

Evaluating the role of technology in disseminating education to patients with chronic kidney disease

Hui Boon Tay¹ MRCP, Terina Ying Ying Seow¹ MD, Chun Fan Lee² PhD, Lee Ying Yeoh¹ FRCP

Dear Editor,

The optimal management of chronic kidney disease (CKD) requires lifestyle changes and adherence to long-term medications. Knowledge is a component of health literacy and is needed for self-management. Limited health literacy can lead to negative outcomes, such as adverse clinical events and mortality.¹

Using technology to improve patients' knowledge and self-management skills through websites or mobile applications is an attractive option. It may engage patients better² and is an efficient mode of delivery from a systems point of view. However, for it to be used effectively, patients need to have the necessary electronic health literacy skills. Electronic health (eHealth) literacy has been defined as the ability to seek, find, understand and appraise health information from electronic sources, and apply the knowledge gained to address or solve a health problem.³ We aimed to evaluate eHealth literacy and receptiveness to education via electronic means among CKD patients.

A cross-sectional survey of 100 male and 100 female outpatients with CKD attending renal clinics at Sengkang General Hospital was conducted from February to June 2022. All patients attending the clinics were screened for eligibility and informed consent was obtained. Patients included in the study had to have a diagnosis of CKD and understand English or Chinese. The survey comprised questions on use of technology, assessment items from the validated eHealth Literacy Scale (eHEALS) and questions on patient preference of modality for CKD education. eHEALS is an 8-item scale used to measure knowledge, comfort and perceived skills at finding, evaluating and applying electronic health information to health problems,⁴ and was used to assess participants' eHealth literacy in this study. The cut-off score indicating adequate eHealth literacy has varied in literature, with the score of ≥ 26 used in some Singapore studies on patients with chronic diseases and notably, the

score of ≥ 32 in a previous study on CKD patients.⁵⁻⁸ Survey questions on the use of technology and patient preference of modality for CKD education were drafted in English by the investigators, piloted among staff and translated into Chinese. The options of education modalities included a renal coordinator in person, a renal coordinator by video consult, leaflet, website or mobile application. Patients were allowed to select all options that they preferred and were asked to indicate which their top choice was of the selected options. Demographic data, cause of CKD, relevant past medical history, dialysis dependence, details of renal visits, renal function, haemoglobin A1C and body mass index readings were also extracted from electronic medical records. Study data were collected and managed using electronic data capture tools hosted at Sengkang General Hospital. The study protocol was approved by the SingHealth Institutional Review Board (CIRB Ref No: 2021/2636) and all participants provided written informed consent.

Logistic regression was used to model receptiveness of education via electronic means, to age, education level, eHEALS score and use of internet on the phone. Factors adjusted for included sex, ethnicity, cause of CKD, diabetes, hypertension, heart disease, and exposure to renal coordinator education. Taking into consideration the Bonferroni correction, $P < 0.01$ was taken as the threshold of significance.

In total, 200 renal patients with a median age of 56.5 (interquartile range [IQR] 44.5–68) years were surveyed. Patient characteristics are summarised in Table 1. Median estimated glomerular filtration rate (eGFR) was 30 mL/min/1.73 m² (IQR 14–54) with 51% of patients in CKD stages 1–3. There were 22.5% patients who were on dialysis at the time of the study, while 38.5% were not aware of their diagnosis of CKD. The median eHEALS score was 29 (IQR 24–32), and 194 (97%) participants had mobile phones with 158 (79%) using the internet on them. Email use was noted for 137 (68.5%) participants.

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¹ Department of Renal Medicine, Sengkang General Hospital, Singapore

² Centre for Quantitative Medicine, Duke-NUS Medical School, Singapore

Correspondence: Dr Hui Boon Tay, Department of Renal Medicine, Sengkang General Hospital, 110 Sengkang East Way, Singapore 544886.

Email: tay.hui.boon@singhealth.com.sg

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Table 1. Patient characteristics of the renal cohort surveyed (n=200).

Patient characteristics	
Age, median (IQR), years	56.5 (44.5–68)
Sex, no. (%)	
Male	100 (50)
Female	100 (50)
Ethnicity, no. (%)	
Chinese	122 (61)
Malay	48 (24)
Indian	21 (10.5)
Others	9 (4.5)
Education level, no. (%)	
Up to Primary	37 (18.5)
Secondary	87 (43.5)
Tertiary	75 (37.5)
Did not report	1 (0.5)
Employment status, no. (%)	
Employed	106 (53)
Professional	65 (32.5)
Non-professional	38 (19)
Unemployed	36 (18)
Retired	58 (29)
Cause of chronic kidney disease, no. (%)	
Diabetes	85 (42.5)
Hypertension	34 (17)
Glomerulonephritis	48 (24)
Polycystic kidney disease	4 (2)
Others	29 (14.5)
Comorbidities, no. (%)	
Diabetes	106 (53)
Hypertension	169 (84.5)
Heart disease	52 (26)
Dialysis, no. (%)	45 (22.5)
Haemodialysis	36 (18)
Peritoneal dialysis	9 (4.5)
Clinic visit type, no. (%)	
New case	14 (7)
Follow up	186 (93)
Renal coordinator counselling, no. (%)	
Done	78 (39)
Not done	122 (61)
eGFR (mL/min/1.73 m ²), median (IQR)	30 (14–54)
CKD stage, no. (%)	
1	20 (10)
2	24 (12)
3	58 (29)
4	44 (22)
5	53 (26.5)
Data not available	1 (0.5)
eHEALS score, median (IQR)	29 (24–32)

CKD: chronic kidney disease; eHEALS: eHealth Literacy Scale;
eGFR: estimated glomerular filtration rate;
IQR: interquartile range

The top modality preferred for CKD education was for education by a renal coordinator in person (66.5%). Overall, 94 (47%) participants were receptive to education by electronic means (website or mobile application), though only 19.5% chose it as their top choice. Education by leaflet was the least popular choice (2%).

Older participants were less likely to be receptive to education by electronic means (odds ratio [OR] 0.95, 95% confidence interval [CI] 0.91–0.98, $P=0.003$). Participants with higher eHealth literacy were more likely to be receptive to education by electronic means (OR 1.14, 95% CI 1.05–1.23, $P=0.001$). Education level and internet use on phone were not associated with receptiveness to education by electronic means.

Our study findings on eHealth literacy with a median eHEALS score of 29 are similar to those from a study on digital health literacy among adults living in the community in Singapore,⁷ which reported a mean eHEALS score of 29.4. As eHEALS scores of ≥ 26 –32 have been used in other studies to indicate adequate eHealth literacy,^{5–8} this may be considered adequate, though higher scores would be ideal. Participants reported high access to technology and were generally receptive to education by electronic modes, though they still preferred face-to-face education.

Other studies have shown similar preference for in-person counselling despite high electronic and internet accessibility, especially among older adults.⁹ In-person education may allow for more effective question-and-answer communication, with visual and auditory interaction and cues adding to its effectiveness. Although entirely remote, unsupervised electronic-based programmes have been successful,¹⁰ this would likely apply to highly motivated participants. Many unsupervised digital learning is often at best partially consumed.² Most patients do not wish for remote programmes to completely replace in-person interaction, although they are not averse to them as complementary modes.

Moving forward, an integrated method such as in-person counselling enhanced by the use of use of electronic media or a mixture of remote and face-to-face sessions may be acceptable to patients, and result in a more effective mode of education. As almost all our patients possessed mobile phones and had internet access, any educational material should be optimised for mobile phones.

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