

Caring for hemodialysis patients in Saudi Arabia

Past, present and future

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ABSTRACT

There are currently 5706 patients receiving hemodialysis therapy in the Kingdom of Saudi Arabia - a 15 fold increase when compared to 1983. The annual increase in the number of patients on dialysis for 1999 is 696 (10 fold increase when compared to 1983). Besides the massive increase in the number of patients in the last 20 years, we have noticed a marked increase in the mean age of patients (51.3 years in 1999 as compared to 37.9 years in the early 80's). Diabetes mellitus which was an insignificant contributory etiology (4%) in the early 80's is now a major cause (16-25%). Similarly mortality has increased from 4% annually to 11-14% annually. This is largely due to increasing age and prevalence of diabetes mellitus. Within the expired cohort the mean age was 62.3 years compared to 51.3 years of the total dialysis population, and diabetes mellitus was present in 60.5% in those who expired. Moreover, Ischemic Heart Disease was diagnosed in 50% before death. Tuberculosis and Hepatitis C virus incidences, however, have not improved over the years but the degree of rehabilitation has, largely due to better hemoglobin level and due to the technological advances in dialysis delivery. This article describes these changes, their causes and implications.

Keywords: Hemodialysis, rehabilitation, aetiology, mortality.

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In 1982 there were 370 patients on hemodialysis (HD) in the Kingdom of Saudi Arabia.¹ The most recent Saudi Centre for Organ Transplantation (SCOT) data show that the numbers have increased to 5706.² In 1999 alone there were 2084 new cases entering dialysis.² This paper aims to compare certain clinical characteristics of patients receiving hemodialysis in Saudi Arabia now to those in the early 80's when dialysis services began to spread in the Kingdom. The significance and reasons for these differences will be discussed. The data on which these conclusions are made is based mainly on the study of patients seen at Riyadh Armed Forces Hospital (RAFH) in the early 80's and late 90's but will also draw on data from the Kingdom as a whole.

It will compare the following parameters between the two periods and whether any significant changes occurred in them; 1) Volume of work; 2) Gender; 3) Age of patients; 4) Rehabilitation rate; 5) Aetiology of chronic renal failure; 6) Mortality rate; 7) Liver disease pattern; 8) Elective versus emergency commencement of dialysis and 9) tuberculosis. The data from the early 80's was based on the study we did then³ and supported by data from similar studies from the Al-Hada Hospital⁴ and Jaizan,⁵ which showed a comparable pattern. These changes will be discussed in relation to world literature and data generated from SCOT, covering the Kingdom as a whole. An attempt will then be

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made to discuss the reasons for and significance of these recent changes.

Has there been a change in the volume of work in Kingdom of Saudi Arabia? The need for more resources. Dialysis service was started at RAFH in 1979. The number of dialysis sessions in 1983 was 1300 annually and in 1984 was 2000 annually.³ By the end of 1999 we performed 32,300 for that year alone. This is in keeping with the vast increase in number of patients requiring dialysis in the Kingdom from 370 in 1982¹ to 5706 in 1999 and is estimated to reach 9242 in 2011.² It is estimated that dialysis costs per patient per year in the Kingdom 98,592 Saudi Riyals.² The total cost, therefore, is over 570 million Saudi Riyals annually. This rise in the dialysis population is seen worldwide. In USA alone there were 232,000 patients on dialysis in 1997 and is anticipated to reach 600,000 in 2010. Over a 5 year period between 1979 and 1984, only 385 patients were dialysed at RAFH.³ In the paper from Al-Hada Military Hospital,⁴ it was seen that, during the same period, they dialysed only 120 patients over a 4 year period i.e. 30 patients per year. In Jaizan the number of patients dialysed was 45 per year.⁵ In 1999 alone 74 new patients were started on our dialysis program. More recently we have started 10-15 new patients per month on dialysis and therefore, the estimated increase is between 120 to 180 new patients per year. SCOT data reveals that for 1999 there were 2804 new patients.² This increase in the number of patients in the Kingdom is multifactorial:- 1) More awareness of the disease among the public and the medical profession; 2) Accessibility to medical care facilities; 3) Massive increase in Diabetes Mellitus (DM) as cause of renal failure; 4) More tendency to accept elderly patients on dialysis with advancement in dialysis technology making this feasible. The implications for this rise in dialysis population in KSA are:- Requirement for more budgeting; Need for more training for medical and nursing staff and the need for promoting transplantation. Currently we do 30-40 transplants per year in our institution. All over the Kingdom 264 renal transplants were performed in 1999.²

Has gender ratio of dialysis patients changed in the Kingdom of Saudi Arabia? More females are accepted on dialysis. The male to female ratio in the early 80's was 2:1 in our unit.³ In 1999, it was 1.5:1. European (EDTA) data shows it to be 1.4:1.^{6,7} In SCOT data, (1999) the ratio for the whole Kingdom was 1.2:1.² If this changed ratio is confirmed it could be due to (a) Females are now more likely to present for medical care when ill compared to 20 years ago; (b) Females live longer and renal failure incidence is higher in the elderly due to a number of reasons including age related nephrosclerosis, hypertensive nephrosclerosis and renovascular hypertension.⁸ In our total dialysis population (270 patients) the mean

Table 1 - Age range in surviving and expired patients.

