Chronic Kidney Disease Education Class Improves Rates of Early Access Creation and Peritoneal Dialysis Enrollment

Saud A. Aloudah ¹, Bandar A. Alanazi ¹, Mohammed A. Alrehaily ¹, Abdulrahman N. Alqessayer ¹, Nawaf S. Alanazi ¹, Elwaleed Elhassan ²

¹. College of Medicine, King Saud bin Abdulaziz University for Health Sciences, Riyadh, SAU  ². Department of Nephrology, King Abdulaziz Medical City, Riyadh, SAU

Corresponding author: Bandar A. Alanazi, bandrxal3nze@gmail.com

Abstract

Background

Most patients with end-stage kidney disease begin hemodialysis (HD) in an unplanned fashion at a late stage, necessitating the commencement of HD with a temporary venous catheter, the least favorable option. Alternative modalities of kidney replacement therapy (KRT), peritoneal dialysis (PD), and preemptive transplant offer similar or better outcomes than HD at a lower overall cost, and yet they remain underutilized in Saudi Arabia. Early education may help prepare patients with advanced chronic kidney disease (CKD IV and V) to accept their disease and choose a KRT modality that minimizes complications and matches their lifestyle.

The aim of the study is to assess the impact of a pilot educational class on therapy choices and outcomes.

Methodology

In a cross-sectional study, we conducted phone interviews and reviewed medical records of 81 attendees of the multidisciplinary monthly educational class about KRT that was held at the King Abdulaziz Medical City (KAMC) from January 2017 to October 2021. The interview was conducted at least one year after the participants attended the class. The study proposal, consent, and questionnaire were approved by the King Abdulaziz International Medical Research Center. Patient data was retrieved from KAMC electronic medical record system.

Results

Volunteer participation in the survey was high (62/81). For the respondents, a preemptive kidney transplant was the most preferred (48/62, 77%) option for KRT. Among the preferred fallback options, HD was the most frequently chosen (29/62, 47%) compared to PD (26/62, 41.9%). At the time of the interview, a great majority of the patients (54/62, 87%) was already on KRT, including about half (26/54, 48%) on HD via a catheter, and the rest about equally divided between those on HD via an arteriovenous (AV) fistula (13/54, 24%) and those on PD (15/54, 28%). Thus, half of the respondents on KRT (28/54, 51%) avoided urgent HD catheter commencement. However, because of an unfortunate shortage of donors, only a small minority (2/62, 3%) of patients received preemptive transplantation.

Conclusion

The KAMC CKD education class helped boost the fraction of patients, significantly above the national average, who accepted the diagnosis of kidney failure and pursued preemptive native HD access or enrolled in PD.

Introduction

Most patients with end-stage kidney disease (ESKD) begin dialysis in an unplanned fashion dictating initiation via a temporary catheter [1], which is rife with complications [2]. Although alternative modalities of kidney replacement therapy (KRT) may support similar or better patient outcomes with other benefits, these are, unfortunately, underutilized in Saudi Arabia [3]. Most Saudi nephrologists believe that peritoneal dialysis (PD) should be offered to chronic kidney disease (CKD) patients as the first dialysis modality [4]. The efficacy of hemodialysis (HD) and PD is the same, but PD is considered more cost-effective [5]. In addition, the quality of life for a CKD patient is better when undergoing PD than HD [6]. A retrospective cohort study showed that PD is considered a better choice of KRT in young patients [7]. A survey of Saudi ESKD patients...
undergoing HD suggested that their refusal of PD is related to a lack of prior and adequate counseling and education about PD [8]. Moreover, the preferred type of vascular access for chronic HD is arteriovenous (AV) fistula rather than HD catheters [9]. HD catheter use has been consistently associated with worse rates of complication and survival [8]. According to the Dialysis Outcomes and Practice Patterns Study (DOPPS), an international prospective cohort study, the use for HD initiation of arteriovenous access is lowest (at 19%), and that of central venous catheter is highest (at 81%) in Gulf Cooperation Council (GCC) member countries [10]. Taken together, these studies suggest that advanced CKD patients in these countries are not given adequate time and resources to make informed decisions about their optimal KRT options. Early education may help CKD patients acknowledge their disease and choose a KRT modality that minimizes complications and matches their lifestyle [11]. In fact, early education has been shown to increase the proportion of patients initiating dialysis with PD [12]. These precedents motivated us to start a pilot multidisciplinary educational class at KAMC for patients with advanced CKD. We have previously reported on the attendees’ high level of satisfaction with the class [13].

