

Survey of Current Practices of Outpatient Hemodialysis for AKI Patients



Victor Ortiz-Soriano¹, Catherine R. Butler², Marla Levy^{3,4}, Sarah C. Huen⁴, Jorge L. Castaneda⁵, Ankit Sakhuja⁶, Rajit K. Basu⁷, Kathleen D. Liu³, Jorge Cerda⁸ and Javier A. Neyra¹

¹Department of Internal Medicine, Division of Nephrology, Bone and Mineral Metabolism, University of Kentucky Medical Center, Lexington, Kentucky, USA; ²Department of Medicine, Division of Nephrology, University of Washington and Veterans Affairs Health Services Research & Development, Seattle-Denver Center of Innovation, Seattle, Washington, USA; ³Department of Medicine, Cardiovascular Research Institute, University of California, San Francisco, California, USA; ⁴Department of Internal Medicine, Division of Nephrology, University of Texas Southwestern Medical Center, Dallas, Texas, USA; ⁵Department of Emergency Medicine, Division of Toxicology, Banner University Medical Center, Phoenix, Arizona, USA; ⁶Department of Cardiovascular and Thoracic Surgery, Division of Cardiovascular Critical Care, West Virginia University, Morgantown, West Virginia, USA; ⁷Department of Pediatrics, Division of Critical Care Medicine, Children's Healthcare of Atlanta, Emory University School of Medicine, Atlanta, Georgia, USA; and ⁸Department of Medicine, St Peter's Hospital Healthcare Partners, Albany, New York, USA

Correspondence: Javier A. Neyra, University of Kentucky Medical Center, 800 Rose Street, MN668, Lexington, Kentucky 40536, USA. E-mail: javier.neyra@uky.edu

Received 10 August 2020; revised 1 December 2020; accepted 4 January 2021; published online 28 January 2021

Kidney Int Rep (2021) 6, 1156–1160; <https://doi.org/10.1016/j.ekir.2021.01.002>

© 2021 International Society of Nephrology. Published by Elsevier Inc. This is an open access article under the CC BY-NC-ND license (<http://creativecommons.org/licenses/by-nc-nd/4.0/>).

PATIENT TESTIMONY

“I developed acute kidney injury requiring dialysis as a complication of heart surgery and was transferred to an outpatient dialysis center. I was readmitted to the hospital multiple times for severe fluid overload and congestive heart failure and became terrified to go back to the outpatient dialysis clinic that I felt had nearly killed me twice. My labs were checked once a week, but I felt I was not comprehensively evaluated and was never able to establish good communication with my nephrologist. I did not receive education about my kidney function or recovery status, laboratory results or the treatment plan. Eventually, I was transferred to another nephrologist who had a goal to get me off dialysis instead of just transitioning me to chronic dialysis, and surprisingly, I did great and became independent of dialysis. Today, I am healthy, happy, and working full time.”

Acute kidney injury that requires dialysis (AKI-D) is associated with increased risk of hospital mortality and, for survivors, increased risk of cardiovascular disease and progression to end-stage kidney disease (ESKD).¹ Kidney failure (i.e., ESKD) associated with AKI carries a higher 6-month mortality risk than kidney failure related to other causes.² Existing data report variable kidney recovery rates in patients with AKI-D ranging from 17% to 66%.^{2–4} This wide range could be

explained, in part, by the heterogeneity in the patient population and in processes of care, and the lack of evidence-based approaches that promote kidney recovery. Importantly, as illustrated in the above vignette, the outpatient hemodialysis experience can be very challenging for patients.

In January 2017, the Centers for Medicare & Medicaid Services (CMS) began covering outpatient hemodialysis (HD) treatment for AKI-D patients.⁵ Rather than remaining in the hospital until kidney recovery or ESKD diagnosis, these patients can now be treated with HD in the outpatient setting. This change has created a new outpatient HD population, in which care is focused on promotion and monitoring of kidney recovery within the first 3 months of dialysis initiation. Despite that these patients are recognized to have different needs compared to the chronic dialysis population, there are few data describing practices and processes of care specific to this growing HD population.^{6,7}

The objective of this study was to survey (Supplementary Table S1) members of the American Society of Nephrology (ASN) AKI Community to examine current practices and to identify challenges for the provision of outpatient HD to patients with AKI-D. We hypothesized that significant practice heterogeneity would exist among participants involved in the care of these patients.

