

Global Dialysis Perspective: Kuwait

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Introduction

Kuwait rests on the Arabian Gulf's northwestern shore, with a total area of 17,818 km² (1). It is a high-income country (2) with a young population (mean age of 37 in 2020) (3). However, Kuwait is plagued with high rates of diabetes, hypertension, obesity, smoking, and sedentary lifestyles (4). All are risk factors for the initiation and progression of CKD. The total population in 2020 was 4.8 million people, with 56% aged <35, 63% men, 31% Kuwaiti nationals, with 69% expatriates (foreign nationals, 67%, and Bedoons, stateless persons, 2%) (5). Expatriates have residency permits that can be renewed indefinitely. Extended residency does not guarantee citizenship. Many expatriates are men who live without their families (6).

Nephrology Services

In Kuwait, hemodialysis (HD) treatments started in 1976, kidney transplantations in 1979, and peritoneal dialysis (PD) in 1982 (6). The public sector provides >90% of nephrology services, mainly from the Ministry of Health (MoH), with little contribution from the military hospital and Kuwait oil company hospital (Figure 1).

Public Sector

Ministry of Health The MoH divides Kuwait into six health regions (7,8). Each region has a hospital that provides full adult nephrology services (Figure 1), including chronic PD and in-center HD, outpatient clinics (with pharmacy and intravenous therapies), vascular access procedures, and inpatient services including acute dialysis (intermittent HD or continuous renal replacement therapy), catheter insertion, plasma exchange, and urgent urological intervention. Inpatient services are free of charge for everyone in MoH hospitals. However, expatriates must pay US\$30–150 for an MoH insurance card to access these services. Other applicable fees are outlined below. Kidney biopsy is conducted in all MoH hospitals and sent to the Mubarak hospital nephropathology laboratory for processing, evaluation, and reporting. Biopsy procedures and histological examinations cost US\$30 for expatriates. There is no home HD program in Kuwait. All MoH HD centers are hospital based, except for Amiri, which operates through one large and two small satellite (standalone) units. Only Mubarak and Jahra hospitals provide pediatric nephrology services, and Mubarak provides dialysis service for 10 patients

on HD and 18 on PD. Pediatric patients are transferred to adult care after the age of 12 years (8). Each MoH nephrology unit requests new equipment (HD/PD machines, ultrasound, monitors, beds, scales, etc.) and new drugs through the MoH nephrology committee, which is made up of the heads of nephrology units in all MoH hospitals and regulates nephrology services in Kuwait. After this committee's approval, the request must then pass through a lengthy bureaucratic process involving other MoH committees and other ministries. The process may take more than a year and may ultimately end with rejection.

The Military Hospital The military hospital provides chronic and acute HD free of charge for all Ministry of Defense personnel and their immediate families, regardless of nationality, but offer no PD, vascular access, or biopsy procedures. It has 22 patients who are chronic and on HD (Figure 1).

The Kuwait Oil Company Hospital Kuwait oil company hospital is owned by the government and provides free outpatient and acute dialysis services for company employees and their immediate families, regardless of nationality, but no chronic HD or PD, and no vascular access or kidney biopsy procedures (Figure 1).

Transplantation Services Kuwait only has one kidney transplantation center that provides preoperative evaluation, surgery, and follow-up. All are provided for free of charge for Kuwaitis, the spouses and children of Kuwaitis married to nonKuwaitis, and Gulf Cooperation Council (GCC) nationals. Other groups have to pay for certain investigations and private room admission. Currently, there are 145 male and 55 female patients with ESKD on the transplant waiting list. The center carries out 50–75 transplantations per year using living-related, living-unrelated (purely altruistic), and cadaveric kidneys. The vast majority of Muslim scholars approve of living and cadaveric organ donation, as long as the living donation is not detrimental to the donor's health and is voluntary. Cadaveric organs come from deceased donors in MoH hospitals. The families of donors, regardless of nationality, receive US\$10,000 remuneration. For deceased expatriates, MoH send the body with a companion to their home country free of charge, should the family wish to bury the body there.

