

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

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## 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.

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**Categories:** Nephrology

**Keywords:** educational class, renal transplantation, general nephrology dialysis and transplantation, peritoneal dialysis (pd), hemodialysis, end stage renal disease (esrd)

## 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

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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%).

		Number	Percentage
First preferred choice of treatment	Hemodialysis	9	14.5%
	Peritoneal dialysis	5	8.1%
	Preemptive transplant	48	77.4%
Second preferred choice of treatment	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 (1416/23,728, 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 [15]. 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 did actually receive 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




<p>Kingdom of Saudi Arabia Ministry of National Guard - Health Affairs</p>   <p>المملكة العربية السعودية وزارة الحرس الوطني - الشؤون الصحية</p>	
<p><b>إقرار موافقة للمشاركة بدراسة مقطعية</b></p>	
<p>Informed Consent for Cross Sectional Surveys</p>	
<p>Study Title : <u>Impact of a Pilot CKD Education Class on Choices of Renal Replacement Therapy</u></p>	<p>RYD-19-418012-134810</p>
<p>Study No. :</p>	
<p>Principal Investigator : <u>Elwaleed Elhassan, MD</u></p>	
<p>You are requested to participate in research that will be supervised by (<i>Elwaleed Elhassan</i>) in (<i>King Abdul Aziz Medical City</i>).</p> <p>This study is about (<i>assessing the impact of attending the CKD Education Class on patients' choices and outcomes of renal replacement therapy</i>).</p> <p>Your participation is voluntary and you have the right to not complete this survey without giving any reason and this will not affect your current or future medical care in MNG-HA.</p> <p>You do not have to sign this information sheet only you can choose to agree/disagree; your acceptance to complete the survey will be interpreted as your informed consent to participate.</p> <p>Your responses will be kept anonymous. However, whenever one works with email/the internet there is always the risk of compromising privacy, confidentiality, and/or anonymity. Despite this possibility, the risks to your physical, emotional, social, professional, or financial well-being are considered to be 'less than minimal'.</p> <p>If you have any questions about the research, please contact (<i>Elwaleed Elhassan</i>) (<i>King Abdul Aziz Medical City</i>) <i>Division of Nephrology, PO Box 22490, Mail Code 1443, Riyadh 11426 Kingdom of Saudi Arabia. Phone 0118011111, Ext 17598 Email: elhassanel@maha.med.sa.</i></p> <p>In case you have any enquiries related to your rights as a research subject you can contact the Institutional Review Board on Tel 8011111 Ext. 14572.</p>	<p>أنت مدعو للانضمام لطاوعية لدراسة بحثية سوف يشرف عليها (<i>الوليد الحسن</i>) في (<i>مدينة الملك عبد العزيز الطبية</i>).</p> <p>هذه الدراسة تهدف إلى (<i>تقييم تأثير حضور فصل التثقيف بمرض الكلى الكلوي المختلفة</i>).</p> <p>إن مشاركتك في هذه الدراسة طوعية ولك الحق التام في عدم قبول تعبئة الاستمارة أو الانسحاب في أي وقت تشاء بدون إيذاء الأسباب ولن يؤثر ذلك على العناية الطبية المقدمة لك حالياً أو في المستقبل في الشؤون الصحية بوزارة الحرس الوطني.</p> <p>لا يجب عليك التوقيع على ورقة المعلومات هذه ، فقط عليك الاختيار موافق / غير موافق فمجرد قبولك تعبئة هذا الاستبيان يعتبر بعبارة إقرارك بالموافقة على المشاركة في هذا البحث .</p> <p>ستبقى الردود على الأسئلة سرية ومع ذلك ، فإن العمل عن طريق البريد الإلكتروني والإنترنت يبقى هناك احتمال الاختراق خصوصية البيانات وسرية المعلومات ولكن بالرغم من هذه الاحتمالية تبقى الأخطار البدنية والمعنوية والاجتماعية والمهنية والمالية المترتبة عليك ضمن الحد الأدنى من الخطورة.</p> <p>إذا كان لديك أي أسئلة حول هذا البحث ، يرجى الاتصال (<i>الوليد الحسن</i>) (<i>مدينة الملك عبد العزيز الطبية</i>) <i>قسم أمراض الكلى، ص.ب 22490، رمز البريد 1443، الرياض 11426 المملكة العربية السعودية، الهاتف 0118011111، تمويه 17598 السيد الدكتور، elhassanel@maha.med.sa</i></p> <p>في حال كان لديك الاستفسارات المتعلقة بحقوقك كموضوع بحث يمكنك الاتصال بمجلس المراجعة المؤسسية على هاتف 8011111 تمويه 14572</p>
<p><input type="checkbox"/> Agree to participate <input type="checkbox"/> Disagree to participate</p>	<p><input type="checkbox"/> موافق على المشاركة <input type="checkbox"/> غير موافق على المشاركة</p>
<p>This information shall not be used, disclosed, or published without written approval from King Abdullah International Medical Research Center</p>	
<p>Version No. : (<i>Please change according to your study</i>)</p>	<p>Version Date: (<i>Please change as appropriate</i>)</p>
<p>Non-Clinical Form Rev. 11/2014 Ref# APP 1419-05 Page 1 of 1 Appendix J O&amp;M # 2301-1054</p>	

FIGURE 1: Consent form



## CKD Class Attendee Follow Up Form

Serial Number: ----

1. When did you attend the CKD education class? Month-Year .....
2. Your level of education
  1. Illiterate
  2. Basic education
  3. High education
3. After attending the class; what was your choice for treatment once your kidneys fail? (list in order of preference)
  1. To undergo hemodialysis ( )
  2. To undergo Peritoneal Dialysis ( )
  3. To undergo a pre-emptive transplant ( )
4. What had actually happened to you since attending the class?
  1. Still under medical observation?
  2. Started Hemodialysis via a temporary catheter?
  3. Started Hemodialysis via an Arteriovenous Fistula?
  4. Started Peritoneal Dialysis?
  5. Received a kidney transplant?
5. If what you are undergoing is different than what you originally chose; what was the reason?

1. متى حضرت درس تثقيف مرض الكلى المزمن؟ الشهر - السنة.
2. ما هو مستواك التعليمي
  1. لا أعرف القراءة والكتابة
  2. تعليمي أساسي
  3. تعليمي متقدم
3. بعد حضورك للفصل، ماذا كان اختيارك للعلاج بمجرد فشل كليتيك؟ (أذكر الترتيب على درجة التفضيل)
  1. إجراء غسيل الكلى دموي؟ ( )
  2. إجراء غسيل الكلى بريتوني؟ ( )
  3. إجراء عملية زرع الكلى الوقائية؟ ( )
4. ما الذي حدث لك بالفعل منذ ذلك الحين؟
  1. لا تزال تحت المراقبة الطبية؟
  2. بدأت غسيل الكلى عن طريق قسطرة مؤقتة (ألي في الرقبة)؟
  3. بدأت غسيل الكلى عن طريق نسور شرياني وريدي (الجهاز)؟
  4. بدأ غسيل الكلى البريتوني؟
  5. تلقيت زرع الكلى؟
5. إذا كان ما جرى لك يختلف عن الذي اخترته في الأصل؛ ماذا كان السبب؟

FIGURE 2: Questionnaire

## 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.

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