

Cross-sectional study on knowledge of chronic kidney disease among medical outpatient clinic patients

Chiun Yann Ng, MRCP, Zhong Shiun Lee, MBBS, Kiam Seong Goh, MD

Department of Internal Medicine, Hospital Pakar Sultanah Fatimah, Muar, Johor

ABSTRACT

Background: Chronic kidney disease (CKD) is a major health concern worldwide. There are limited studies which look into the actual knowledge level of CKD among the general population both locally and internationally. This study aims to assess the knowledge level of CKD among patients in a secondary hospital in Malaysia.

Methods: Consecutive sampling of patients attending the Medical Outpatient Clinic was performed in this cross-sectional study. Respondents were given self-administered questionnaires which contain questions on demographic characteristics and knowledge on CKD.

Results: Out of 300 respondents, 78.6% (n=236) of the respondents completed the questionnaire. Majority of respondents (73.7%, n=174) scored less than 4 out of 7 marks on knowledge on CKD. Respondents who were younger, males, having higher education status, professionals/executives and earned higher monthly income were more likely to have a higher mean knowledge score of CKD. Respondents who have heard of CKD were also significantly associated with higher mean knowledge score of CKD.

Conclusion: The study findings suggest that our Malaysian population is still inadequately informed on CKD, especially those who are at risk of developing CKD and its complications, and also among those of the lower socioeconomic group. In order for successful primary and secondary prevention of CKD, more importance should be placed on increasing awareness on CKD among these at-risk groups.

KEY WORDS:

Chronic kidney disease, knowledge, source of information

INTRODUCTION

Chronic Kidney Disease (CKD) is defined as kidney damage or glomerular filtration rate (GFR) <60 mL/min/1.73 m² for 3 months or more, irrespective of cause.^{1,2} CKD can progress to end stage renal disease (ESRD), which requires renal replacement therapy (RRT), and is associated with morbidity and mortality at all stages. With the increasing prevalence and incidence of CKD and ESRD, CKD is becoming a major health concern worldwide, and associated with high costs and poor outcomes.^{2,3} Prevalence of CKD is estimated to be 8-16% worldwide.³

In Malaysia, the prevalence of ESRD on RRT had increased from 457 per million populations (pmp) in 2004 to 1065 pmp in 2013.⁴ Diabetes mellitus and hypertension are two major risk factors for CKD in Malaysia which contribute to 61% and 16% of total CKD patients respectively.⁴

Although the prevalence and incidence of CKD is high, studies which looked into the actual knowledge level of CKD among the general population both locally and internationally were limited.⁵⁻¹⁰ A cross-sectional survey of primary care patients without kidney disease in Singapore reported that only 55% of respondents had average knowledge in questions related to kidney function, symptoms, risk factors and treatment options.⁵ On the other hand, cross-sectional studies carried out in Hong Kong and Iran concluded that the public is poorly informed about CKD in which less than half of the respondents knew that hypertension and diabetes can cause kidney disease.^{6,7} Similarly, studies carried out in the United States of America showed the knowledge on CKD was low.⁸⁻¹⁰

Since the recent studies done in various countries concluded that there is limited knowledge on CKD among the public and patients, educating the public is important to improve the public knowledge on CKD and hence reduce the incidence rate of CKD.⁵ Therefore, assessing the knowledge and source of information on CKD among the public plays an important role for formulating the future health promoting programs to improve the public knowledge on CKD. Therefore, this study aims to assess the knowledge level of CKD among patients attending a secondary hospital in Malaysia.

MATERIALS AND METHODS

The sample population for this cross-sectional study was the adult patients visiting the medical outpatient clinic of Hospital Pakar Sultanah Fatimah from 5-7 April 2015. Consecutive sampling of 300 patients attending the clinic was used. Patients below 21 years old, diagnosed with ESRD on dialysis and history of kidney transplant were excluded.

A total of 300 self-administrated questionnaires were distributed to the patients in the medical outpatient clinic during this period of time. Clarifications and assistance were provided to the respondents by trained surveyors when needed.

The questionnaire consisted of 3 sections. Section A consisted of 2 screening questions used to exclude patients who did not

This article was accepted: 18 March 2016

Corresponding Author: Chiun Yann Ng, Hospital Pakar Sultanah Fatimah, Medicine, Jalan Salleh, 84000 Muar, Johor

Email: yann731@yahoo.com

fulfil the criteria for the study. Section B consisted of questions on demographic characteristics and health conditions of the respondents.

