service and had been prepared properly for the initiation of RRT; Group 2 - those known to the medical service, but were not prepared for the RRT; Group 3 - those with undiagnosed CKD. Outcome is mainly survival at 3rd, 6th, 9th and 12th month.

Results: There were 249 ESRD patients. 153 (61.4%) were male. The average age was 53.3 (range 12 - 83). The main cause of ESRD was diabetic nephropathy (128 patients, 51.4%). Most patients were started on RRT with a catheter (74.3%), 47 patients (18.9%) with a fistula, and 17 patients (6.8%) with a Tenckhoff catheter. 185 (74.3%) patients were not prepared properly (Group 2 – 66.3%, and Group 3 – 8.0%). The survival for 249 patients were 86.3% at 6 months, 77.9% at 12 months. Group 2 has the worst survival (81.9% at 6 months, 71.1% at 12 months).

Conclusions: Our data showed that most patients (74.3%) were started on dialysis in an unplanned manner with poor survival. A comprehensive and well-supported predialysis programme is needed.

INTRODUCTION

The number of patients with end-stage renal disease (ESRD) is increasing in Sabah. From the 21st Report of the Malaysian Dialysis and Transplant Registry (2013),[1] the dialysis treatment rate for Malaysia was 223 per million populations in 2012, and for Sabah (& Labuan) it was only 106 per million populations. Most of the patients in Sabah on renal replacement therapy (RRT) were on haemodialysis (HD) (n = 1168), while the number of patients on peritoneal dialysis (PD) was low (n = 85, 2011). The mortality of dialysis patients (either on HD or PD) is high. The annual death rate was 11.3% in 2013. Cardiovascular disease appeared to be the major contributor to death.

Dialysis should be initiated to promote wellness and not to rescue from illness.[2] Many ESRD patients in Sabah present late. This may be due to many factors. Patient-related factors include poorly controlled diabetes mellitus and/or hypertension, poor understanding of CKD resulting in denial of disease presence and low compliance to the general measures in CKD management. Additionally, Sabahan patients face a myriad of logistical issues such as a remote area of residence resulting in difficult access to healthcare services. Physician-related factors include a lack of awareness at primary care level on the importance of early diagnosis, treatment and referral of a patient with CKD. We observed that many patients in Sabah frequently present with potentially fatal complications of CKD (severe anaemia, acute pulmonary oedema, hyperkalaemia) and with no proper vascular access.

From the national registry, the number of patients on catheter for dialysis was noted to be increasing from 4.1% in 2004, to 9.8% in 2013.[1] Consequently and not surprisingly, CRBSIs are increasingly commonplace and appear to make up the bulk of our ward admission. Our Malaysian Clinical Practice Guidelines (CPG) recommends that an arteriovenous fistula (AVF) be placed at least six months before the anticipated start of HD treatment.[2] A fistula is always the preferred vascular access for any CKD patient planned for HD as long term RRT.

We performed a descriptive study, looking at all the new dialysis patients started on dialysis from Hospital Queen Elizabeth (HQE), from 1st January to 31st December 2014. The primary objective is to find out the number of patients initiated on dialysis from a tertiary centre in Sabah in 2014, the epidemiology and characteristics of the patients. The data of vascular access at the beginning of RRT and the short-term survival of those patients were collected and analyzed.

Study design and setting

A single-center, descriptive cross sectional study was done in the Nephrology Unit of Queen Elizabeth Hospital (QEH).

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Table I: Residence (district) of study patients according to state division

Residence	n	%
West Coast Division		
Kota Kinabalu	92	36.9
Tuaran	21	8.4
Papar	16	6.4
Kota Belud	12	4.8
Ranau	12	4.8
Penampang	2	0.8
Putatan	5	2.0
Menggatal	4	1.6
Inanam	3	1.2
Tamparuli	2	0.8
Telipok	2	0.8
Interior Division		
Beaufort	17	6.8
Kuala Penyu	7	2.8
Tenom	7	2.8
Sipitang	4	1.6
Keningau	4	1.6
Tambunan	2	0.8
Kudat Division		
Kota Marudu	12	4.8
Kudat	9	3.6
Pitas	4	1.6
Tawau Division		
Tawau	1	0.4
Lahad Datu	1	0.4
Semporna	1	0.4
Sandakan Division		
Sandakan	4	1.6
Federal Territory		
Labuan	3	1.2
Sarawak State		
Lawas	2	0.8