Private Sector

Private nephrology practice is still underdeveloped. Five hospitals out of 13 provide outpatient

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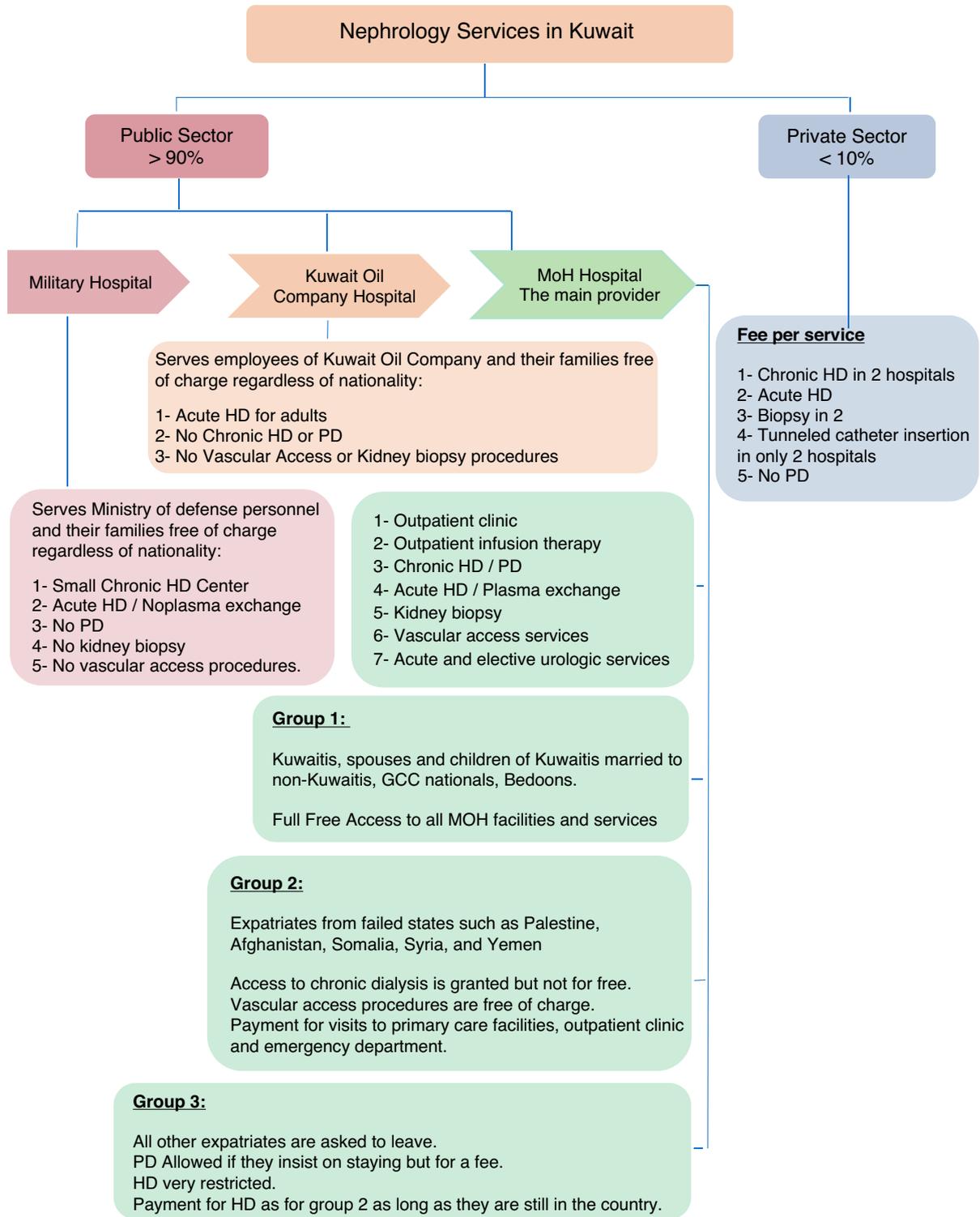