Section C consisted of 7 questions to assess the knowledge of CKD among the respondents. These questions were adapted from a study done in Singapore that looked at the knowledge of CKD among the primary care patients.⁵ The same set of questions was adapted in a study in Hong Kong to study the awareness of CKD.⁶ Hence, the measurement tool was valid to measure the knowledge of CKD in this study. There were slight modifications in question numbers 3, 4 and 5 after discussion with the consultant nephrologist and senior consultant physicians in order to better suit the target respondents background of the study. The questions were again validated by the consultant nephrologist and physicians.

The questions were intended to assess the knowledge of CKD of the respondents in the following 7 domains.⁵ Question 1: How many healthy kidney(s) does a person need to lead a normal life? (Anatomy); Question 2: What is the function of a kidney in a human body? (Physiology); Question 3: What can cause kidney disease? (Aetiology); Question 4: What is the early symptom of chronic kidney disease? (Presentation); Question 5: Which of the following statement about kidney disease is correct? (Progression); Question 6: Where can dialysis treatment be carried out? (Resources available); and Question 7: What is the best medical treatment for End Stage Kidney Failure? (Treatment). One mark was given to each correct answer.

The questionnaire was designed in closed-ended questions and was translated to Malay and Chinese version. Back to back translation method was used to validate the translated questionnaire to ensure the translation was proper and valid. In addition, pretesting was conducted on the target respondents to ensure their understanding of the translated questionnaire.

Data analysis was performed using Statistical Package for Social Sciences (IBM Corp. Released 2013. IBM SPSS Statistics for Windows, Version 22.0. Armonk, NY: IBM Corp.) Percentages were compared by means of t-test or one-way ANOVA. The level of statistical significance was set at $p < 0.05$.

RESULTS

Out of 300 respondents, 78.6% (n=236) of the respondents completed the questionnaire.

The majority of respondents were between ages 41-60 (39%, n=92) and 61-80 (38.6%, n=91). Majority of respondents were women (52.5%, n=124). The respondents consisted of Malay (62.3%, n=147), Chinese (30.5%, n=72), Indian (6.4%, n=15), and other races (0.8%, n=2). In term of religion of the respondents, 62.7% (n=148) were Muslims, whilst 26.7% (n=63) were Buddhists, 5.9% (n=14) were Hindus, and 2.5% (n=6) were Christians. There were 40.3% (n=95) of respondents had education up to secondary level, while 28.4% (n=67) had tertiary level education. Only 8.9% (n=21) of respondents were professionals/executives, while 32.6%

(n=77) were non-professionals, 20.8% (n=49) were retirees and 37.3% (n=88) were unemployed. Most of respondents earned less than RM2000/month (72.9%, n=172). (Table I)

Majority of respondents (73.7%, n=174) scored less than 4 out of 7 marks on knowledge on CKD (Figure 1). The mean score was 2.39 and median score was 2.

There was a statistically significant difference found among the age groups of respondents on the knowledge on CKD ($p = 0.006$; Table I). Pairwise comparison of group means with post hoc Turkey HSD test (honestly significant different) showed the mean knowledge score of age group 61-80 years old was significantly lower than age groups 21- 40 years old ($p = 0.03$; Table I) and 41- 60 years old ($p = 0.01$; Table I).

The male respondents were also found to have higher mean knowledge score compared to the female respondents ($p < 0.001$; Table I).

On the other hand, the education status of the respondents had significant effect on the knowledge on CKD ($p < 0.001$; Table I). The respondents who had tertiary education had the highest mean knowledge score, followed by the respondents who had educational level up to secondary school when compared to the groups who had primary school education and those without formal education respectively (Table I).

The different types of occupation also had significant effect on knowledge on CKD ($p < 0.001$; Table I). The unemployed group had the lowest mean knowledge score compared to professional/ executive ($p < 0.001$; Table I), non-professional ($p=0.004$; Table I) and retired ($p < 0.001$; Table I) groups respectively.

Besides that, there was a significant association of the monthly income of the respondents on the knowledge on CKD ($p < 0.001$; Table I). Respondents who had monthly income less than RM 2000 had the lowest mean knowledge score on CKD compared with the groups of respondents who had monthly income RM 2000-RM4999 and more than RM5000 (Table I).

Respondents who have heard of CKD ($p < 0.001$; Table II) were significantly associated with higher mean knowledge score of CKD. Among those who have heard about CKD, respondents who have heard about CKD from the newspaper ($p = 0.001$; Table II), the internet ($p = 0.012$; Table II), medical personnel (p -value = 0.043; Table II) or health campaigns (p -value < 0.001 ; Table II) were significantly associated with higher mean knowledge score of CKD.