Nephrology Unit of QEH is a tertiary referral center for nephrology service in Sabah and it is located in Kota Kinabalu, the capital city of Sabah state. The center provides dialysis services to population residing mainly in the west coast division of Sabah. Patients from other state divisions who receive medical treatments in QEH, may also receive dialysis services in this center.

This study was conducted according to the Declaration of Helsinki and with the International Conference on Harmonization-Good Clinical Practice (ICH-GCP) standards. The study received administrative authorization from the QEH and ethical approval was obtained from the Medical Research Ethics Committee, Ministry of Health Malaysia.

Patient Population and Measures

All new patients initiated with dialysis in QEH between 1st January 2014 to 31st December 2014 were identified. All those with confirmed diagnosis of CKD requiring maintenance dialysis after the first dialysis initiation, were included in this study. Those included in the study, were followed up for a duration of one year from the date of the first dialysis initiation or until deaths or lost to follow up occurred. Their basic socio-demographic variables, clinical data, preparedness for renal replacement therapy (RRT) and mortality outcomes within the first year of dialysis were collected, and entered into a computerized patient database in the center.

Based on the preparedness for RRT initiation, the patients were stratified into three different groups. Group 1: Patients known to have CKD, had follow ups with renal/medical services (e.g. primary care clinics, either private or public, and medical clinics in the district hospitals), and were adequately prepared for RRT inititation. Group 2: Patients known to have CKD and had follow ups with renal/medical services, but were not optimally prepared for RRT inititation. Group 3: Patients diagnosed with CKD acutely requiring RRT, and were not prepared for RRT initiation.

Analysis on demographic characteristics, clinical features, and one-year survival of the newly dialysed patients were performed. The survival between the three patient groups were also compared at 3rd, 6th, 9th and 12th months.

Table II: Characteristics of new CKD patients initiated with RRT in 2014

Characteristics	n	%
Gender		
Male	153	61.4
Female	96	38.6
Age in years, mean (SD)	53.3 (15.14); Range 12 - 83	
Etiology of CKD		
Diabetes mellitus	128	51.4
Hypertension	45	18.1
Unknown	40	16.1
Renal stone disease	10	4.0
ADPKD	4	1.6
FSGS	4	1.6
Chronic glomerulonephritis	3	1.2
IgA nephropathy	3	1.2
Lupus nephritis	2	0.8
Renal tubular acidosis	2	0.8
Alport's syndrome	1	0.4
Goodpasture's	1	0.4
Kidney donor	1	0.4
Membranus glomerulonephritis	1	0.4
Multiple myeloma	1	0.4
Obstructive uropathy	1	0.4
Post-Streptococcal Glomerulonephritis	1	0.4
Renal tuberculosis	1	0.4
Hepatitis B / C / HIV status		
Hepatitis B Negative	194	77.9
Hepatitis B Positive	14	5.6
Unknown Hep B /C / HIV status	9	3.6
Hepatitis C Positive	2	0.8
HIV Positive	1	0.4
Ethnic		
Sabah Bumiputera	198	79.5
Chinese	38	15.3
Indian	4	1.6
Malay	2	0.8
Sarawak Bumiputera	2	0.8
Non-local	5	2.0
Diabetes status		
Diabetic		
Group 1	34	13.7
Group 2	94	37.8
Group 3	0	0.0
Non-diabetic		
Group 1	30	12.0
Group 2	70	28.1
Group 3	20	8.0
Unknown diabetes status		
Group 2	1	0.4

Group 1: CKD patients who are known to the renal/medical service (e.g. primary care clinics, either private or public, and medical clinics in the district hospitals), and are prepared properly for the initiation of RRT;
Group 2: CKD patients who are known to the renal/medical service, but not prepared for the RRT;
Group 3: CKD patients with undiagnosed CKD