Materials And Methods

Patient education

Nephrology staff extended invitations to all patients with advanced CKD attending KAMC outpatient nephrology clinics and encouraged them to attend the class. KAMC is a large tertiary care center in Riyadh serving members of the National Guard and their families across Saudi Arabia. The two-hour monthly class was delivered by a team comprising a nephrologist, dialysis nurses, a dietician, and vascular and transplant coordinators in a roundtable fashion. For background and context, it featured an overview of normal kidney function, pathophysiological alterations, and medical and nutritional management of CKD. Then patients and their family members learned about the benefits, complications, and outcomes of different KRT options, which were presented in a balanced manner and with emphasis on early choice and access planning. Brochures, sample catheters, and a PD mannequin were made available for demonstration. Participants were given ample opportunity to ask questions and received the contact information of the PD Unit and the coordinators for assistance with their further management. After attending the educational class, patients were sent back to their primary nephrologists to map their next move in the process.

Cross-sectional data

The study took place at the KAMC PD unit. After one year of attending the class, each patient was queried about their choices and outcomes using a questionnaire. Every class attendee was included and individually contacted by phone. The information they provided was corroborated by cross-checking with the hospital medical record system (BestCare; ezCaretech, Seoul, South Korea). Variables retrieved from the hospital database included age, gender, height, weight, body mass index (BMI), and baseline glomerular filtration rate (GFR). Variables obtained from the patient in the questionnaire included marital status, occupation, educational level, and the patients’ preferred KRT modality upon finishing the class. In addition, patients were asked about their outcomes at the time of the questionnaire (i.e., one year or more time past their class) and whether they had been commenced on any form of KRT. For those who started dialysis, commencing type of access and reasons for not undergoing transplantation were also recorded. The consent form and questionnaire can be found in the appendix.

Data Analysis

Data entry and statistical analysis were done by SPSS version 21 (IBM Inc., Armonk, New York). Frequencies and percentages were calculated for categorical data, such as “preferred choice of treatment.”

Results

Patient Demographics

Of 81 class attendees invited in the study, 62 returned complete responses (15 declined; four were deceased). Demographics of the patient pool have been summarized in Table 1. Participants’ ages ranged broadly (15 to 85 years), with the majority in the middle-age (46 through 65) cohort. The majority were male (36/62, 58%), married (76%), not active (69.3% unemployed or retired), had some education (69%), and, notably, were overweight or obese (71%).
|                         | Number | Percentage |
|-------------------------|--------|------------|
| Gender                  |        |            |
| Male                    | 36     | 58.1%      |
| Female                  | 26     | 41.9%      |
| Age groups              |        |            |
| 15 to 35                | 14     | 22.6%      |
| 36 to 45                | 8      | 12.9%      |
| 46 to 65                | 22     | 35.5%      |
| 66 to 85                | 18     | 29.0%      |
| Marital status          |        |            |
| Single                  | 11     | 17.7%      |
| Married                 | 47     | 75.8%      |
| Divorced                | 1      | 1.6%       |
| Widowed                 | 3      | 4.8%       |
| Occupation status       |        |            |
| Employed                | 13     | 20.9%      |
| No job                  | 24     | 38.7%      |
| Retired                 | 19     | 30.6%      |
| Student                 | 6      | 9.7%       |
| Level of education      |        |            |
| Illiterate              | 19     | 30.6%      |
| Basic education         | 23     | 37.1%      |
| High education          | 20     | 32.3%      |
| BMI category            |        |            |
| Underweight             | 4      | 6.5%       |
| Normal                  | 14     | 22.6%      |
| Overweight              | 25     | 40.3%      |
| Obese                   | 19     | 30.6%      |

**TABLE 1: Demographics of 62 CKD patients**

*CKD - chronic kidney disease*

**Preferred KRT**

Patients were asked to rank their order of KRT preference (Table 2). At the time of the interview, at least one year had passed since the patient attended the class. The preferred first choice was preemptive kidney transplant for the majority (48/62, 77%), followed by HD (9/62, 15%). Apparently, PD was the least popular first choice (5/62, 8%).
| First preferred choice of treatment | Number | Percentage |
|------------------------------------|--------|------------|
| Hemodialysis                        | 9      | 14.5%      |
| Peritoneal dialysis                 | 5      | 8.1%       |
| Preemptive transplant               | 48     | 77.4%      |
| Hemodialysis                        | 29     | 46.8%      |
| Peritoneal dialysis                 | 26     | 41.9%      |
| Preemptive transplant               | 7      | 11.3%      |

| Second preferred choice of treatment| Number | Percentage |
|-------------------------------------|--------|------------|
| Hemodialysis                        | 29     | 46.8%      |
| Peritoneal dialysis                 | 26     | 41.9%      |
| Preemptive transplant               | 7      | 11.3%      |

**TABLE 2: Post-class preference for kidney replacement therapy**

Patients were also asked to pick an alternative modality if their first choice was not feasible. Among the fallback options, hemodialysis was most popular (29/62, 47%), followed by PD (26/62, 42%) and preemptive transplantation (7/62, 11%). This order of preference is a shifted version of the primary preferences, providing indirect proof of the patients' consistency and deliberation in choosing their preferred options.

