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Urgent-Start Peritoneal Dialysis: A Chance for a New Beginning

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Abstract

Peritoneal dialysis (PD) remains greatly underutilized in the United States despite the widespread preference of home modalities among nephrologists and patients. A hemodialysis-centric model of end-stage renal disease care has perpetuated for decades due to a complex set of factors, including late end-stage renal disease referrals and patients who present to the hospital requiring urgent renal replacement therapy. In such situations, PD rarely is a consideration and patients are dialyzed through a central venous catheter, a practice associated with high infection and mortality rates. Recently, the term urgent-start PD has gained momentum across the nephrology community and has begun to change this status quo. It allows for expedited placement of a PD catheter and initiation of PD therapy within days. Several published case reports, abstracts, and poster presentations at national meetings have documented the initial success of urgent-start PD programs. From a wide experiential base, we discuss the multifaceted issues related to urgent-start PD implementation, methods to overcome barriers to therapy, and the potential impact of this technique to change the existing dialysis paradigm.

INDEX WORDS

Peritoneal dialysis; urgent peritoneal dialysis; urgent-start peritoneal dialysis; late end-stage renal disease (ESRD) referral; acute-start peritoneal dialysis; acute peritoneal dialysis

INTRODUCTION

Peritoneal dialysis (PD) is greatly underutilized[1,2] as a treatment for end-stage renal disease (ESRD) despite many potential benefits, including lifestyle flexibility, preservation of kidney function,[3,4] and cost-savings compared with hemodialysis (HD).[5,6] Despite these advantages, 93% of patients who require dialysis are initiated on HD,[7] the majority (80%)

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with a central venous catheter (CVC). The latter incur a high risk of infection, hospitalization, and death in the first year of therapy, particularly when compared with a PD catheter.[7,8] Widespread efforts to minimize the use of CVCs have been blunted by continued reliance on HD to initiate ESRD therapy in those without permanent vascular access.

The HD-centric model of ESRD care, with all its disadvantages, has evolved in response to a complex set of factors, including economic conditions that favored HD and the industrialization of HD by dialysis providers.[1] Although the lack of pre-ESRD care clearly is linked to inadequate vascular access preparation and high use of CVCs for patients who require dialysis in an emergency, many patients require a catheter for an unanticipated dialysis therapy start, even under the watchful eye of a nephrologist.[9] More than 40% of patients receiving more than 12 months of nephrology care initiate dialysis therapy with a CVC and no permanent vascular access.[7] The ready availability of CVC placement facilitates relatively effortless initiation of HD versus PD therapy in most hospitals. Although these problems are well known, very little progress has been made in changing practice patterns. Many practicing nephrologists feel powerless to overcome these entrenched systematic issues, leading to frustration and maintenance of the status quo.[1]

Within the last decade, urgent-start PD has gained considerable interest in the nephrology community. Traditional PD consists of PD catheter placement and initiation of training after a 2- to 4-week healing period. This process requires synchronization among patient, nephrologist, operator, and dialysis center. The present infrastructure makes it difficult to accommodate patients who present unexpectedly for dialysis. Such logistical barriers are illustrated by the fact that many patients with adequate pre-ESRD education and preference for PD are started on HD therapy.[10] Urgent-start PD refers to an approach that involves initiation of PD therapy earlier than 2 weeks after PD catheter insertion. Treatment is performed with low fill volumes in the supine position using a cycler to avoid pericatheter leak. Numerous clinical experiences with urgent-start PD have been published or discussed at scientific meetings[11–21] and promoted by the dialysis industry.[22] Treatment varies from thrice weekly to daily, typically occurring in the outpatient dialysis center for 6–8 hours per day until the patient is able to tolerate larger fill volumes and undergo traditional PD training. This attractive alternative to default HD therapy by a CVC is illustrated in the following vignette.

A 56-year-old woman was admitted for unexpectedly worsening chronic kidney disease. The patient was interested in PD therapy. The nephrologist contacted an experienced surgeon, who promptly inserted a PD catheter in the hospital. Low-volume supine dialysis was initiated postoperatively using a cycler. On postoperative day 2, she was discharged to an outpatient urgent-start PD program. Cycler fill volumes were increased gradually, and she began modified PD training. After 2 weeks, she tolerated normal fill volumes and was transitioned to home.

In response to a growing number of reports, particularly the Ghaffari[13] case series, urgent-start PD programs are rapidly appearing around the United States, with as many as 100 programs now in existence (S. Guest, personal communication, March 19, 2013). The authors of this commentary are passionate about PD and come from a diverse experiential

base: community practice, academia, a health maintenance organization, and the dialysis industry. The group met in person and by teleconferences to discuss immediate and broader issues related to urgent-start PD therapy implementation (Table 1). The key elements for successful urgent-start PD were identified, with the nephrologist serving to orchestrate a multidisciplinary process (Fig 1). Our observations and recommendations are presented next and were fully vetted by all the authors with no significant disagreements.