RESULTS

All 510 active members of the ASN AKI Community at the time that the study was conducted were invited to participate in the survey, and 104 completed the survey (response rate of 20.4%) (see details in Supplementary Methods). Of them, 89 (85.6%) were adult nephrologists and/or intensivists, 1 (1%) was a pediatric nephrologist, 6 (5.7%) were nephrology nurse practitioners or physician assistants, and the remaining 8 (7.7%) were researchers or trainees. In all, 76 (73.1%) participants worked in academic hospitals, 6 (5.8%) in community-based hospitals, and 19 (18.3%) in private nephrology practices. The majority of respondents reported that at their corresponding institutions, between 0 and 5 (51.9%) or between 5 and 10 (24%) patients with AKI-D are discharged every month with ongoing outpatient HD need (Figure 1a).

Of the participants, 72 (69.2%) reported active evaluation of AKI-D patients in outpatient HD centers. These evaluations were reported to occur at least once a week by the majority of participants ($n = 53$, 73.6%), although some participants ($n = 12$, 16.7%) reported evaluating these patients only once a month (Figure 1b). Laboratory data were reported to be obtained predominantly once a week ($n = 53$, 73.6%) (Figure 1c). Most participants reported either a 25% to 50% ($n = 33$, 45.8%) or <25% ($n = 19$, 26.4%) kidney recovery rate in these patients (Figure 2a). Furthermore, 31 (43.1%) participants

reported that kidney recovery occurred in the first 30 days after hospital discharge, 28 (38.9%) between 30 and 60 days, and 13 (18.1%) between 60 and 90 days (Figure 2b). Most participants ($n = 52$, 72.2%) reported declaring permanent kidney failure status between 60 and 90 days after hospital discharge (Figure 2c). The most common clinical parameter perceived to be associated with kidney recovery was baseline kidney function (Figure 2d).

The majority of participants knew about the change in CMS legislation, but some (16 of 104, 15.4%) were not aware of this change. Only 25 of 72 participants (34.7%) actively caring for these patients in the outpatient setting reported having established protocols for AKI-D management at their respective institutions/centers (Figure 1d). The majority of participants (63 of 72, 87.5%) highlighted the need to develop evidence-based guidelines for the provision of HD to AKI-D patients in the outpatient setting. Supplementary Table S2 presents responses from those participants reporting details of available or developing outpatient HD protocols for AKI-D management.

Informed consent was given for the patient testimony presented in this article.

DISCUSSION

Our survey results reinforce evolving reports suggesting that there is extreme heterogeneity in the

