

RESEARCH LETTER

Improving Kidney Health Knowledge for Acute Kidney Injury Survivors: A Multidisciplinary AKI Survivor Program



To the Editor:

Acute kidney injury (AKI) survivor programs aim to close care transition gaps and reduce the risk of poor outcomes.¹ One program goal is to improve kidney health knowledge through patient education. Previous studies report that patients are frequently unaware that they experienced AKI and demonstrate low objective and perceived knowledge about AKI.^{2,3} Survivors report receiving inadequate AKI education from their care teams and desire to learn more, particularly about preventing future episodes.⁴ It is hypothesized that participation in care transition programs may improve AKI survivor awareness and kidney health knowledge, contributing to better health outcomes.^{5,6}

The AKI in care transition (ACT) program is a multidisciplinary program where AKI survivor care begins before hospital discharge through education and care coordination and continues with outpatient follow-up in primary care. We previously demonstrated an association between ACT participation and improved clinical and laboratory follow-up of kidney health.⁷ Here we report changes in kidney health knowledge in the ACT pilot study.

ACT was implemented in a prospective pilot study using a 3-phase quasi-experimental design. Candidates were

adults who survived stage 3 AKI and were discharged from the hospital to home, not receiving dialysis. In the first group, participants were passively surveilled for endpoints of interest (usual care). In the next group, inpatient AKI education was delivered by a trained nephrology nurse educator using videos, pamphlets, and teach-back strategies before hospital dismissal (education; Fig S1). Education intensity was individualized but standard components were delivered to all participants. In the final group, participants received the previously described education and care coordination for post-hospital laboratory and clinical follow-up with a primary care provider (PCP) and pharmacist within 14 days of discharge (ACT). Clinicians were encouraged to use the KAMPS framework⁸ and patient education tools (Fig S1, Item S1). Nephrology follow-up occurred as needed. Health literacy⁹ and quality of life were assessed at study entry. Quality of life was re-evaluated after 30 days. Kidney health knowledge, measured using the modified Kidney Knowledge Survey (mKiKS; Items S2-S4)³, was compared between study entry (2-3 days before hospital discharge), the day after education (education, ACT groups only), and 14 days after discharge with the Wilcoxon signed rank test and McNemar's tests. Higher mKiKS scores corresponded to greater knowledge. Mayo Clinic institutional review board approved the study and individuals provided informed consent (IRB 20-004204). The study was registered on [ClinicalTrials.gov](https://clinicaltrials.gov) (NCT04505891).

Of the 46 participants (Fig S2, Tables S1 and S2), 16 (35%) were unaware of their AKI diagnosis at study entry

Table 1. Patient-Centered Outcomes

	Usual Care n = 13	Education n = 18	ACT n = 15	P
Awareness about AKI at study entry ^{a,b}				0.67
Unaware	4 (31)	6 (33)	6 (40)	
Aware, described as mild	4 (31)	5 (28)	6 (40)	
Aware, described as severe	3 (23)	6 (33)	1 (7)	
Unsure	2 (15)	1 (6)	2 (13)	
mKiKS scores				
Study entry ^b	13 (11-14)	12 (8-14)	11 (8-14)	0.73
14 d ^c	15 (14-16)	15 (14-16)	15 (14-16)	0.75
Change from study entry	2 (0-3)	4 (0-7)	2 (1-6)	0.47
PROMIS ^d – Physical health				
Study entry ^b	45 (42-45)	36 (30-42)	40 (37-45)	<0.05
30 d ^c	42 (37-45)	37 (35-42)	42 (34-45)	0.28
Change from study entry	0 (-7 to 0)	4 (0 to 6)	-0.2 (-5 to 8)	0.14
PROMIS ^d – Mental Health				
Study entry ^b	48 (44-48)	42 (36-51)	44 (39-51)	0.40
30 d ^e	46 (41-56)	46 (39-53)	48 (40-51)	0.59
Change from study entry	0 (-2 to 5)	5 (-3 to 5)	2 (-5 to 8)	0.92

Note: Data reported as n (%) for nominal/discrete data or median (IQR) for continuous data.

Abbreviations: ACT, AKI in care transitions; mKiKS, modified kidney knowledge survey (Instrument available in Item S2).

^aAssessed once at study entry (Item S2).

^bStudy entry was typically within 2-3 days of hospital discharge.

^cParticipants with available data: usual care, n = 11 (85%); education, n = 17 (94%); and ACT, n = 13 (87%).

^dPROMIS Global Health Tool version 1.2: lower scores indicate poorer quality of life, with 50 representing the general population mean (Instrument available in Item S4).

^eParticipants with available data: usual care, n = 11 (85%); education, n = 18 (100%); and ACT, n = 12 (80%).