DISCUSSION

This study showed that the overall knowledge of CKD among patients attending the Medical Outpatient Clinic at Hospital Pakar Sultanah Fatimah was low, whereby almost three quarters (73.7%, n=174) of respondents scored less than 4 out of 7 marks on knowledge on CKD. Poor knowledge on CKD is not only found among the Malaysian population, but is also prevalent in other countries, as demonstrated in studies conducted in Singapore, Hong Kong, Iran and America.⁵⁻¹⁰

Table I: Comparison of mean knowledge score of Chronic Kidney Disease amongst variables (demographic data)

Variable	No (Percentage)	Mean knowledge score (standard deviation)	F statistic	P value
Age				
21-40 years old	48 (20.3)	2.71 (1.501) ¹	4.293	0.006**
41-60 years old	92 (39.0)	2.66 (1.564) ¹		
61-80 years old	91 (38.6)	1.92 (1.662) ¹		
81 years and above	5 (2.1)	2.80 (1.304)		
Gender				
Male	112 (47.5)	2.78 (1.575)	3.575*	<0.001**
Female	124 (52.5)	2.04 (1.584)		
Race				
Malay	147 (62.3)	2.53 (1.473)	1.438	0.232
Chinese	72 (30.5)	2.21 (1.921)		
Indian	15 (6.4)	1.80 (1.373)		
Others	2 (0.8)	3.00 (0.000)		
Religion				
Islam	148 (62.7)	2.51 (1.482)	1.172	0.324
Buddhism	63 (26.7)	2.27 (1.936)		
Christianity	6 (2.5)	1.83 (1.722)		
Hindu	14 (5.9)	1.71 (1.383)		
Others	5 (2.1)	2.80 (1.483)		
Marital status				
Single	24 (10.2)	2.42 (1.640)	0.009	0.991
Married	184 (78.0)	2.39 (1.616)		
Divorced/separated/widowed	28 (11.9)	2.36 (1.682)		
Education status				
None	22 (9.3)	1.05 (1.618) ²	26.305	<0.001**
Primary	52 (22.0)	1.52 (1.229) ²		
Secondary	95 (40.3)	2.42 (1.506) ²		
Tertiary	67 (28.4)	3.46 (1.318) ²		
Occupation				
Professional/executive	21 (8.9)	3.67 (1.390) ^{3,4}	12.921	<0.001**
Non-professional	77 (32.6)	2.52 (1.429) ^{3,4}		
Unemployed	88 (37.3)	1.70 (1.456) ³		
Retired	49 (20.8)	2.88 (1.763) ³		
Monthly income				
Less than RM2000	172 (72.9)	1.95 (1.496) ⁵	29.010	<0.001**
RM2000-RM4999	50 (21.2)	3.54 (1.216) ⁵		
RM5000 and above	8 (3.4)	4.00 (1.512) ⁵		
Diabetes mellitus				
Yes	75 (31.8)	2.36 (1.745)	-0.193*	0.847
No	161 (68.2)	2.40 (1.563)		
Hypertension				
Yes	135 (57.2)	2.22 (1.601)	-1.848*	0.066
No	101 (42.8)	2.61 (1.625)		
Chronic kidney disease				
Yes	13 (5.5)	2.31 (1.974)	-0.188*	0.851
No	223 (94.5)	2.39 (1.601)		

* T-test value

** p<0.05, significant

- 1- Pairwise comparison of group means with post hoc Turkey HSD (honestly significant different) test showed a significant difference between age 61- 80 years old group and age 21- 40 years old, age 41- 60 years old groups respectively.
- 2- Pairwise comparison of group means with post hoc Turkey HSD test showed a significant difference between the tertiary and secondary groups, as well as both groups (tertiary and secondary) when compared with none and primary groups.
- 3- Pairwise comparison of group means with post hoc Turkey HSD test showed a significant difference between unemployed group and professional/executive, non-professional, retired groups respectively;
- 4- Pairwise comparison of group means with post hoc Turkey HSD test showed a significant difference between professional/executive and non-professional groups.
- 5- Pairwise comparison of group means with post hoc Turkey HSD test showed a significant difference between monthly income less than RM2000 group and monthly income RM2000- RM 4999, more than RM5000 groups respectively.

