

## RESEARCH LETTER

**Improving CKD Patient Knowledge and Patient-Physician Communication: A Pilot Study of a CKD Report Card**

To the Editor:

Chronic kidney disease (CKD) affects approximately 1 in 7 US adults and is associated with premature morbidity, mortality, and reduced quality of life. Avoiding negative outcomes of CKD progression, such as cardiovascular events and kidney failure,<sup>1</sup> requires patients to achieve aggressive lifestyle and medical management.<sup>2</sup> However, many patients lack understanding of the tasks required to prevent CKD progression.<sup>3,4</sup> This knowledge gap, the complexity of kidney disease information, and the challenge of CKD self-management demand effective communication between physicians and their patients.<sup>5</sup>

Wright Nunes et al<sup>6</sup> found that use of a physician-delivered educational worksheet was associated with increased patient CKD knowledge in a predominately white population. This work, although important, was physician led, required physician training and acceptance, and included few racial minorities. The CKD Report Card, an investigator-developed 2-sided educational worksheet modified from National Kidney Disease Education Program materials,<sup>7</sup> was designed to increase CKD knowledge and encourage patient-centered communication by facilitating discussion of clinical status (eg, laboratory values and CKD stage) and patient-led goal setting. We assessed the effects of the CKD Report Card at an urban predominantly African American nephrology clinic.

We recruited adult patients from the University of Chicago Nephrology Clinic. Patients enrolled during the first 4 weeks formed the control group; those during the second 4 weeks formed the intervention group. The intervention group was provided the CKD Report Card (Fig 1) immediately before the clinic visit. Patient knowledge was assessed before and after the clinic visit using a 30-item CKD Knowledge Tool, modified from the Kidney Disease Knowledge Survey.<sup>8</sup> Paired-sample t tests were performed to analyze the change in CKD knowledge scores from pre- to postvisit. Difference-in-difference analysis was performed to examine the relative magnitude of improvement for the intervention group compared with controls. Intervention group and control group postvisit scores were compared using multivariable regression analysis adjusting for previsit scores and patients' age, race, sex, education level, visit status (ie, new vs returning patient), CKD stage, years seeing nephrology, and physician status (ie, fellow vs attending). All statistical calculations were performed using Stata Statistical Software, version 14 (StataCorp). Additional methods are included in Item S1.

Twenty-five patients were enrolled in each study group (intervention and control), with at least 3 patients per physician per phase of the study. Mean age of the study population (N = 50) was 63 ± 15 years, and 50% were 65 years or older. Fifty-eight percent were women, 76% were African American, 88% had CKD stages 3-5, 50% had diabetes, and 86% had hypertension. There were no significant differences between the control and intervention groups in age, race, sex, education level, CKD stage, or comorbid conditions (Table S1).

Compared with controls, the CKD Report Card group had greater postvisit knowledge gain for topics of kidney function, causes of CKD, and general CKD knowledge (Tables 1 and S2). Mean CKD knowledge score in the control group was 60.3% ± 15.4% for previsit scores and 64.1% ± 18.7% for postvisit scores. Mean CKD knowledge score in the CKD Report Card group was 62.9% ± 13.8% for previsit scores and 73.1% ± 14.7% for postvisit scores. Using paired-sample t tests, the mean difference (post-previsit CKD knowledge) in the control group was +3.9% (P = 0.12) compared with +10.1% (P = 0.004) in the intervention group (Table 1). Multivariable regression analysis controlling for previsit score, age, race, sex, education level, visit status, CKD stage, years seeing nephrology, and physician status showed a 7.1% increase in intervention group knowledge scores compared with the control group (95% confidence interval, 0.22-14.1; P = 0.05).

In our pilot study, we found that patient-led use of the CKD Report Card was associated with increased patient knowledge in an urban predominantly minority nephrology clinic. Implementation of our user-friendly and easily navigable tool may offer patients a simple method of learning more about their kidney disease, pertinent laboratory values, and tips for successful health management. Furthermore, our educational intervention may facilitate physician-patient communication by empowering patients to ask questions that pertain to their personal health goals.


There were several limitations to this study, including a small sample size and single-institution research design. Patients varied in both the method and extent of CKD Report Card use during the clinic visit. Additionally, because this was not a randomized study, residual confounding cannot be ruled out. Planned next steps are to test the CKD Report Card in a larger randomized intervention with longer follow-up and then, if findings are robust, incorporate the tool into routine clinical care.

Jasmine Tzeggai, BA, Keyira Jones, BA, Tipu Puri, MD, PhD,  
Milda R. Saunders, MD, MPH.

**SUPPLEMENTARY MATERIAL**

Supplementary File (PDF)

Item S1: Supplementary methods

Modified from:  
 **NKDEP**  
 National Kidney Disease Education Program

## The Key to your Kidneys

**Welcome to the Nephrology Clinic!**  
 You are here to see a **Nephrologist**, a doctor who takes care of kidney problems.