Age range (years)	Surviving patients (n=232) %	Expired patients (n=38) %
0-10	1	0
11-20	5	0
21-30	9	3
31-40	13	3
41-50	13	13
51-60	27	16
61-70	21	39
71-80	10	18
81-90	1	5
91-100	0.43	3

Table 2 - KT/V in surviving and expired patients.

KT/V range	Surviving patients (n=232) %	Expired patients (n=38) %
0.3-0.8	4	8
0.81-1.13	37	58
1.31-1.8	52	28
1.81-2.3	7	6

Table 3 - HGB level in surviving and expired patients.

HGB range	Surviving patients (n=232) %	Expired patients (n=38) %
5-7	4	15
7.1-9	10	24
9.1-11	39	50
11.1-13	41	8
13.1-15	6	3
15.1-17	0.43	0

Table 4 - Albumin level in surviving and expired patients.

Albumin range (g/l)	Surviving patients (n=32) %	Expired patients (n=38) %
10-20	0	5
21-30	7	39
31-40	73	37
41-50	20	18

ages for males was 51.3±1.7 and females 51.3±1.2 (not statistically significant). The implication for this increase in female patients on dialysis (if confirmed) would include; Requirement for more home help (maids, drivers); Need to train more female Saudi nurses for dialysis care and possible turbulence in family psychodynamics

Has the age of dialysis population changed in the Kingdom of Saudi Arabia? The need for more state of the art dialysis therapy. The changes here are marked. In our early 80's observation,³ the mean age was 37.9 years. In Al-Hada's paper it was 40.9 years.⁴ Our recent findings are that of all our dialysis population (270 patient) the mean age is 51.3±1.0 and for the patients admitted to dialysis in 1999 it was 51.2±1.1. Moreover the patients over 50 years of age constituted 59% (Table 1) compared to only 10% in the early 80's. SCOT data show that 59% of current dialysis population are aged more than 50 years.² This change in age distribution is clearly marked and is in keeping with trends seen internationally. In the EDTA report in 1977, patients over 65 years accounted for only 9% and in 1992 it rose to 38%.^{6,7} USRDS figures show that they account for 48%.⁹ Mean age in EDTA registry is 52.3 years and in USRDS is 58.2 years.⁹ The reasons in Saudi Arabia would include the more recent increase in prevalence of DM as a cause of chronic renal failure, as well as the reasons mentioned above (under "volume of work"). Another reason would be that, with improved medical and social care, patients tend to live longer. Resulting from the increasing age of dialysis patients, as we have and other nephrologists in the Kingdom have noticed, is the increased mortality rate, more hospitalization, more vascular access problems, more dialysis complications (mainly related to hemodynamic instability) and more incidence of comorbid conditions (specially cardiovascular). The implication for this would be more requirement for qualified nephrologists. In this connection, it is worth noting that the total number of consultants and specialists looking after 5706 on dialysis in the Kingdom is 191 i.e. 30 patients per doctor. However, for MOH hospital alone, the ratio

is 45 patients per doctor and for the other medical sectors the ratio is 15 per doctor.² Clearly there should be more nephrologists recruited in the MOH; 1) More staff to man dialysis units than previously required. 2) Increased need for more sophisticated dialysis machines, biocompatible membranes and bicarbonate based dialysis to reduce the morbidity and mortality in these elderly patients. This of course will add to the cost. 3) More inpatient beds for nephrological services and 4) Consideration for offering peritoneal dialysis as an option for elderly patients.

Has rehabilitation of patients changed in the Kingdom of Saudi Arabia? Particular note of hemoglobin level. A main reason associated with reduced well being and rehabilitation of dialysis patients is the anemia associated with renal failure. This can be largely overcome with erythropoetin therapy. The mean Hb encountered in the early 80's was 8.4 g/dl.³ More recent Hb in our overall dialysis patients is 10.8±0.1 g/d (P.<01) with 47% of the patients having Hb level >11 gms (Table 3). This is of course due to availability of erythropoetin. This rise in Hb helps to a great extent in the rehabilitation of patients. For example, there has been a number of reports from the Kingdom of women becoming pregnant whilst on dialysis which was not possible before.^{10,11} In our view erythropoetin should be available to all dialysis patients who require it. However, this is an expensive drug. In some hospitals in the Kingdom its use is restricted because of this. (Less than 50% of the patients on dialysis in the Kingdom are receiving erythropoetin - personal communication). There are, to our knowledge, no

Table 5 - Some parameters for all patients and those who expired.