Table II: Comparison of mean knowledge score of Chronic Kidney Disease amongst variables (prior exposure knowledge of CKD and the source of information)

Variable	No (Percentage)	Mean knowledge score (standard deviation)	T-test value	P value
Heard of Chronic kidney disease				
Yes	164 (69.5)	2.71 (1.597)	4.850	<0.001**
No	72 (30.5)	1.65 (1.426)		
Source of information – family/friends				
Yes	64 (39.0)	2.89 (1.682)	1.138	0.257
No	100 (61.0)	2.60 (1.537)		
Source of information – newspaper				
Yes	49 (29.9)	3.37 (1.334)	3.543	0.001**
No	115 (70.1)	2.43 (1.623)		
Source of information – internet				
Yes	21 (12.8)	3.52 (1.250)	2.532	0.012**
No	143 (87.2)	2.59 (1.611)		
Source of information – television/radio				
Yes	55 (33.5)	2.58 (1.595)	-0.749	0.455
No	109 (66.5)	2.78 (1.601)		
Source of information – medical personnel				
Yes	42 (25.6)	3.14 (1.539)	2.041	0.043**
No	122 (74.4)	2.57 (1.595)		
Source of information – health campaign				
Yes	30 (18.3)	3.60 (1.102)	4.423	< 0.001**
No	134 (81.7)	2.51 (1.626)		

** p <0.05, significant

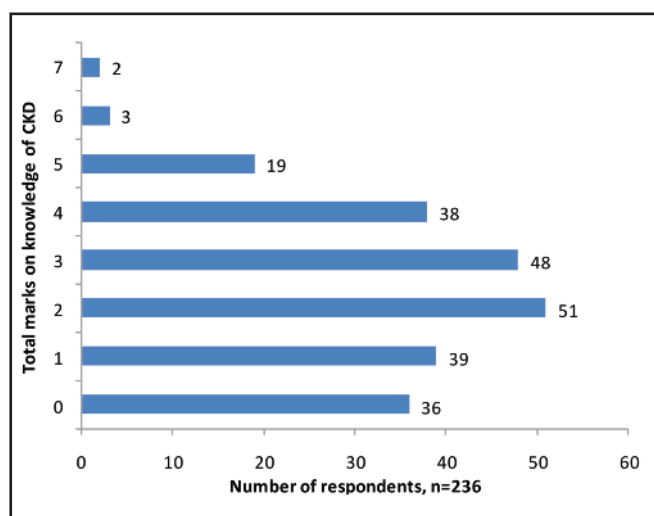


Fig. 1: Distribution of marks on knowledge on CKD amongst the respondents.

Although the overall knowledge of CKD among the population was poor, the results of this study showed that there were various demographic groups associated with better knowledge of CKD. Respondents who were professionals/executives, younger, had higher education status and monthly income were associated with higher knowledge scores on CKD. These findings are consistent with the study conducted among the primary care patients in Singapore which revealed that professionals, those with younger age, those having an above primary education level, and higher monthly household income were more likely to have better knowledge of CKD.⁵ This is also consistent with other studies which show that lower socioeconomic/education status is associated with lower

knowledge levels of hypertension and diabetes, which are risk factors of developing CKD.^{11,12} Besides, younger age and having a college degree were independent predictors of higher CKD knowledge in a study done among patients with CKD stage 3 or 4.¹³ This can be explained by higher exposure to information regarding CKD among those with higher socioeconomic status. Those of the younger age group are savvier with the usage of mass media and information technology to acquire knowledge of CKD.

The result of our study shows that the knowledge levels of CKD among the patients who are at high risk of developing CKD and its complications are still poor. Respondents who have diabetes mellitus, hypertension or CKD were not significantly associated with better knowledge score of CKD. However, CKD knowledge surveys done in Hong Kong, Iran, Australia, Jordan and among African-Americans revealed otherwise.^{6,7,9,10,14,15} In the study done in Hong Kong, Iran and among the African-American showed that higher knowledge of CKD were seen among respondents with hypertension or diabetes.^{6,7,9,10} The study done in Australia and Jordan revealed that patients with diabetes mellitus had a significantly higher awareness of relationship between diabetes and CKD.^{14,15}

The study also revealed that respondents who have heard of CKD before were more likely to have better knowledge on CKD. Knowing about CKD from the newspaper, internet, medical personnel or health campaigns were associated with better knowledge of CKD. This is consistent with the study done in a Canadian province showed that the awareness on kidney health was successfully increased after a public health campaign especially in those with less than a high school education, and lower yearly income.¹⁶ However, hearing about CKD from family or friends was not associated with

better knowledge score of CKD. This suggests that existing health campaigns and dissemination of CKD knowledge via the mass media and official health authorities are effective and successful in increasing CKD knowledge among our population.