Table III: Initial dialysis access and patients' profile according to preparedness for RRT initiation (univariate analysis) (N=249)

	Prepared for RRT initiation	Unprepared for RRT initiation		Group 2 & 3 (n=185, 74.3%)
	Group 1 (n=64, 25.7%)	Group 2 (n=165, 66.3%)	Group 3 (n=20, 8.0%)	
Dialysis access for initial RRT, n				
Internal jugular catheter	0	106	8	114
Femoral catheter	0	59	12	71
Fistula	47	0	0	0
Tenkhoff	17	0	0	0
Age, in years, mean (SD)	58.5 (13.7)	54.1 (13.2)	30.1 (14.2)	51.54 (15.23)
Male gender, n (row %)	39 (25.5)	105 (68.6)	9 (5.9)	114
With diabetes mellitus, n (row %)	34 (26.6)	94 (73.4)	0 (0.0)	94

Group 1: CKD patients who are known to the renal/medical service (e.g. primary care clinics, either private or public, and medical clinics in the district hospitals), and are prepared properly for the initiation of RRT;
Group 2: CKD patients who are known to the renal/medical service, but not prepared for RRT;
Group 3: CKD patients with undiagnosed CKD, not prepared for RRT.

Table IV: Factors associated with patients' survival outcomes (Dead/Alive) at one year follow up (univariate analysis) (N=245)

	Dead (n=53, 21.6%)	Alive (n=192, 78.4%)	Test statistic (df)	P value
Preparedness for RRT initiation, n (%)				
Group 1	6 (9.4)	58 (90.6)	12.590 (2) [a]	0.002
Group 2	46 (28.2)	117 (71.8)		
Group 3	1 (5.6)	17 (94.4)		
Dialysis access for initial RRT, n (%)				
Internal jugular catheter	28 (25.2)	83 (74.8)	7.937 (3) [a]	0.047
Femoral catheter	19 (27.1)	51 (72.9)		
Fistula	5 (10.6)	42 (89.4)		
Tenkhoff	1 (5.9)	16 (94.1)		
Gender, n (%)				
Male	36 (23.7)	116 (76.3)	0.994 (1) [a]	0.319
Female	17 (18.3)	76 (81.7)		
Diabetes status, n (%)				
With DM	34 (26.8)	93 (73.2)		0.013b
Without DM	18 (15.4)	99 (84.6)		
Unknown	1 (100.0)	0 (0.0)		
Age in years, mean (SD)	58.89 (12.20)	51.92 (15.63)	3.00 (243)[c]	0.003

[a] Chi square test
[b] Fisher exact test
[c] T-test
4 lost to follow up were not included in the univariate analysis for outcomes

Statistical Analysis

Analyses of the data were carried out using SPSS software (version 22: SPSS, Chicago, IL, USA). Chi-squared test was used to compare categorical variables and data presented as absolute numbers or percentages. For comparison of continuous variables, we used independent t-test and presented the data as means ± standard deviations. Non-normally distributed variables were analysed using non-parametric tests. Survival was estimated with the Kaplan–Meier method, and comparisons were performed using the log-rank test. Values of P less than 0.05 were considered statistically significant.

RESULTS

Epidemiology and clinical characteristics

In 2014, a total of 249 new CKD patients were initiated with RRT in this center. Most of the patients that received dialysis services in this center originated from districts located within the west coast division of Sabah (69.5%). The remaining 30.5% came from other state divisions, federal territory and Sarawak state (Refer Table I). Majority of the newly dialysed patients in this center were Sabah natives (79.5%) and 61.4% of all the patients were males. The patient mean age for dialysis initiation in this center was 53.3 years (SD 15.14); range 12 – 83 years old.