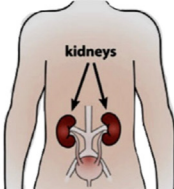
---

**What do my kidneys do?**

**Filter your blood** to get rid of waste

**Remove extra fluid** from your body

Keep your body's **chemicals in balance**



**kidneys**

Help to **control blood pressure**

Help to **make red blood cells**

Help to **keep bones healthy**

---

**Do I have kidney disease?**

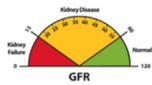
Chronic Kidney Disease (CKD) is when your kidneys are **damaged** and **lose some of their function**. Your doctor can test this with a **blood test** and a **urine test**.

**Blood test for GFR (Glomerular Filtration Rate)** measures how well your kidneys are working.

**Urine test** looks for **protein leaking in the urine**, which can be a sign of kidney damage.

**You have a higher risk for kidney disease if you...**

- have diabetes
- have high blood pressure
- have lupus
- are 60 or older
- are an African American, Hispanic American, Asian and Pacific Islander, or American Indian
- have a family member with kidney disease



**GFR**


---

**What can I do about my kidney problem?**


Chronic Kidney Disease cannot be cured, and without treatment it can get worse and lead to **kidney failure**, also called **End Stage Renal Disease (ESRD)**. You should **follow these guidelines** to prevent your kidney problem from getting worse and leading to ESRD.

**NOTE: "Renal" is another word for kidney**


Check your blood pressure at home. If you have diabetes, check your blood sugar. Work with your doctor to keep your numbers under control.



Eat less than 2 grams of salt per day and Exercise 20 minutes a day, 5 times a week



Take prescribed medications and Quit smoking



### Your Lab Values...

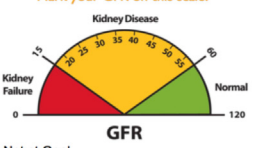
What is your creatinine? \_\_\_\_\_

What is your GFR? \_\_\_\_\_

What CKD Stage are you? \_\_\_\_\_

	GFR	What to expect...
Stage 1	More than 90	Diagnosis & Treatment to slow down disease progression
Stage 2	60 – 89	
Stage 3	30 – 59	See kidney specialist & Treat complications
Stage 4	15 – 29	Start learning about treatment for ESRD & Prepare for treatment
Stage 5	Less than 15	Monitor for need to start kidney replacement therapy

Mark your GFR on this scale!



**GFR**

### Other Important Lab Values...

Blood pressure: Today's \_\_\_\_\_ Goal \_\_\_\_\_

Glucose (sugar) A1c, if you have diabetes:  At goal  Not at Goal

Anemia: Hemoglobin (Hgb) is \_\_\_\_\_  At goal  Not at Goal

Bone Health: includes Calcium, Phosphorous, Vitamin D and PTH  At goal  Not at Goal

We are treating with \_\_\_\_\_

Proteinuria (Leaking Protein in Urine): \_\_\_\_\_  Stable/Getting Better  Getting Worse

### Set and Reach Your Goals!

Goals (What are some things you want to improve?)	Date to Reach Goals
<b>Action Plans</b> (How are you going to reach your goals?)	

Notes: \_\_\_\_\_

**Table 1.** Select CKD Knowledge Tool Results by Question (percent of individuals answering correctly) and Mean CKD Knowledge Score for Control and Intervention Groups

Question Topic	Control Group (n = 25)			Intervention Group (n = 25)			Intervention Compared With Control
	Previsit	Postvisit	% Difference	Previsit	Postvisit	% Difference	Mean Difference (95% confidence interval)
<b>Functions of the kidney: The kidney...</b>							
filters and cleans the blood	22 (88%)	21 (84%)	-4% (-12% to 4%)	23 (92%)	23 (92%)	0% (-12% to 12%)	+4 (-10 to 18)
helps keep bones healthy	4 (16%)	7 (28%)	+12% (-2% to 26%)	10 (40%)	15 (60%)	+20% (-4% to 43%)	+8 (-19 to 34)
helps keep red blood cell counts normal	12 (48%)	12 (48%)	0% (-24% to 24%)	13 (52%)	20 (80%)	+28% (3% to 53%)	+28 (-6 to 62)
helps keep phosphorus levels in the blood normal	7 (28%)	10 (40%)	+12% (-6% to 30%)	9 (36%)	12 (48%)	+12% (-2% to 26%)	0 (-22 to 22)
<b>Causes of CKD: What can cause CKD?</b>							
High blood pressure	21 (84%)	22 (88%)	+4% (-4% to 12%)	22 (88%)	25 (100%)	+12% (-2% to 26%)	+8 (-8 to 23)
Diabetes	23 (92%)	23 (92%)	0% (0% to 0%)	23 (92%)	25 (100%)	+8% (-3% to 19%)	+8 (-3 to 19)
<b>General CKD knowledge</b>							
GFR = glomerular filtration rate	16 (64%)	14 (56%)	-8% (-32% to 16%)	18 (72%)	22 (88%)	+16% (-4% to 35%)	+24 (-6 to 54)
There are 5 stages of CKD	8 (32%)	11 (44%)	+12% (-2% to 26%)	7 (28%)	15 (60%)	+32% (12% to 52%)	+20 (-3 to 43)
CKD patients should avoid ibuprofen	14 (56%)	14 (56%)	0% (-12% to 12%)	16 (64%)	18 (72%)	+8% (-3% to 19%)	+8 (-8 to 24)
Mean score (SD)	60 (15)	64 (19)	+4% (-1% to 9%)	63 (14%)	73 (15%)	+10% (5% to 15%)	+6 (-0.6 to 13)