The findings of our study have an important implication for both clinicians and policy makers in Malaysia. There are significant knowledge gaps on CKD in our population, more so among those with lower socioeconomic group and those at-risk of developing CKD such as individuals with diabetes and/or hypertension. Hence, there is a need for a more targeted approach to increase awareness and knowledge on CKD among the at-risk group and those significantly associated with lower levels of CKD knowledge, such as those with lower education status, lower monthly income, and non-professional workers or the unemployed. Therefore, our study suggests that organizing health campaigns is an important approach to increase CKD knowledge not only among those at risk of developing CKD, but also the general population at every level of the society. Besides, Medical personnel and the mass media such as the newspaper and internet have important roles to play to ensure effective dissemination of CKD information among the public.

Increasing CKD knowledge is an important aspect of CKD treatment because patients who are educated about their disease are more likely follow proper treatment, cope better, and participate in healthcare decisions.¹⁷ Studies have shown that patients with ESRD who have greater knowledge of their condition is associated with better clinical outcomes.^{18,19} In addition, there is evidence that late referrals of individuals with CKD to nephrologists are associated with poor outcomes.²⁰⁻²⁴ Individuals with higher perceived risk for CKD are more likely to seek information on CKD and get tested.¹⁰ Therefore, the policymakers need to formulate policy interventions to improve access to healthcare for the socio-economical disadvantaged.²⁵ By providing targeted awareness and interventional programmes, this group of people may be able to be more informed and detect their health problem such as CKD earlier.

This study adapted a questionnaire from Singapore due to similarity in demographic profile and because there is no universally-accepted, standardized questionnaire to assess the level of understanding and knowledge on CKD.⁵ Therefore, the interpretation and comparison of knowledge level of CKD between studies is limited. Another limitation of this study is the possibility selection bias of respondents. Respondents who agreed to complete the questionnaires might have better health awareness. We tried to prevent this by recruiting respondents by consecutive sampling. Besides, the response bias is another limitation, particularly in the questions in which respondents had to self-report underlying diabetes mellitus, hypertension and CKD. Furthermore, diabetes, mellitus, hypertension, CKD or even ESRD may be undiagnosed in these respondents. In addition, the result of the study cannot be generalised on the Malaysian population as the study only focused on one hospital.

Future research may aim to identify the best way to improve the patients' knowledge on CKD, by comparing outcome of different health education intervention programmes retrospectively. Further research can be done to assess knowledge on CKD among healthcare providers, as was explored in other studies.^{9, 26} With effective measures to increase knowledge of CKD, adequate knowledge on CKD can play a vital role in primary and secondary prevention of CKD.

CONCLUSION

Overall, the findings suggest that the patients attending medical outpatient clinic, Hospital Pakar Sultanah Fatimah are still inadequately informed on CKD, especially those who are at risk of developing CKD and its complications. In addition, poor knowledge of CKD is significantly associated with various demographic characteristics, particularly among those of the lower socioeconomic group. Increasing the awareness on CKD via health promotion campaigns and mass media should be implemented to educate the targeted group, in order for successful primary and secondary prevention of CKD.

ACKNOWLEDGEMENTS

The authors would like to thank the Director General of Health Malaysia for granting permission to publish this paper and Professor Dr. Adinegara bin Lutfi Abas, Deputy Dean of Melaka Manipal College for his guidance throughout the completion of the study.