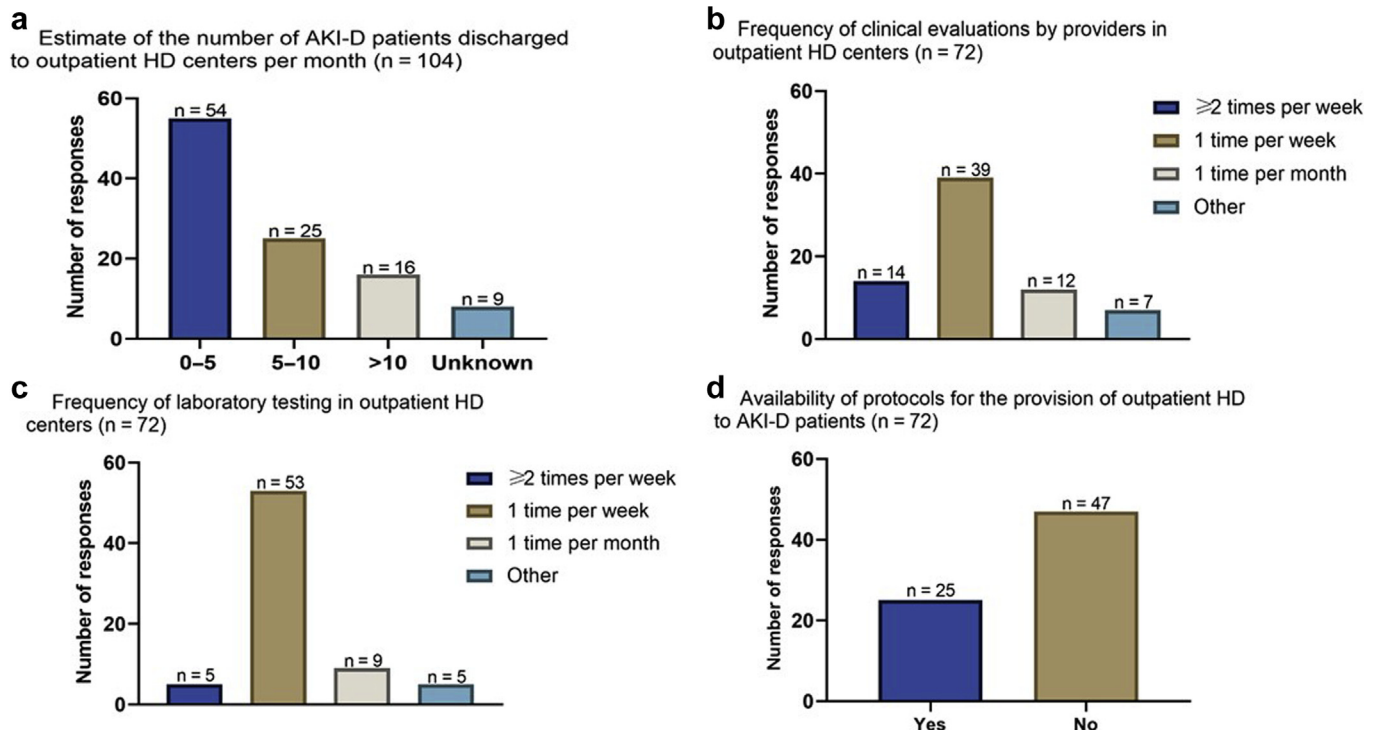


Figure 1. Responses of survey participants regarding processes of care related to the evaluation and management of patients with AKI-D receiving outpatient HD care. AKI-D, acute kidney injury that requires dialysis; HD, hemodialysis.

approach to outpatient HD care and kidney recovery rates in the AKI-D population. These findings suggest that AKI-D patients constitute a growing outpatient dialysis population and that there is need for evidence-based practice guidelines to improve outpatient HD care.

There is limited research on the optimal management of patients with AKI-D. Generalizable estimates of the incidence and the timeline of kidney recovery are still poorly determined, and may be influenced by many factors such as comorbidities (e.g., underlying chronic kidney disease, cardiovascular disease), type of kidney injury (e.g., ischemic, nephrotoxic), genetic factors, and processes of outpatient HD care, among others.⁸ Therefore, risk stratification of kidney recovery, recognition of modifiable risk factors, and treatments to promote adaptive kidney repair constitute areas of active investigation.

Reported rates of kidney recovery among AKI-D patients range from 17% to 66%,^{2–4} and substantial differences in study populations and clinical settings may partially account for this variability. Among AKI-D patients discharged to a long-term acute care facility, kidney recovery was reported to be as high as 66% by the time of discharge from the facility. In academic hospital-based outpatient dialysis units, kidney recovery has been reported in ~40% of AKI-D patients.⁹

However, more recent studies using Medicare/Medicaid claims and the United States Renal Data System report overall lower kidney recovery rates ranging from 17% to 35% in AKI-D patients treated in community dialysis centers.⁴ It should be noted that some of the AKI-D claims may have been made after the declaration of permanent kidney failure status,⁴ which raises the concern that, had these patients been identified earlier as AKI-D, they might have had a different outcome.

There is an urgent need to develop clinical practice guidelines to help clinicians, institutions, and dialysis centers adopt practices and policies to target the unique needs of AKI-D patients. While evidence-based approaches are developed, close surveillance and individualized outpatient HD care are recommended for these patients. In Figure 3, we have outlined key recommendations from the Acute Disease Quality Initiative (ADQI) group and members of the ASN AKI Community for improvement in the outpatient care of patients with AKI-D.⁵¹ Furthermore, we have highlighted areas that require additional investigation. Finally, one should note that liberation from dialysis carries a significant impact on not only clinical but patient-centered outcomes and health-related quality of life, as emphasized by the patient's testimony in this article. The latter observation warrants qualitative