Table V: Overall survival experience and survival comparison based on preparedness for RRT initiation among all dialysis patients using Kaplan Meier survival analysis

Survival time intervals	Percent survival (%)	X^2(df) [P-value]
Overall survival experience		
3 months	91.8	
6 months	86.3	
9 months	83.0	
12 months	77.9	
Comparison of survival experience		
Group 1:		
Prepared known CKD		
3 months	98.4	Overall comparison:
6 months	95.2	12.564 (2)
9 months	92.0	[0.002] [a]
12 months	90.4	
Group 2:		
Unprepared known/at risk for CKD		
3 months	88.2	Group 1 vs. Group 2:
6 months	81.9	8.701(1)
9 months	77.4	[0.009][b]
12 months	71.1	
		Group 2 vs. Group 3:
		4.498(1)
		[0.102][b]
Group 3:		
Unprepared acute CKD		
3 months	100.0	
6 months	100.0	
9 months	100.0	
12 months	94.4	

[a] Overall log rank test
[b] P value is adjusted by Bonferroni method (multiple comparison)

Group 1: CKD patients who are known to the renal/medical service (e.g. primary care clinics, either private or public, and medical clinics in the district hospitals), and are prepared properly for the initiation of RRT;
Group 2: CKD patients who are known to the renal/medical service, but not prepared for the RRT;
Group 3: CKD patients with undiagnosed CKD

Diabetes mellitus is the major contributing factor for CKD development among patients known and predisposed towards CKD regardless whether they were prepared for RRT or not (51.4%). This is followed by hypertension (18.1%) and unknown causes (16.1%). Other causes for CKD identified are tabulated in Table II.

Preparedness for RRT and initial dialysis access
Of the 249 patients, RRT was started with a femoral catheter in 71 patients (28.5%), an internal jugular catheter (IJC) in 114 patients (45.8%), fistula in 47 patients (18.9%), and a Tenckhoff catheter in 17 patients (6.8%) (Table III). That means most patients were started on dialysis with a catheter (74.3%). In the analysis for the RRT preparation, 64 patients (25.7%) were prepared in a timely mannered, in Group 1. The remaining 185 (74.3%) patients were not prepared properly for RRT initiation, and majority of them were in Group 2 (66.3%), and 8.0% were in Group 3. Group 3 represented the group of patients who presented acutely with no prior history of illness, shrunken kidneys on presentation, and therefore the underlying aetiorlogy of their ESRD was unknown. Of the 20 patients in Group 3, none had diabetes mellitus.

Short term survival between groups
Of the 249 patients, two was transferred to other centres with unknown outcome, one was lost to follow-up, one with lost case note. Their outcomes (living statuses) were not known when this study ended. 21.6% (53) of 249 patients died within the first year of RRT. Diabetes mellitus status (p=0.013), preparation for RRT (p=0.002) and age (p=0.003) were found to have significant association with the mortality status within one year of dialysis (Refer Table IV).

The survival analysis showed Group 3 had better survival experience within the first year of RRT initiation when compared to Group 1 and Group 2. However the observed differences were found to be insignificant (Refer Table V). Group 1 had a significantly better survival experience when compared to Group 2 (p=0.009). Group 1 survival percentage remained above 90% by the 12th month. Survival percentage for Group 2 dropped from 88.2% at the 3rd month to 71.1% at 12th month (Refer Figure 1).

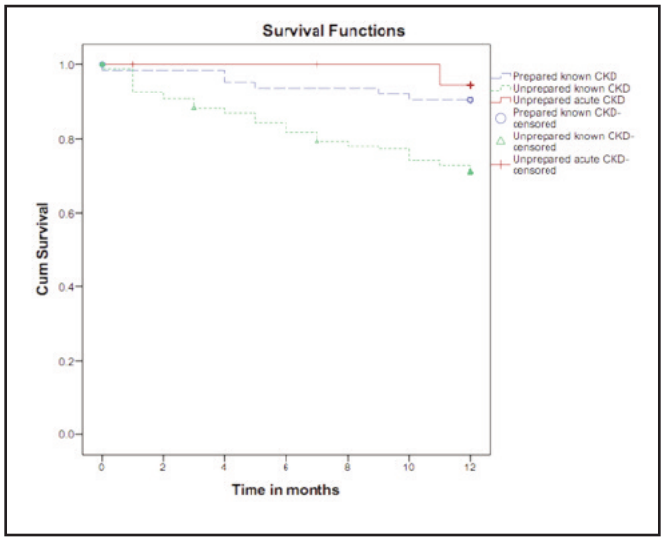

Fig. 1: Comparison of Kaplan Meier survival curves by three different types of RRT initiation preparedness among dialysis patients

Prepared known CKD: Group 1;
Unprepared known CKD: Group 2;
Unprepared acute CKD: Group 3.