Figure 1. | Flow chart showing the nephrology services offered by different providers in Kuwait, and whether they are free of charge. MoH, Ministry of Health; HD, hemodialysis; PD, peritoneal dialysis; GCC, Gulf Cooperation Council.

nephrology services, and only two provide private hospital-based chronic HD (Salam and Mowasat), servicing only 5% of the total dialysis population. Almost all of their patients on HD are expatriates (7). Two hospitals provide a

tunneled catheter insertion procedure at a cost of US\$2500, and two provide a kidney biopsy procedure at a cost of US\$1500–3000. However, histological examinations are conducted outside Kuwait.

Table 1. Dialysis services in Kuwait 2020

Item	Result
Total population of the country, <i>n</i>	4,800,000
Total dialysis population, <i>n</i>	2275 (0.047% of the general population)
Incidence, pmp	156
Prevalence, pmp	474
Dialysis modality distribution, %	
Incenter HD	89
Eight centers are hospital based and three are satellite (standalone)	95% of patients in ministry of health centers
PD	12
Home HD	0
Payment	
Dialysis services	Free of charge for Kuwaitis in public hospitals. Restricted access and not free of charge for others. Limited number in private sector. See text (access and cost of dialysis and flow chart). Salary-based contract. No reimbursement for MoH. Private sector nephrologists are reimbursed.
Reimbursement	
Staffing	
Who delivers dialysis?	Nurses only
Nurse to patient ratio	1:3
Doctor rounds on patients	Junior doctors (registrars) round on all patients daily. Consultants round once weekly.
HD session frequency (standard practice is 3 per week), %	
4 sessions per week	5
3 sessions per week	89
2 sessions per week	6
HD session length (standard practice is 4 hours per session), %	
≥4 hours	54
3.5–4 hours	35
<3.5 hours	11
HD vascular access, %	
AVF	37
AVG	5
Tunneled catheter	59
Anticoagulation, %	
Heparin	60
Enoxaparin	26
Fondaparinux, low citrate in dialysate, danaparoid (Orgaran)	5
No anticoagulation	9
Oral anticoagulants (warfarin and newer agents)	10 (in addition to anticoagulation)
HBV/HCV prevalence, %7y	
HBV	2
HCV	3

pmp, per million population; HD, hemodialysis; PD, peritoneal dialysis; MoH, Ministry of Health; AVF, arteriovenous fistula; AVG, arteriovenous graft; HBV, Hepatitis B virus; HCV, Hepatitis C virus.

Access to and Cost of Dialysis

Public Sector

All patients on ESKD initiate dialysis under the MoH when indicated. No one is rejected for age, sex, or nationality. However, for long-term dialysis, patients are divided into three groups (Figure 1).

Group 1 Kuwaitis, the spouses and children of Kuwaitis married to nonKuwaitis, nationals of the GCC countries (Saudi Arabia, Kuwait, Bahrain, Qatar, Emirates, and Oman) with valid residency, and Bedoons can access all MoH services, including primary care, emergency

departments, outpatient clinics, hospitalization, and all nephrology services mentioned above, free of charge (they pay US\$3 per night for a private room).

Group 2 Expatriates from failed states such as Palestine, Afghanistan, Somalia, Syria, and Yemen are allowed to stay in the country after they reach ESKD, and can access long-term dialysis in MOH dialysis units. However, they must pay US\$80 per HD session, US\$30 a month for medications, US\$15–30 per emergency department and outpatient clinic visit, and US\$30 per night in a shared room if hospitalized for any reason (fee is US\$150 per night for a

Table 2. Dialysis population, hemodialysis prescription: frequency, session length, modality, vascular access, and calcium bath, and dialysis mortality from 2016 to 2020