NEPHROLOGIST

A nephrologist champion is essential for any urgent-start PD program; however, many young nephrologists are not comfortable with PD therapy due to lack of exposure and/or emphasis in fellowship training.[23,24] Although published reports can serve as a template for urgent-start PD, they do not substitute for experience. Nephrologists interested in urgent-start PD should seek guidance and advice from more experienced practitioners. In particular, PD medical directors may have urgent-start PD interest and serve well as advisors. Regional and national PD experts often are approachable and willing to share their expertise. Meetings and video material such as those sponsored by the International Society for Peritoneal Dialysis, Annual Dialysis Conference, and Home Dialysis University offer resources and networking opportunities for colleagues interested in urgent-start PD.

Patient selection for urgent-start PD varies and depends on the judgment of the referring nephrologist. This decision is determined by local resources, physician experiences, the clinical situation, and the particular protocol that the nephrologist references[11–13,21] (Table 2). Ultimately, the nephrologist is responsible for ensuring that referrals are medically appropriate. Based on our experiences, patients who require initiation of dialysis therapy within 2 weeks, but not within 48 hours, generally are appropriate candidates for outpatient urgent-start PD. Individuals requiring urgent-start PD within 48 hours should be dialyzed in the hospital, and if timely placement of a PD catheter is not possible, it is reasonable to place a temporary CVC and transition to urgent-start PD when the patient is stabilized.[12] Patients who can wait 2 or more weeks to initiate PD therapy should do so to reduce the risk of pericatheter leak.

The financial aspect of home therapies also must be addressed in the present era of bundling of payment for dialysis care and relative greater reimbursement for home therapies.[5,25] Although Medicare endorses a reimbursement policy as a means to promote PD therapy growth,[26] we raise caution that profitability might encourage implementation of urgent-start PD without sufficient planning and assessment needed to safeguard patient outcomes. The basis for urgent-start PD should always be patient centered and not enterprise driven.

OPERATOR

No program will succeed without a reliable and competent operator to insert PD catheters. The nephrologist must recruit and maintain a good relationship with a trusted operator in order to ensure timely PD catheter placement, ideally within 48 hours.

The debate about which technique is superior for PD catheter insertion is beyond the scope of this discussion, but whether the operator is a surgeon, interventional radiologist, or

nephrologist, technique success depends on operator experience. Unfortunately, many operators are suboptimally trained in PD catheter placement.[27] Participation in available PD catheter placement training courses and review of published insertion techniques can improve operator knowledge and should be encouraged.[28–30] Nephrologists also should engage in collegial dialogue with operators regarding expectations about responsiveness and outcomes. Complications or delays in insertion will erode enthusiasm quickly.

Perioperative care and patient education often are neglected in PD catheter placement despite the availability of practice guidelines.[31] Coordination of care also is challenged when PD nurses do not feel comfortable questioning operator practices.[31] To address these issues, the nephrologist must help educate the operator about best practices and ensure implementation of standardized care protocols. Such protocols should emphasize patient education and communication with dialysis caregivers. There should be a clear algorithm reflecting operator responsibilities and a periodic audit of quality metrics.[31]

HOSPITAL

The nephrologist must anticipate the impact of urgent-start PD on the hospital and ensure that adequate resources are available. This involves outreach to hospital departments that encounter dialysis patients. Emergency department physicians, radiologists, surgeons, hospitalists, nursing staff, discharge planners, and other nephrologists should be educated about urgent-start PD. Without transparency and communication about goals, problems may arise if urgent-start PD is viewed as a deviation from the standard of care. Competition for limited procedural space may occur if PD catheter insertion is needed on short notice. Delays may occur if the on-call operator is unwilling or unable to perform PD catheter placement in the usual operator's absence. If the hospital does not have a regular inflow of PD patients, there may be a lack of trained nursing staff and supplies to care for them. In some cases, the hospital may need to contract with an outside acute dialysis provider for PD services.

After the patient begins urgent-start PD, discharge planning becomes critical. The nephrologist should personally communicate disposition needs with the PD nurse when possible. The patient and family must be given adequate education about PD catheter care and clear instructions for follow-up after discharge. Discharge planners accustomed to outpatient HD requirements may not understand urgent-start PD needs. These case managers and social workers need close support and education from the nephrologist to facilitate a smooth transition of care.