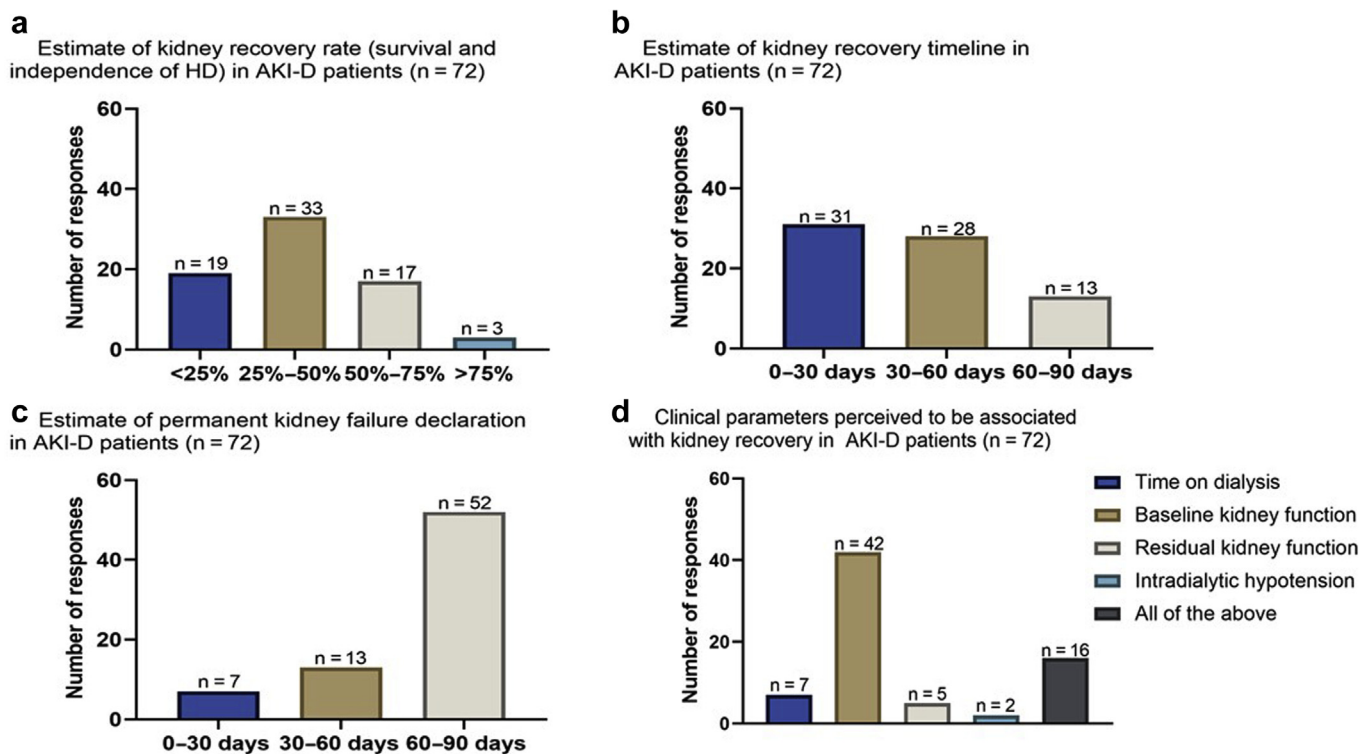


Figure 2. Responses of survey participants regarding estimates and timeline of kidney recovery and clinical parameters perceived to be associated with kidney recovery in patients with AKI-D receiving outpatient HD care. AKI-D, acute kidney injury that requires dialysis; HD, hemodialysis.