**Actual KRT**

Information derived from the patient questionnaire and the hospital record system was used to determine patient outcomes after an interval of one year or longer passed since they attended the class. The data is summarized in Table 3. A large majority (54/62, 87%) of patients were already put on KRT, including 39/54 (72%) on HD and 15/54 (28%) on PD. Unfortunately, two-thirds of those in hemodialysis therapy were commenced by a temporary catheter (26/39, 67%) rather than a native AV fistula (13/39, 33%). On the positive side, all 15 patients on PD therapy had skipped interim HD. Thus, half of the patients on KRT, 28/54 (51%), avoided urgent HD catheterization, the commencement mode most rife with complications.

**Outcome | Number | Percentage**
|----------|--------|------------|
| Still under medical observation | 6  | 9.7%  |
| Hemodialysis via a temporary catheter | 26 | 41.9% |
| Hemodialysis via an AV fistula | 13 | 21.0% |
| Peritoneal dialysis | 15 | 24.2% |
| Preemptive kidney transplant | 2  | 3.2%  |

**TABLE 3: Patient outcomes one plus years after class**

*AV - arteriovenous*

Despite preemptive transplant being the most preferred choice of KRT in our patient group, only a small minority (2/62, 3%) of the respondents were lucky enough to have received a transplant kidney by the time of the interview, while another minority (6/62, 10%) were still undergoing medical observation. Unavailability of donors was the highest reported (15/40, 38%) reason for not attaining a transplant.

**Discussion**

Denial and misinformation commonly afflict CKD patients’ thinking about their disease. Moreover, many present for KRT in an advanced stage, necessitating an urgent and unplanned commencement on hemodialysis via a temporary intravenous catheter. Preemptive transplantation and PD can offer similar or better outcomes, yet these KRT options are distinctly underutilized in Saudi Arabia. Notably, the fraction of CKD patients on some form of KRT who received PD in the Kingdom was minuscule (14/616/23,728, 6%) in 2014 [2].

Patient education has been shown to help significantly improve KRT outcomes. A structured, patient-centered education program significantly increased the frequency of opting for PD in patients needing unplanned KRT in Germany [14]. A retrospective analysis conducted in South Korea, using propensity score...
matching, showed that patients who received multidisciplinary pre-dialysis education, compared with those who did not, commenced dialysis at a higher GFR and had less need for urgent unplanned dialysis [13]. Those precedents motivated us to run a multidisciplinary education program for patients with late-stage CKD in the Kingdom to educate them about their disease, its natural progression, and the full spectrum of KRT options. The program put special emphasis on early access and the benefits of PD and preemptive kidney transplantation over HD.

In this survey, we compare the patients’ initial preferences with their documented outcomes one year after attending the class or later. Unsurprisingly, most patients chose preemptive transplant as their first preference. However, medical ineligibility or shortage of donors usually prevent the realization of that preference for the vast majority. In our survey, only three out of 48 (6%) who had preemptive transplant as their first preference actually received it.

Remarkably, more than 40% of the class attendees indicated PD as their second (fallback) option. This corroborates surveys conducted elsewhere that reported PD could be popular if it is presented to pre-dialysis patients in a balanced and thorough manner. A quarter of the patients in our survey ended up receiving PD, and 100% of the latter skipped an interim urgent HD phase. This is a dramatic improvement over the current national average PD utilization (<10% of all KRT) in the Kingdom, underscoring the value of patient education in raising awareness of PD and facilitating patient recruitment for PD [4].

Hemodialysis was the most utilized method for KRT initiation. Unfortunately, two-thirds of those who began HD received it through a temporary catheter, the least desirable option. Native arteriovenous fistula (AVF), which is safer and more secure, was created in only one-third of HD patients in our sample. Although this is still far from optimal, it is higher than those reported for GCC countries in the DOPPS study survey [10].

Our survey was designed as an interventional study aimed to improve the clinical outcome in our own clinical routine through pre-dialysis patient education. The results, although preliminary obtained in a small sample, are highly encouraging and are consistent with precedents reported in other countries. However, because of its observational design, our study is highly specific to the local Saudi patient population, and its applicability in broader demographics has limits. In addition, group allocation was not performed in a randomized controlled setting, thus confounding effects cannot be excluded. Lastly, the measures we report for successful outcomes may have a possible bias from volunteer participation (patients who declined may represent a group with less optimal outcomes), which can only be excluded using a longer-term retrospective survey on a much larger patient pool.