Year	Total (<i>n</i> (% Annual Growth))	Hemodialysis (%)	Males (%)	Kuwaitis (%)	New Patients (<i>n</i>)	Hemodialysis Frequency <3 per week (%)	Hemodialysis Session Length <3.5 h (%)	Hemodialysis Modality (%)			Hemodialysis Vascular Access (%)			Hemodialysis Calcium Bath (%)			Total Mortality (%)
								Low Flux	High Flux	Hemodiafiltration	Fistula	Graft	Catheter	1.25 mmol/L	1.5 mmol/L	1.75 mmol/L	
2016	1850 (6)	88	48	65	490	7	25	17	30	53	42	8	50	24	25	50	12
2017	2010 (9)	88	55	63	675	9	22	14	38	50	40	5	55	26	25	50	12
2018	2100 (5)	89	52	70	400	12	19	13	23	64	44	10	46	30	25	45	12
2019	2230 (6)	89	52	70	500	10	11	10	36	54	47	5	48	24	26	50	12
2020	2275 (3)	89	52	72; 50 F/50 M	769	6	11	10	25	65	36.5	4.5	59	29	26	45	16; COVID-19- related 30%

F, female, M, male; COVID-19, coronavirus disease 2019.

private room in general ward or a bed in a critical care unit). Dialysis access procedures and preoperative evaluation (anesthesia, cardiology, respiratory, etc.) are provided free of charge for this group. Some medications are restricted and may not be available in private pharmacies or are expensive.

There is only one charity group in Kuwait that helps non-Kuwaiti patients, including patients on dialysis (the Patients Helping Fund Society, PHF), which is funded by donations from the public. In the MoH centers, it pays for 12 of the 13 HD sessions prescribed per month. MoH centers provide the last session, especially for those with volume overload and/or hyperkalemia. Patients are expected to repay costs later; however, this often does not happen.

Group 3 On reaching ESKD, expatriates from other countries can stay for up to 6 months after they start dialysis, then they are asked to leave the country because the MoH centers will not continue to provide long-term dialysis services, even when the cost is covered by the PHF. However, some expatriates, such as the parents of affected children and those who have lived their entire lives in Kuwait, may be exempt and allowed access to long-term PD, provided they pay US\$300 a month, plus cost of medications and hospitalization mentioned above. Consequently, they seek PHF help to cover dialysis costs. Those expatriates continue to receive dialysis under the MoH if they remain in the country and refuse to depart, they are admitted in case of an emergency, and the PHF will continue to support them. No one is expelled from the country when they reach ESKD. As a result of these costs and restrictions, Kuwaiti citizens make up 72% of the dialysis population, despite representing only 31% of the total population. Therefore, dialysis incidence and prevalence of Kuwaitis is different from dialysis incidence and prevalence in the total population (9). Depending on availability, visitors and tourists to Kuwait are given access to a few HD sessions in MoH facilities; however, the session costs and hospitalization fees are doubled, and they have no access to medications.

Private Sector

Some expatriates receive HD in private centers for US\$100 per session (higher than the MoH fee), not including medications. The PHF pays for eight of 13 sessions per month in the private sector and does not pay for medications, so most patients receive HD twice weekly, and their medications (including erythropoiesis-stimulating agents) from their original MoH hospital (7). However, HD capacity in the private sector is extremely limited.

Private hospitals transfer extremely sick patients to MoH hospitals to avoid complications and mortality, and to substantially reduce costs for families. The cost of a single continuous RRT session is >US\$2000, although it is not truly continuous and runs for 8 hours daily, whereas the cost of temporary catheter insertion is >US\$300, in addition to medications and critical care unit admission costs.

Delivery of Dialysis Services

Public and private HD is delivered by nurses in Kuwait, with a nurse-to-patient ratio of roughly 1:3. There are no dialysis technicians. In each HD center, a team of junior

nephrologists (registrars) conduct daily rounds on all patients on HD in every shift. Consultants conduct rounds on each group (a Saturday/Monday/Wednesday group and Sunday/Tuesday/Thursday group) once a week. The government does not reimburse MoH nephrologists for any service (e.g., biopsy, catheter insertion, acute/chronic HD or PD) because contracts are salary based. Private sector nephrologists are reimbursed (Table 1).

