

## Mobile Health in Dialysis: The Best Engagement Medium Is the One that's with Patients

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The photographer Chase Jarvis famously titled his book of photos taken with an iPhone *The Best Camera Is the One that's with You*, illustrating that the best pictures often capture moments that would otherwise have been missed in the absence of a readily available smartphone (1). People burdened with the responsibility of managing an illness, such as patients receiving long-term dialysis, face many such moments where obtaining a rapid answer to a question could change the trajectory of their care or prevent hospitalization. How to engage these patients more effectively can perhaps be summed up with the following advice: The best engagement medium is the one that's with patients.

Increasingly, smartphone apps represent the medium through which Americans engage with information of all types. This is unsurprising given that 81% of Americans now own a smartphone, a sharp rise over the past decade (2). Ownership is also fairly high, but not ubiquitous, among vulnerable populations, including people aged  $\geq 65$  years (53%), Black patients (80%), Hispanic patients (79%), and those earning an annual income  $< \$30,000$  (71%).

In this issue of *CJASN*, Hussein *et al.* (3) sought to evaluate whether patients receiving dialysis have the means to engage with this medium, in the face of rising smartphone ownership among Americans more generally. Using the Khatun mobile health readiness framework, Hussein *et al.* evaluated the extent to which in-center and home dialysis patients owned smartphones, were proficient with their use, and were ready to use them to manage their health. As patients receiving dialysis tend to be older than average Americans, we would expect smartphone ownership to be lower among this group. Somewhat surprisingly, the authors found that 81% of dialysis patients own smartphones, a proportion similar to that observed in national surveys. Beyond simply owning smartphones, 70% of patients were proficient with their use and 60% expressed interest in using them to support their health care, highlighting the growing stature of smartphones as a medium for engaging with the world.

Despite these findings, we need to be careful about relying too heavily on smartphones to engage patients because of the existence of a digital divide. The digital divide refers to the gap in ownership of smartphones and internet access between different parts of our society. Those who lack access to digital resources often already

face barriers to medical care. Thus, efforts to engage patients using smartphones may further leave these vulnerable groups behind, further widening this gap. In addition to evaluating the overall mobile health readiness of patients receiving dialysis, Hussein *et al.* characterized the nature of the digital divide for this patient population. The authors found that older age, Hispanic ethnicity, lower educational level, and lack of employment were associated with lower smartphone proficiency. Of these factors, older age and lower educational level were also associated with a lower motivation to use smartphones to manage their health. Although the nature of these factors suggest that the lack of proficiency or motivation may be related to low literacy or poor eyesight, the authors found this not to be the case: 98% of patients owning smartphones were literate and could both read and type on their device.

Given that the vast majority of patients receiving dialysis appear ready to use smartphone apps in their care, the onus is now on the nephrology professional community to deliver. What does a successful response from our community look like? First, we need to work with patients to capture and catalog the missed opportunities. Patients receiving long-term dialysis are asked to closely manage their diet, limit their fluid intake, and take an often complex medication regimen that may differ on dialysis and nondialysis days. Patients administering their dialysis at home face a whole other set of complex tasks, including management of the dialysis machine itself. We need to think about all of those moments where a person receiving dialysis had a question, but did not want to make a phone call to try to get to an answer. We need to consider the moments where a patient was unsure whether a dinner item contained potassium or phosphate, but did not know where to find reliable information quickly.

Although we have many opportunities to engage patients in constructive ways, we also have a number of lessons to learn from other clinical areas where the use of apps is more widespread. First, kidney disease does not exist in a vacuum. People receiving dialysis often do not only have kidney disease. Many also suffer from diabetes, coronary and peripheral arterial disease, and congestive heart failure. Although these conditions are managed by different clinical specialties, patients experience them as one overlapping set of hindrances on their quality of life. Patients who need to keep track

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of their medications do not keep track of these through separate mechanisms for each disease, and patients needing to limit their fluid intake do not distinguish whether this restriction is imposed by poor function of the heart or the kidneys. Being mindful of what task patients need help with, we do not have to reinvent the wheel for patients receiving dialysis if apps already exist to tackle these tasks in other contexts. For instance, smartphone apps focusing on medication and fluid management already exist, and some may be appropriate in the context of kidney disease and dialysis.

Second, apps should meet the needs of both patients and nephrologists. Our prior work has shown that patients and clinicians judge app quality differently (4). There is no way to adjudicate these differences using objective measures of app quality. In the context of CKD, neither the app store rating nor the number of total ratings are correlated with either patients' or nephrologists' evaluations of app quality (5). This is not surprising because patients and nephrologists have fundamentally different goals. Patients require apps to be usable (because they are the users), whereas nephrologists may place more emphasis on the accuracy of information. For an app to be useful, it needs to meet the needs of both patients and nephrologists.

Third, we should narrow the digital divide, not widen it. Although we are faced with the unfortunate reality that smartphone apps may not be an accessible medium for all patients, there are still ways in which we can expand the use of apps without widening the digital divide. First, we should make sure that app content is available in as many languages as possible. Despite the fact that most patients in this study denied literacy as a substantive problem, 16% of patients reported Spanish as a primary spoken language. Some of these patients may have had low English proficiency, and relatively few medical apps are available in Spanish (6). The authors were sufficiently concerned about the potential for low English proficiency that they translated their survey into Spanish for patients preferring this. We need to make similar efforts to improve the accessibility of apps for patients with low English proficiency. Second, although it is not surprising that older patients are disproportionately less proficient with apps, we need to remember that patients also do not exist in a vacuum. Many patients are brought to their in-center dialysis appointments by friends and family, and patients receiving home dialysis commonly have additional family members there to help. Thus, apps should be family and caregiver friendly. Even if a patient is not proficient with apps, their caregiver very well may be, and should be considered as a member of the target audience.

Fourth, nephrologists are not professional software developers: 70% of smartphone apps described in scientific studies are nowhere to be found on the app stores (7). In some cases, this is because the apps are integrated into a clinical workflow that cannot be broadly replicated through the app store (8). Another reason is that the incentives to bring an app to the market and to iterate on it until it is successful are often different from the incentives to study it. Thus, apps developed by clinicians and clinical groups often do not adapt fast enough to stay relevant. Consider the example of H2Overload, an app developed by the National Kidney Foundation for fluid management in the context of kidney and heart disease (9). Although the app appears to have very useful functionality, it was last updated 5 years ago on the

Apple app store—where it has received a total of three ratings—and is not available for Android. This model simply would not work in a software company. This is not meant as a critique of the National Kidney Foundation, but rather a call for more technology transfer within nephrology to facilitate the creation of more sustainable apps.

Patients are ready to engage with us. They have their smartphones ready. They are motivated. The question for the nephrology community is this: Are we ready to engage them using the medium most readily accessible to patients?

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See related article, "The Mobile Health Readiness of People Receiving In-Center Hemodialysis and Home Dialysis," on pages 98–106.