Conclusions
In conclusion, survey measures indicate that our patient education class succeeded as attendees had a significantly higher proportion of accepting the diagnosis of kidney failure, and a significantly higher fraction pursued preemptive native HD access or enrolled in PD than the national average.

Appendices
FIGURE 1: Consent form
Additional Information

Disclosures

Human subjects: Consent was obtained or waived by all participants in this study. King Abdullah International Medical Research Center issued approval SP18/326/R.

Animal subjects: All authors have confirmed that this study did not involve animal subjects or tissue.

Conflicts of interest: In compliance with the ICMJE uniform disclosure form, all authors declare the following:

Payment/services info: All authors have declared that no financial support was received from any organization for the submitted work.

Financial relationships: All authors have declared that they have no financial relationships at present or within the previous three years with any organizations that might have an interest in the submitted work.

Other relationships: All authors have declared that there are no other relationships or activities that could appear to have influenced the submitted work.

References

1. Hassan R, Akbari A, Brown PA, Hiremath S, Brimble KS, Mohnar AO: Risk factors for unplanned dialysis initiation: a systematic review of the literature. Can J Kidney Health Dis. 2019, 6:10.1177/2054358119831684
2. Haddad NJ, Cleef SV, Agarwal AK: Central venous catheters in dialysis: the good, the bad and the ugly. Open Urol Nephrol J. 2012, 5:12-8. 10.2174/1874303X01205010012
3. Souqiyyeh MZ, Al-Attar MB, Zakaria H, Shaheen FA: Dialysis centers in the kingdom of Saudi Arabia. Saudi J
4. Dahlan R, Qureshi M, Akrely F, Al Sayyari AA: Barriers to peritoneal dialysis in Saudi Arabia: nephrologists’ perspectives. Perit Dial Int. 2016, 36:564-6. 10.3747/pdi.2015.000252

5. Sinnakirouchenan R, Holley JL: Peritoneal dialysis versus hemodialysis: risks, benefits, and access issues. Adv Chronic Kidney Dis. 2011, 18:428-32. 10.1055/s.2011.09.001

6. Zazzaroni L, Pasquinelli G, Nanni E, Cromonini V, Rubbi I: Comparison of quality of life in patients undergoing hemodialysis and peritoneal dialysis: a systematic review and meta-analysis. Kidney Blood Press Res. 2017, 42:717-27. 10.1159/000484115

7. He Z, Hou H, Zhang D, et al.: Effects of dialysis modality choice on the survival of end-stage renal disease patients in southern China: a retrospective cohort study. BMC Nephrol. 2020, 21:412. 10.1186/s12882-020-02070-7

8. Dahlan RA, Alsuwaida AO, Farrash MS, Qureshi MA, Hejali I, Al Sayyari AA: Let us listen to patients: underutilization of peritoneal dialysis from patients’ perspectives. Perit Dial Int. 2017, 37:574-6. 10.3747/pdi.2016.00521

9. Santoro D, Benedetto F, Mondello P, et al.: Vascular access for hemodialysis: current perspectives. Int J Nephrol Renovasc Dis. 2014, 7:281-94. 10.2147/INRD.S46645

10. Pisoni RL, Zepel L, Port FK, Robinson BM: Trends in US vascular access use, patient preferences, and related practices: an update from the US DOPPS practice monitor with international comparisons. Am J Kidney Dis. 2015, 65:905-15. 10.1053/j.ajkd.2014.12.014

11. Narva AS, Norton JM, Boulware LE: Educating patients about CKD: the path to self-management and patient-centered care. Clin J Am Soc Nephrol. 2016, 11:694-705. 10.2215/CJN.07680715

12. Ribitsch W, Haditsch B, Otto R, Schilcher G, Quehenberger F, Roeh JM, Rosenkranz AR: Effects of a predialysis patient education program on the relative frequencies of dialysis modalities. Perit Dial Int. 2013, 33:567-71. 10.3747/pdi.2011.00255

13. Elhassan EA, Al-Ruwaymi M, Osman A, Al-Sayyari AA: Attendees’ feedback on king abdulaziz medical city pilot chronic kidney disease education class. Saudi J Kidney Dis Transpl. 2019, 30:440-4. 10.4103/1319-2442.256850

14. Schanz M, Ketteler M, Heck M, Dippon J, Alscher MD, Kimmel M: Impact of an in-hospital patient education program on choice of renal replacement modality in unplanned dialysis initiation. Kidney Blood Press Res. 2017, 42:865-76. 10.1159/000484531

15. Cho EJ, Park HC, Yoon HB, et al.: Effect of multidisciplinary pre-dialysis education in advanced chronic kidney disease: propensity score matched cohort analysis. Nephrology (Carlton). 2012, 17:472-9. 10.1111/j.1440-1797.2012.01598.x