Implementation of a Staff-Assisted Peritoneal Dialysis Program in the United States
A Feasibility Study

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Peritoneal dialysis (PD) offers several clinical and lifestyle advantages for people on dialysis, such as less hemodynamic instability as well as autonomy from the rigid schedules of in-center hemodialysis (HD), making it particularly desirable for frail or elderly people (1,2). Staff-assisted PD, herein referred to as assisted PD, is not typically available in the United States but is an integral part of dialysis delivery in many countries with higher home dialysis penetration (1,2). Implementing assisted PD in the United States offers an opportunity to expand PD to more patients (1–3). We ran a pilot project to better understand the needs of patients and the requirements to enable further scaling of this approach in the United States.

We trained nonregistered nurse health care staff to support PD treatments to provide temporary support to enable patients to gain independence from staff assistance within a maximum of 90 days. Six home dialysis centers from Northern California, under the management of one nonprofit dialysis provider, participated in the study. We prospectively included all patients identified by the clinical teams as needing staff assistance to transition to or remain on PD. The study team worked with the patient and the primary clinical team to evaluate and plan the required assistance, focusing on building problem-solving skills and self-confidence. Informed consent was obtained prior to provision of staff assistance (Ethics committee Approval No. WCG Aspire 20200056).

Over 69 center-months, 54 patients were referred to the program (eight patients prior to PD training, 16 patients during training, and 30 patients established on PD experiencing a self-care or care partner event that required assistance). Mean age was 70 (SD 13) years, 46% were women, and 56% had diabetes. Main indications for referral were reduced physical function, psychosocial issues, and cognition (70%, 46%, and 39% of the total referrals, respectively) (Figure 1A). Psychosocial issues included care partner unavailability, patient anxiety about the technique, and patient or care partner burnout. Thirteen referrals were canceled as patients, families, and the care team deemed assistance no longer necessary, and seven referrals were canceled because PD was deemed no longer suitable. Thirty-four patients consented. Two transferred to in-center HD prior to commencement of assistance. Thirty-two patients received assistance (17 new starts and 15 prevalent patients on PD).

Patient median duration in the program was 17 days (interquartile range [IQR], 8–26; range, 1–84), during which patients received a median of six visits (IQR, 4–16; range, 1–38). Of all 369 completed visits, 46 (12%) were completed by video or voice calls, as in-person presence was not necessary. Visits lasted for a median of 60 minutes (IQR, 35–60). Commonly provided services included cycler setup, reviewing and dressing the exit site, observing the aseptic technique, and moving and organizing supplies (Figure 1B).

Thirty (94%) patients were discharged on PD without staff assistance (as agreed with the patient and primary clinical team). One patient died with intracerebral hemorrhage, and one patient died with terminal cancer. No patients required transfer to HD prior to discharge. There were no peritonitis events or exit site infections. Four hospitalizations occurred, but none were related to assisted PD. Over a total postdischarge follow-up of 114 patient-months (median, 3 months; IQR, 2–5; range, 0–12), 23 patients continued PD without assistance, two were re-enrolled, two died, and three transferred to in-center HD.

In this proof-of-concept study, we demonstrated that a program designed to run with appropriately trained nonregistered nurse assistants, with a limited scope of practice and under the indirect supervision of nurses, is safe and effective in supporting patients on PD. Offering the program seems to have enabled more patients to successfully start and finish training for PD, as a large proportion of patients accepted for assisted PD finished training and no longer saw the need for assistance. The short period of support required by most patients in the program reflects the short nature of need until they developed confidence...
and necessary skills, all while eliminating the need for trips to the home dialysis program (for more training) or transition to HD. The program enabled many patients to remain on PD after experiencing events that would have otherwise required temporary or permanent transfer to in-center HD.

Given the success of assisted PD in countries with higher home dialysis penetration, our study strengthens the argument for this approach in the US system to execute on the promise of the Advancing American Kidney Health initiative (1,2,4). These programs are more likely to be implemented broadly with support by Medicare and regulatory agencies, as recently proposed in the Improving Access to Home Dialysis Act (5). Our results should be interpreted with the recognition of some limitations. All participating centers were under the management of a single dialysis provider, and assistance was provided by the same staff supervised by the research department. A larger sample size and longer follow-up postdischarge from assisted PD are required to evaluate clinical outcomes and allow estimation of cost-effectiveness.

In conclusion, non-nursing staff assistance support of both incident and prevalent patients on PD is operationally feasible in the United States.

Disclosures
G. Abra reports employment with Satellite Healthcare, consultancy agreements with Akebia, and serving in an advisory or leadership role for Nephrology News & Issues. A. Anwaar is a recipient of the Satellite Hans Wolf Research fellowship award. J. Atwal reports employment with Satellite Healthcare. P.N. Bennett reports employment with and consultancy agreements with Satellite Healthcare, is on the Vifor Advisory Board, and is an A men-paid speaker. W.F. Hussein reports employment with Satellite Healthcare. V. Legg reports employment with Satellite Healthcare and Veronica Legg, LLC; consultancy agreements with Gastroklenz, Inc. and Satellite Healthcare; and ownership interest in Veronica Legg, LLC. L. Pravoverov reports employment with and ownership interest in The Permanente Medical Group. B. Schiller reports employment with Satellite Healthcare; consultancy agreements with CVS, Quanta, and Rockwell Medical; ownership interest in Unicycle Therapeutics Inc.; serving in an advisory or leadership role on the advisory board for Quanta Medical and Rockwell and on the board of directors at Unicycle; and speakers bureau for AstraZeneca. S. Zheng reports employment with The Permanente Medical Group and serving in an advisory or leadership role as the medical director of Wellbound Emeryville.

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Author Contributions
W.F. Hussein, B. Schiller, P.N. Bennett, G. Abra, J. Atwal, V. Legg, L. Pravoverov, and S. Zheng conceptualized the study; W.F. Hussein, J. Atwal, P.N. Bennett, and V. Legg were responsible for data curation; W.F. Hussein, J. Atwal, P.N. Bennett, A. Anwaar, J. Atwal, V. Legg, G. Abra, S. Zheng, L. Pravoverov, and B. Schiller were responsible for investigation; W.F. Hussein was responsible for formal analysis; W.F. Hussein, P.N. Bennett, G. Abra, J. Atwal, B. Schiller, and S. Zheng wrote the original draft; and W.F. Hussein, P.N. Bennett, G. Abra, A. Anwaar, J. Atwal, V. Legg, L. Pravoverov, B. Schiller, and S. Zheng reviewed and edited the manuscript.

References
5. United States Congressman Bobby L. Rush: Rush introduces bipartisan legislation to expand home dialysis, ensure kidney

Figure 1. | Referral indications and provided services. (A) Indications for referral to staff-assisted peritoneal dialysis (number and percentage of patients) and (B) services provided (number and percentage of visits). Percentages do not add up to 100% as categories are not mutually exclusive. Commonly documented services under the “other” category (not shown) included observing patients perform the aseptic technique correctly and moving and organizing supplies.
patients are educated about full range of treatment options.

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