DISCUSSION

Our study showed that diabetes mellitus is the major contributor to our ESRD burden. It also seemed to be affecting the short term survial of our patients. Our study also showed that majority of our patients were not prepared optimally for RRT initiation. Those patients who are optimally prepared had better short term survival.

Hooi et al[3] started a local registry in Johor Baru in 1990. The authors were capturing all the new patients started on dialysis due to ESRD, and they excluded all the cases of acute renal failure. They found that about 109 patients in 1990, and 103 patients in 1991. During that time, many of the patients had unknown cause as their primary aetiology of the ESRD. The mortality reported was about 22 – 28% at 12 months. In a study using the same registry by Liu et al,[4] but at a later dates (2003 – 2004), the number of new patients diagnosed with ESRD increased to 306 patients in 2003, and 299 patients in 2004. Diabetic nephropathy had become the major contributor to the aetiology of ESRD. The survival seemed to have improved with almost 90% survival at one year.

From Penang, Shaza et al[5] studied 117 patients who were diagnosed and started on dialysis over 30 months from year 2000 – 2002. Diabetic nephropathy accounted for about 30% of their cases. There were more male (56.4%) than female patients. Mortality outcome was not reported.

Unplanned initiation of RRT is associated with poorer outcomes, and such patients are known as "crash landers" to the renal services. It is a rather common scenario in many countries. It tends to occur in patients unknown to the available renal services, and in late referrals to the nephrology services.[6-10] However, it also may occur in those patients who are under the nephrology clinic follow up and in those referred early to nephrologists for the preparation of RRT.

In a Korean study,[8] it was found that more than 80% of the 503 patients were started haemodialysis in an unplanned manner, and up to 86% were started with a central venous catheter. Even though pre-dialysis care was performed for almost 60% of those patients, less than quarter of them were started in a planned manner. Even in a developed country such as Canada and Spain, up to 40% of patients may be started on RRT in an unplanned manner.[9,10]

Probably similar to many centres in Malaysia and most developing countries, this study showed that most of our patients were started on dialysis in an unplanned manner, most requiring an urgent insertion of a catheter. Even though most of the patients were known to the medical or renal services, the RRT was still not started in a timely manner. The reasons are not analyzed in this study. Lenz O et al[11] identified three main reasons – absence of adequate predialysis care (45%), acute illness with failure to recover from an episode of acute renal failure (31%), and patient's failure to scheduled clinic or surgical appointments (17%). The above reasons are probably the most likely cause of our patients in Group 2 for being started on RRT in an emergency situation. Like most developing countries, Sabah is still short of nephrologists and surgeons with experience in vascular access, as well as access to RRT. The dialysis treatment rate for Sabah is still significantly below those of other states in Malaysia.[1]

Our study is limited by the short duration of follow up (12 months), and we did not include other variables potentially affect survival, e.g. haemoglobin level, serum albumin at initiation etc.

In conclusion, our data showed that diabetes mellitus is a major contributor to our ESRD burden. With the rising number of diabetic patients in Malaysia, the burden of ESRD from diabetes will increase even more. Prevention strategies and policies are very important to reduce the burden of this alarming disease. Efforts are very much required to address this issue of poor RRT preparation. Vascular access is the major issue for those who have no RRT preparation, as shown in Table III. Besides a higher risk of mortality, poor RRT preparation may be associated with other complications such as infection and anaemia. A comprehensive and well-supported pre-dialysis program with multidisciplinary team approach may help to reduce the number of this group of patients with unplanned initiation on dialysis.

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