REFERENCES

1. Ministry of Health Malaysia. Management of Chronic Kidney Disease in Adult. Putrajaya: Ministry of Health. 2011.
2. Levey AS, Eckardt KU, Tsukamoto Y *et al*. Definition and classification of chronic kidney disease: a position statement from Kidney Disease: Improving Global Outcomes (KDIGO). *Kidney Int* 2005; 67(6): 2089-100.
3. Jha V, Garcia-Garcia G, Iseki K *et al*. Chronic kidney disease: global dimension and perspectives. *Lancet* 2013; 382(9888): 260-7.
4. Lim YN, Ong LM, Goh BL *et al*. 21st Report of the Malaysian Dialysis and Transplant Registry 2013. Kuala Lumpur: National Renal Registry. 2013.
5. Chow WL, Joshi VD, Tin AS *et al*. Limited knowledge of chronic kidney disease among primary care patients - a cross-sectional survey. *BMC Nephrol* 2012; 13: 54.
6. Chow KM, Szeto CC, Bonnie CH Kwan *et al*. Public lacks knowledge on chronic kidney disease: telephone survey. *Hong Kong Med J* 2014; 20: 139-44.
7. Roomizadeh P, Taheri D, Abedini A *et al*. Limited knowledge of chronic kidney disease and its main risk factors among Iranian community: an appeal for promoting national public health education programs. *Int J Health Policy Manag* 2014; 2(4): 161-6.
8. Wright JA, Wallston KA, Elasy TA *et al*. Development and Results of a Kidney Disease Knowledge Survey Given to Patients With CKD. *Am J Kidney Dis* 2011; 57(3): 387-95.
9. Plantinga LC, Tuot DS, Powe NR. Awareness of Chronic Kidney Disease among Patients and Providers. *Adv Chronic Kidney Dis* 2010; 17(3): 225-36.
10. Waterman AD, Browne T, Waterman BM *et al*. Attitudes and behaviors of African Americans regarding early detection of kidney disease. *Am J Kidney Dis* 2008; 51: 554-62.
11. Ayotte BJ, Trivedi R, Bosworth HB. Racial differences in hypertension knowledge: effects of differential item functioning. *Ethn Dis* 2009; 19: 23-7.
12. Fezeu L, Fointama E, Ngufor G *et al*. Diabetes awareness in general population in Cameroon. *Diabetes Res Clin Pract* 2010; 90(3): 312-8.
13. Tan AU, Hoffman B, Rosas SE. Patient Perception of Risk Factors Associated with Chronic Kidney Disease Morbidity and Mortality. *Ethn Dis* 2010; 20(2): 106-10.

14. White SL, Polkinghorne KR, Cass A *et al*. Limited knowledge of kidney disease in a survey of AusDiab study participants. *Med J Aust* 2008; 188(4): 204-8.
15. Khalil A, Abdalrahim M. Knowledge, attitudes, and practices towards prevention and early detection of chronic kidney disease. *Int Nurs Rev* 2014; 61(2): 237-45.
16. Ryz K, Tangri N, Verrelli M *et al*. A before and after cross-sectional analysis of a public health campaign to increase kidney health awareness in a Canadian province. *BMC Res Notes* 2015; 8: 695.
17. Swartz MD, Robinson K, Davy T, *et al*. The role of patients in the implementation of the National Kidney Foundation-Dialysis Outcomes Quality Initiative. *Adv Ren Replace Ther* 1999; 6: 52-8.
18. Cavanaugh KL, Merkin SS, Plantinga LC, Fink NE, Sadler JH, Powe NR. Accuracy of patients' reports of comorbid disease and their association with mortality in ESRD. *Am J Kidney Dis* 2008; 52(1): 118-27.
19. Grubbs V, Gregorich SE, Perez-Stable EJ, Hsu CY. Health literacy and access to kidney transplantation. *Clin J Am Soc Nephrol* 2009; 4(1): 195-200.
20. Lhotta K, Zoehl M, Mayer G, Kronenberg F. Late referral defined by renal function: association with morbidity and mortality. *J Nephrol* 2003; 16(6): 855-61.
21. Jungers P, Massy ZA, Nguyen-Khoa T *et al*. Longer duration of predialysisnephrological care is associated with improved long-term survival of dialysis patients. *Nephrol Dial Transplant* 2001; 16: 2357-64.
22. Chan MR, Dall AT, Fletcher KE, *et al*. Outcomes in patients with chronic kidney disease referred late to nephrologists: a meta-analysis. *Am J Med* 2007; 120:1063-70.
23. Avorn J, Bohn RL, Levy E *et al*. Nephrologist care and mortality in patients with chronicrenal insufficiency. *Arch Intern Med* 2002; 162(17): 2002-6.
24. Stack AG. Impact of timing of nephrology referral and pre-ESRD care on mortality risk among new ESRD patients in the United States. *Am J Kidney Dis* 2003; 41: 310-8.
25. Navaneethan SD, Aloudat S, Singh S. A systematic review of patient and health system characteristics associated with late referral in chronic kidney disease. *BMC Nephrology* 2008, 9: 3.
26. Agrawal V, Ghosh AK, Barnes MA *et al*. Awareness and knowledge of clinical practice guidelines for CKD among internal medicine residents: a national online survey. *Am J Kidney Dis*. 2008; 52: 1061-9.