Parameters	All Pts. on Dx (n=270) Mean±SE	Expired Pts. (n=38) Mean±SE	P-value
Age	51.31±1.07	62.36±2.12	0.001
Male	51.33±1.72	62.11±3.8	0.01
Female	51.31±1.25	62.6±2.26	0.001
KT/V	1.35±0.018	1.20±0.04	0.001
Alb (gm/L)	37.46±0.23	32.04±1.14	0.001
HgB (g/dl)	10.8±0.10	9.405±0.26	0.001
Duration (m)	34.03±2.2	31.11±4.48	NS
DX time	9.9±0.088	9.35±0.16	0.0005

HgB-hemoglobin, NS-not significant, Alb-Albumin, m-months, Dx-Dialysis, Pts-patients.

studies carried out regarding degree of economic and social rehabilitation of the dialysis patients in KSA. What is clear, however, is that whereas patients in the early eighties used to stay in hospital for months simply to receive dialysis, this is now not the case. It is our impression, also, that a significant number of patients (possibly over 60%) are fully partially employed. Another aspect regarding rehabilitation is the prevalence of renal bone disease which the nephrologists should attend to.

Has aetiology of renal failure changed in the Kingdom of Saudi Arabia? The problem of Diabetes Mellitus. Here also a marked change occurred. In our paper in 1984,³ 84% of 389 patients studied had small shrunken kidneys and only 16 (4%) were due to DM. Similarly, in the paper from Al-Hada, of the same period, only 11 out of 120 patients (9%) had diabetes mellitus.⁴ Recent data from SCOT show that 16% of patients had DM.² Magdi Hussein, describing his experience over 13 years states that 15% of the patients had DM.¹² In our own patients the percentage of patients with DM among those started on dialysis in 1999 alone was 40.5%. A similar trend is seen in international registries where DM and renovascular disease contributed 50%, in USRDS registry.⁹ In fact, DM especially NIDDM has become an epidemic in the Kingdom affecting so many branches of medical care. Al-Hazmi et al¹³ showed, in an epidemiological study, that 17% of the population over 30 years of age have NIDDM. Professor Ritz described DM as a cause of End Stage Renal Disease (ESRD) as "medical catastrophe of worldwide dimensions".¹⁴ The implication of this in patient care in the Kingdom is similar to those described above for elderly patients. In addition, the nephrologist should be aware of the danger of retinal hemorrhage in diabetic retinopathy patients treated with heparin during dialysis. Moreover, the nephrologist should be aware of high incidence renal artery stenosis in elderly diabetic patients on dialysis being the cause of the renal failure¹⁵ which if attended to, could lead to recovery of some renal function.¹⁶ Moreover, this cohort of patients are prone to vascular access problems and the nephrologist will do well to plan regular assessment of their vascular access using for example, the non-invasive doppler flow meter.

Has mortality rate changed in the Kingdom of Saudi Arabia? Role of older age and Diabetes Mellitus. We have noticed an increased incidence of mortality in our patients over the last 20 years. We reported it to be 8% over a 5 year period (18 only out of the 385 dialysed at RKH died over that period i.e. 3.5 patients per year).³ Of those, 7 had DM (i.e. 39% of those who died) and their mean age was 53 years. Magdi Hussein¹² noted that out of 46 deaths, 28% had DM. In the paper from Al-Hada Hospital,⁴ 15 out of 120 patients seen over 4 years died (13%) i.e. an