Dialysis Practices and Outcomes

Tables 1 and 2 show the dialysis population, HD prescription, vascular access, and dialysis mortality. Despite the availability of personnel and resources, there are inadequacies:

- High rates of tunneled catheter usage (Table 1), which is due to a lack of adequate vascular access services, lack of dedicated CKD clinics, lack of patient cooperation, and poor vasculature due to comorbidities (10).
- Usage of high calcium baths: 1.75 mmol/L (Table 1), despite Kidney Disease Improving Global Outcomes recommendations to use lower calcium baths (11) that are endorsed by European Renal Best Practice (12) and Kidney Disease Outcome Quality Initiative statements (13).
- Suboptimal HD adequacy as measured by Kt/V (14). Most patients on HD in MoH centers are on online hemodiafiltration (Table 2) (8) to enhance removal of medium-sized uremic toxins via convection. However, because many patients have tunneled catheters rather than arteriovenous access, the recommended convective volume is often unattainable (14), and catheters reduce rates of blood flow, contributing to the low Kt/V achieved (14).
- High rates of severe secondary hyperparathyroidism (15). Both low dialysis adequacy and hyperparathyroidism are associated with increased mortality (14,15).
- PD share is still low, despite adequate education and support. This is possibly due to the fear of worsening diabetic control, and obesity, and lack of social support or the right home environment. PD is less favored by expatriates despite its lower cost. PD is administered at home; PD machines and solutions are collected from hospital. Catheter insertion and catheter care are performed in hospitals for free. Cycler machines are used by 65% of patients, and only 35% are on manual PD. PD clinics are held monthly.

Challenges and Needs

The rapidly growing CKD population pressures the nephrology community to meet its challenges and respond to its needs to improve and expand services:

- Fight the high prevalence of CKD initiation and the progression risk factors.
- Increase CKD awareness and screening for early detection.
- Revitalize the health care system:
 - a. Primary care physicians must be on the front line; instead, they are currently working at walk-in clinics for semiurgent care.
 - b. Hospitals must be connected digitally instead of the current fragmented care that costs lives and money.

- c. The lengthy bureaucratic process to purchase medications or equipment must be shortened.
- d. A national database and disease registry to monitor rates, trends, risk factors, effective treatments, genetic diseases (because consanguinity is very common in Kuwait) etc. are necessities.
- Change some of dialysis practices to improve outcomes:
 - a. Reduce catheter rates through workshops, surveillance, better practices, better interventional nephrology services, and better patient education.
 - b. Reduce high calcium bath usage.
 - c. Reduce secondary hyperparathyroidism burden.
 - d. Improve dialysis adequacy, through improving blood flow rates, adherence to 4-hour HD session duration (14), and reduce catheter usage.
- Increase PD utilization and start a home HD program.
- Improve access to deceased donor organs, which is limited due to social/cultural reasons, not religious or legal reasons.

Disclosures

A. AlYousef reports receiving honoraria from Abbott, Amgen, AstraZeneca, Novartis, Roche, and Sanofi; reports being a scientific advisor or member of AstraZeneca and Sanofi; and reports other interests/relationships as Vice President of the Kuwait Nephrology Association. A. AlSahow reports receiving speakers honoraria from Abbott, AbbVie, Alexion, Algorithm, Amgen, AstraZeneca, Fresenius, Merck Sharp & Dohme, Roche, and Sanofi; reports being a scientific advisor or member as County Representative in the International Society of Peritoneal Dialysis Middle East Chapter, Country Representative in the Dialysis Outcome and Practice Patterns GCC Advisory Board; and reports other interests/relationships through membership of the American Society of Nephrology, European Renal Association-European Dialysis and Transplantation Association, the International Society of Peritoneal Dialysis, the International Society of Nephrology, Kuwait Nephrology Association, and the National Kidney Foundation.

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Author Contributions

A. AlSahow was responsible for the investigation, methodology, software, validation, and visualization. A. AlSahow and A. AlYousef conceptualized the study, were responsible for data curation, formal analysis, and project administration, provided supervision, wrote the original draft, and reviewed and edited the manuscript.

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