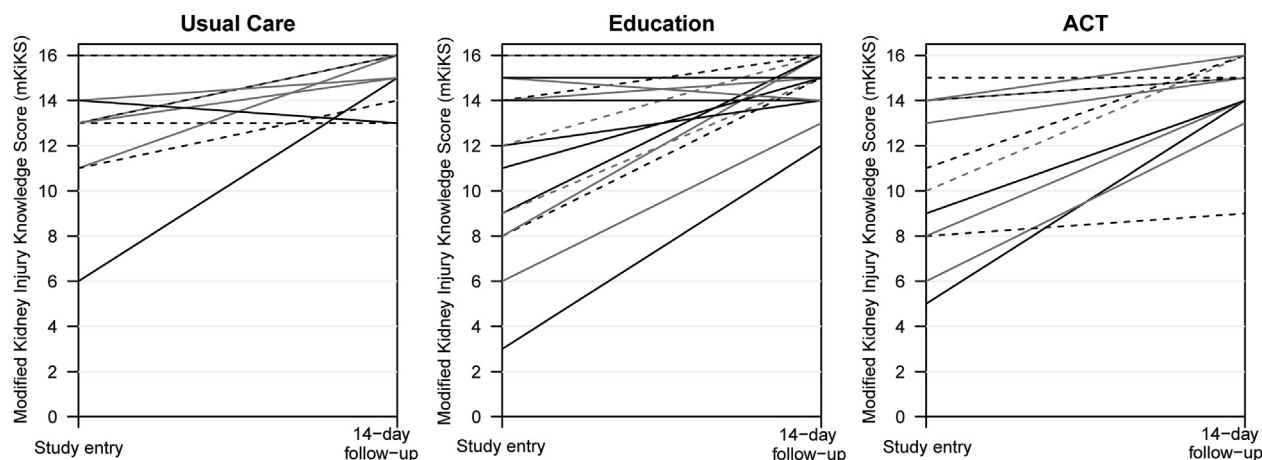


Figure 1. Changes in modified Kidney Knowledge Assessment (mKiKS) scores between study entry and 14-day follow-up. The median (IQR) change from study entry: usual care +2 (0-+3), $P = 0.02$; education +4 (0-+7), $P < 0.01$; and ACT +2 (+1-+6), $P < 0.01$.

(Table 1). Inpatient education was delivered as intended to 18/18 education group participants and 14/15 ACT group participants ($n = 1$ discharged before education). In participants who received inpatient, targeted AKI education (education, ACT groups), mKiKS scores improved the following day (median [IQR] change from study entry: +2 [0-+6]; $P < 0.001$). All median within group mKiKS scores improved from study entry to day 14 (Fig 1).

Analysis of question-level responses revealed that patients who received inpatient, targeted AKI education improved their understanding of the following: (1) what AKI is, (2) early signs of AKI, (3) the associated risk of rehospitalization, and (4) actions that protect kidney health ($P < 0.05$ for all comparisons). The usual care group improved its knowledge of actions that protect kidney health ($P = 0.01$).

This study found that participants in ACT, a primary care-based, multidisciplinary AKI survivorship program, improved their kidney health knowledge 14 days after hospital discharge. Kidney health education was delivered longitudinally, beginning with inpatient, nurse-driven education that was reinforced at outpatient PCP and pharmacist visits. Such a model addresses recommendations for education reinforcement across care settings.⁴ Increased kidney health knowledge was observed in all groups 14 days following discharge, possibly because of education delivery independent of ACT (eg, part of usual care and nephrologist follow-up), practice effect, small sample size, or Hawthorne effect. However, those who received targeted AKI education designed for ACT (education, ACT groups), which addressed unmet educational needs previously expressed by survivors,⁴ learned about more facets of AKI (eg, what AKI is, early signs of AKI), as evidenced by the question-level responses. This adds to the collective evidence of the potential for enhancing kidney health literacy through care transition programs.

This work has limitations. Unfortunately, there are no validated instruments for AKI knowledge assessment. The mKiKS was validated in patients with chronic kidney disease and later adapted for AKI survivors. Measuring knowledge during hospitalization may have decreased validity, as acutely ill patients often suffer from lower cognitive performance and difficulty recalling details about their care.¹⁰ This concept was reinforced in this study, as over one-third of this cohort of stage 3 AKI survivors were unaware of their AKI episode or unsure of its severity. All groups demonstrated improved kidney health knowledge after 14 days, which is in line with expected overall clinical and cognitive improvement after discharge.

There is consensus about the need to improve kidney health knowledge among AKI survivors. These data suggest participation in multidisciplinary care transition programs with targeted AKI education may achieve this objective.

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SUPPLEMENTARY MATERIALS

[Supplementary File \(PDF\)](#)

Figure S1: Sample educational materials and teach-back questions.

Figure S2: ACT Pilot Participant Flowchart.

Item S1: KAMPS Framework for components of kidney follow-up care.

Item S2: Modified KiKS (mKiKS) survey instrument.

Item S3: Brief Health Literacy Screen.

Item S4: PROMIS Global Health v1.2.

Table S1: Baseline Characteristic and Hospitalization Data.

Table S2: Clinician Follow-up.

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Support: This work was supported in part by the Mayo Midwest Pharmacy Research Committee, Mayo Midwest Clinical Practice Committee Innovation Award, American College of Clinical Pharmacy, the National Institute of Allergy, and Infectious Diseases of under award number K23AI143882 (PI; EFB), and the Agency for Healthcare Research and Quality HS028060-01 (PI; EFB). The funding sources had no role in study design; data collection, analysis, or interpretation; writing the report; or the decision to submit the report for publication. Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the NIH.

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

Acknowledgements: We would like to acknowledge the valuable contributions of Shelley Preble, Kate Mayhew, and Sophea Seng to this project.

Data Sharing: Source data may be made available on reasonable request.

Peer Review: Received October 27, 2023. Evaluated by 1 external peer reviewer, with direct editorial input from the Statistical Editor, an Associate Editor, and the Editor-in-Chief. Accepted in revised form February 24, 2024.

Publication Information: © 2024 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 June 14, 2024 with doi [10.1016/j.xkme.2024.100854](https://doi.org/10.1016/j.xkme.2024.100854)

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