average of 3% annually. Of those who died 29% had DM. In other words the mortality rate amongst the dialysis population in the early 80's was very low and amongst those who died, the presence of diabetes was a prominent factor. With increasing age of the dialysis population and increasing prevalence of DM one would expect the mortality to increase. Indeed, this is what we noticed. Data from SCOT (1999) shows that the overall mortality rate is 11%.² We had 38 deaths in 1999 alone (i.e. 14% of the dialysis population). Of these 38 patients 23 (60.5%) had DM. Their mean age was 62.3 years 2.12 as compared to the mean age of the dialysis patients as a whole of 51.3±1.07 (P 0.001) (Table 5). The direct cause of death was known in 29 patients. Of these 48% died from cardiovascular disease, 38% from septacemia and 14% from gastrointestinal bleeding. Seventeen of the patients had history of ischemic heart disease and 19 (50%) had a history of infection. Prior to their death the majority of these patients required multiple hospital admission. It is not surprising that elderly diabetic patients with a history of IHD are more prone to death. However, we compared them in terms of dialysis adequacy (using Kt/V), nutrition (using plasma Albumin level as a surrogate) and Hb to the dialysis population as a whole. (Table 1, 2, 3 and Table 5). The survival rate in elderly diabetic patients with comorbid conditions tends to be high and our results are no worse than the world literature (10-30% at 5 years in Europe).¹⁴ Nevertheless, it is apparent that their dialysis adequacy (Kt/V of 1.2) although reasonable, is less than the surviving dialysis population in our unit (Kt/V 1.35) as were the hemoglobin and Albumin levels and we should (and would) improve these parameters in this cohort of patients (in elderly diabetic patients), in the hope of improving the prognosis in the future. For example the duration of weekly dialysis in the expired group was 9.35±0.16 hours compared to 9.9±0.09 hours in the surviving patients (P.005) (Table 5). The aim is to increase the number of hours on dialysis for this cohort of patients. There are other important prognostic factors which we have not looked into namely blood pressure and dry weight control. The cause for the increased mortality is the increasing age of the dialysis population, the increasing prevalence of DM and IHD. The implication is that we as nephrologists should optimize dialysis therapy (including the use of Erythropoietin) and nutritional status of these patients.

Has hepatitis C and B infection changed in the Kingdom of Saudi Arabia? Importance of the isolation policy. In the early 80's we recognized the high prevalence of liver disease in our dialysis and transplant population. We estimated it to be in the region of 25-30% of in-patient on dialysis if one excludes HbSAg positive patients and other cause of

hepatitis.¹⁷ This was attributed to non-A not B hepatitis.^{3,4} We now know that this was due to Hep C. Unfortunately, HCV positivity rate is still high in the dialysis units in the Kingdom (48%).² This has not been reduced significantly in the Kingdom as a whole except in certain units which practiced isolation policy and strict aspect technique or both.¹⁸ To that end, it is interesting to note that HCV positivity incidence is 51% in MOH hospitals, but only 29% in other governmental medical sector.² There is an urgent need for application of these techniques as a matter of priority. On the other hand, HbSAg prevalence has decreased from 11% - 20%^{3,4} to 5% currently in KSA as a whole.² In our own unit, this has dropped from 11.1 in 1984³ to 5% currently. Similar findings were seen by Husein et al,¹² who noted the prevalence to have dropped to 3% in 1993. This drop is only partly due to vaccination campaign and one sometimes wonders if the virulence of this virus has dropped and the immunity of the population as a whole has increased or both due to better social and nutritional conditions.

Has emergency versus elective dialysis requirement changed in Kingdom of Saudi Arabia? Importance of health education. An unfortunate observation is that the requirement for emergency start of dialysis as opposed to elective start of dialysis has not changed over the last 20 years. Clearly this is not optimal for the care of patients let alone the increasing mortality associated with late commencement of dialysis, requirement for temporary vascular catheters to be inserted, (with all the complications that go with this) and need for dialysis service to be available 24 hours a day.

In our report of the early 1980's³ we report 17% of the patients as requiring emergency dialysis as compared to 65% of the newly admitted patients to dialysis in 1999. However, in the report from Jaizan of the early 80's, it was stated that "most patients" required urgent dialysis.⁵ Even if our early figure is wrong, 65% of the current figure still remains high and quite unacceptable. We would have expected that this would have improved. We feel that nephrologist should do more to educate the public (and other medical personnel) to improve early referrals.

Has tuberculosis incidence in dialysis patients changed in the Kingdom of Saudi Arabia? Final word about tuberculosis. In a survey carried out in the KSA dialysis unit,¹⁹ we found that the incidence of tuberculosis was 5%. This rate has not changed and possibly increased (personal impression), Dr. Al-Shohaib et al²⁰ has noted the incidence to be 8%. Husein et al noted the incidence to be 9%.¹²

In conclusion, it is clear that there has been significant changes in the characteristics of dialysis patients in KSA notably increasing numbers, rising age, rising mortality rate and rising DM incidence. This is in keeping with international trends. We still

have particular problems with HCV, tuberculous, late referrals and late diagnosis. We should aim at public health education (for earlier referral) and start isolation policy to reduce HCV infection and spreading of infection. There is a great need for more renal doctors and nurses. Dialysis is a costly service and we should aim at increasing the number of patients receiving transplantation or being treated with peritoneal dialysis both of which are cheaper and more rehabilitative. Despite its cost, however, dialysis saves lives and is cheaper than many other forms of therapy (eg. therapy for cancer or heart disease) which are taken for granted.

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