Note: Values expressed as number (percent correct) unless otherwise noted. Abbreviations: CKD, chronic kidney disease; SD, standard deviation.

**Table S1:** Overall Patient Characteristics Associated With Patient Chronic Kidney Disease

**Table S2:** Complete CKD Knowledge Tool Results by Question (percent of individuals answering correctly) for Control and Intervention Groups

## ARTICLE INFORMATION

**Authors' Affiliations:** University of Chicago Pritzker School of Medicine (JT); and University of Chicago Medicine, Chicago, IL (KJ, TP, MRS).

**Address for Correspondence:** Milda R. Saunders, MD, MPH, 5841 S Maryland Ave, MC2007, Chicago, IL 60637. E-mail: [msaunders@uchicago.edu](mailto:msaunders@uchicago.edu)

**Authors' Contributions:** Research idea and study design: JT, TP, MRS; data access and acquisition: JT, KJ; data analysis and interpretation: JT, MRS; statistical analysis: JT, MRS; supervision and mentorship: TP, MRS. Each author contributed important intellectual content during manuscript drafting or revision and accepts accountability for the overall work by ensuring that

questions pertaining to the accuracy or integrity of any portion of the work are appropriately investigated and resolved.

**Support:** Ms Tzeggai was supported by the National Kidney Foundation of Illinois Medical Student Award and The University of Chicago Pritzker School of Medicine Summer Research Program. Dr Saunders was supported by National Institute of Diabetes and Digestive and Kidney Diseases K23DK103111. The funder had no role in the design and conduct of the study; collection, management, analysis, and interpretation of the data; or preparation, review, and approval of the manuscript.

**Financial Disclosure:** The authors declare that they have no relevant financial interests.

**Peer Review:** Received June 18, 2019. Evaluated by 2 external peer reviewers, with direct editorial input from the Statistical Editor, an Associate Editor, and the Editor-in-Chief. Accepted in revised form January 12, 2020.

**Prior Presentation:** This work was presented in abstract form at the National Kidney Foundation Spring Clinical Meeting; Boston, MA; May 8-12, 2019.

**Figure 1 (previous page).** The Chronic Kidney Disease (CKD) Report Card (sides 1 and 2). Abbreviation: PTH, parathyroid hormone. Modified with permission from the National Kidney Disease Education Program clinical and educational tools.<sup>7</sup>

**Publication Information:** © 2020 The Authors. Published by Elsevier Inc. on behalf of the National Kidney Foundation, Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>). Published online April 18, 2020 with doi: 10.1016/j.xkme.2020.01.011

## REFERENCES

1. Marks A, Fluck N, Prescott GJ, et al. Definitions of progression in chronic kidney disease—predictors and relationship to renal replacement therapy in a population cohort with a 6 year follow-up. *Nephrol Dial Transplant*. 2014;29(2):333-341.
2. Whitham D. Nutrition for the prevention and treatment of chronic kidney disease in diabetes. *Can J Diabetes*. 2014;38(5):344-348.
3. Saunders MR, Kim SD, Patel N, Meltzer DO, Chin MH. Hospitalized patients frequently unaware of their chronic kidney disease. *J Hosp Med*. 2015;10(9):619-622.
4. Lissanu L, Lopez F, King A, et al. "I try not to even think about my health going bad": a qualitative study of chronic kidney disease knowledge and coping among a group of urban African-American patients with CKD. *J Racial Ethn Health Disparities*. 2019;6(3):625-634.
5. 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(4):694-703.
6. Wright Nunes J, Greene JH, Wallston K, et al. Pilot study of a physician-delivered education tool to increase patient knowledge about CKD. *Am J Kidney Dis*. 2013;62(1):23-32.
7. Explaining Your Kidney Test Results: A Tear-off Pad for Clinical Use | NIDDK. National Institute of Diabetes and Digestive and Kidney Diseases. <https://www.niddk.nih.gov/health-information/professionals/clinical-tools-patient-education-outreach/explain-kidney-test-results>. Accessed December 11, 2017.
8. Wright JA, Wallston KA, Elasy TA, Ikizler TA, Cavanaugh KL. Development and results of a kidney disease knowledge survey given to patients with CKD. *Am J Kidney Dis*. 2011;57(3):387-395.