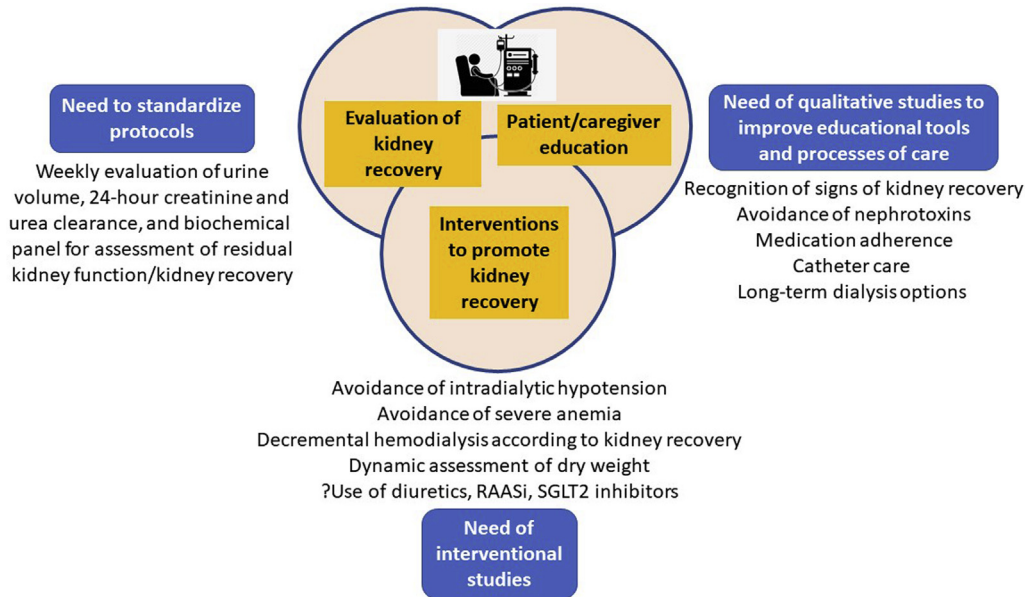


Figure 3. Recommendations for outpatient management of patients with AKI-D and areas that need investigation. AKI-D, acute kidney injury that requires dialysis; RAASi, renin–angiotensin–aldosterone system inhibitor; SGLT, sodium–glucose cotransporter–2.

studies to evaluate barriers and facilitators to outpatient AKI-D care as experienced by patients, caregivers and providers, which is beyond the scope of the reported survey.

Our study has some limitations. Our study population consists of a convenience sample of ASN AKI Community members, which may not be representative of the general nephrology community. Furthermore, participants in the survey may have had specific interest and/or expertise in the subject domain, which could have influenced the results. In addition, our survey data are based on participants' recall rather than direct data collection and may be subject to recall bias. Finally, our survey was created for this study and has not been previously validated.

In conclusion, our survey results highlight that patients with AKI-D represent a growing outpatient dialysis population, although heterogeneity in practice and lack of evidence-based outpatient HD care exist. Survey participants highlighted the need for practice guidelines to standardize and to improve the care of this susceptible and growing dialysis population.

DISCLOSURE

All the authors declared no competing interests.

ACKNOWLEDGMENTS

JAN is currently supported by NIDDK R56 DK126930 and P30 DK079337. The authors would like to thank all the ASN AKI community members for their continuous participation and exchange of ideas on the website.

SUPPLEMENTARY MATERIAL

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

Supplementary Methods

Supplementary Reference

Table S1. Summary of questions used in the survey and the proportion of responses for each question.

Table S2. Participants' responses related to customized protocols for the treatment of patients with AKI-D in the outpatient setting.

REFERENCES

1. Wu VC, Wu CH, Huang TM, et al. Long-term risk of coronary events after AKI. *J Am Soc Nephrol.* 2014;25:595–605.
2. Shah S, Leonard AC, Harrison K, et al. Mortality and recovery associated with kidney failure due to acute kidney injury. *Clin J Am Soc Nephrol.* 2020;57:995–1006.
3. McAdams M, Ortiz-Soriano V, Jordan M, et al. Kidney recovery in patients discharged to an acute rehabilitation facility with acute kidney injury requiring hemodialysis. *Clin Nephrol.* 2019;92:15–24.
4. Segal JH, Dahlerus C, Chen S, et al. Outcomes of AKI patients receiving dialysis in ESRD facilities. *ASN Kidney Week 2019.* 2019.
5. Heung M. Outpatient dialysis for acute kidney injury: progress and pitfalls. *Am J Kidney Dis.* 2019;74:523–528.
6. Cerda J, Liu KD, Cruz DN, et al. Promoting kidney function recovery in patients with AKI requiring RRT. *Clin J Am Soc Nephrol.* 2015;10:1859–1867.
7. Centers for Medicare & Medicaid Services, Department of Health and Human Services. 2018b. Medicare program; end-stage renal disease prospective payment system, payment for renal dialysis services furnished to individuals with acute kidney injury, End Stage Renal Disease Quality Incentive Program, Durable Medical Equipment, Prosthetics,

Orthotics and Supplies (DMEPOS) Competitive Bidding Program (CBP) and fee schedule amounts, and technical amendments to correct existing regulations related to the CBP for certain DMEPOS. Final rule. Federal Register 83, no. 220 (November 14): 56922–57073, 2019, Available at: [https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/ESRDpayment/End-Stage-Renal-Disease-ESRD-Payment-](https://www.cms.gov/Medicare/Medicare-Fee-for-Service-Payment/ESRDpayment/End-Stage-Renal-Disease-ESRD-Payment-Regulations-and-Notices-Items/CMS-1691-F)

[Regulations-and-Notices-Items/CMS-1691-F](#), Accessed February 17, 2021.

8. Sato Y, Takahashi M, Yanagita M. Pathophysiology of AKI to CKD progression. *Semin Nephrol.* 2020;40:206–215.
9. Gautam SC, Brooks CH, Balogun RA, et al. Predictors and outcomes of post-hospitalization dialysis dependent acute kidney injury. *Nephron.* 2015;131:185–190.