DIALYSIS CENTER

The bulk of urgent-start PD is performed at the outpatient dialysis center. It is essential for the referring nephrologist to understand that adequate infrastructure and leadership must exist at the dialysis center in order to implement urgent-start PD. There must be support and a clear agreement between the medical director, referring nephrologists, and PD nurses about the rationale and goals for the program. Nephrologists insisting on implementing urgent-start PD in a dialysis center that lacks space or staffing can place tremendous strain on resources and morale. PD nurses will feel more invested and accountable for the success

of the program if involved in the planning phases and patient selection process.[13] The nurses must feel assured that patients referred to outpatient urgent-start PD are medically appropriate for therapy.[13] This can be accomplished by allowing PD nurses to participate in the urgent-start PD screening process by interviewing patients and using standardized questionnaires.[13] Nephrologist-led advocacy with operators and hospitals can foster the use of best practices to reduce the number of complications encountered by the PD nurse.[31]

The physical environment in the dialysis center also may pose a challenge.[17] The dialysis center should have adequate space allotted for training and to accommodate beds or chairs that are comfortable enough to allow patients to dialyze in the supine position. Patients should be positioned in an area that is viewable and accessible to nurses tending to other tasks for safety and regulatory reasons.[11] The medical director overseeing an urgent-start PD program should anticipate staffing and space considerations, then lobby dialysis administrators for sufficient resources to meet needs and anticipated growth.

Dieticians and social workers are important, but often underappreciated, members of the urgent-start PD team. Nutritional management of urgent-start PD patients is challenging.[19] Untreated uremia, decreased appetite from postoperative pain, and reduction in bowel motility all contribute to the risk of malnutrition.[19] Urgent-start PD programs may increase referrals of patients who traditionally are excluded from PD therapy for social reasons. The social worker is tasked with helping patients and families with the anxiety, grief, and adjustment related to starting dialysis therapy.[20] Insurance and work-related issues also must be navigated in this period.[20] Nephrologists and dialysis administrators must ensure that the important roles of the dietician and social worker are not overlooked.

It is critical for providers to monitor quality measures for urgent-start PD. Important PD metrics include catheter-related complications, exit-site infections, and peritonitis. A higher incidence of mechanical complications with unplanned PD may be observed.[21] One also should anticipate that some urgent-start PD patients will demonstrate an inability to perform self-care or choose not to remain on PD therapy. Despite these concerns, the onus is on urgent-start PD programs to achieve low complication rates. If adequate infrastructure is present, urgent-start PD outcomes ideally should be comparable to those of traditional PD therapy starts. There needs to be a clear understanding that complications observed with urgent-start PD can be mitigated with close attention to outcomes and quality improvement measures.

PATIENT

Patients starting urgent-start PD undergo a sudden and significant life change. Whether planned or unplanned, the transition to dialysis therapy can be emotionally overwhelming for patients and their families. Talking to patients about urgent-start PD may be challenging, particularly with individuals who require dialysis without prior care or knowledge of their advanced chronic kidney disease. This task requires in-depth conversations with both patients and family members; dedicated dialysis educators must be an integral part of any urgent-start PD program and should share this responsibility with the nephrologist. However, many hospitals lack this resource. One solution is for nephrologists to ask

outpatient dialysis educators to contact the urgent-start PD candidates and their families as soon as they are identified. All patients being considered for urgent-start PD should be educated about their options for renal replacement therapy. Education should highlight the advantages and disadvantages of each therapy, with an emphasis on appropriate dialysis access, minimizing complications, and lifestyle considerations. Realistic expectations should be set, and patients and their families should be able to express a verbal understanding of the process.

Unfortunately, patients who present urgently for dialysis therapy may not have the cognitive or emotional capacity to fully understand the option of urgent-start PD. In these instances, it is imperative that patients have friends or family included in the education process.[32] Translators should be available for non-English speakers, and ideally, written materials about urgent-start PD in the patient's native language should be available. Appropriate patient selection also may be facilitated with screening questionnaires or checklists developed by collaboration with the dialysis center staff to assess baseline eligibility.[13] Ideally, the primary nephrologist (if different from the referring nephrologist) and PD nurse also should participate in the process. Early home nurse visits can provide invaluable information for planning. The added investment in time to identify appropriate urgent-start candidates and properly educate patients and their families is of tremendous value.

Some patients initially are treated successfully with urgent-start PD, only to lose the motivation or support of their caregivers. The multidisciplinary care team must help foster the patient's efforts to become more self-sufficient. Some established PD patients may be willing to share their experiences with urgent-start PD patients and their families to help with the transition. Although PD therapy offers advantages, such as improved quality of life and independence, coordinated multidisciplinary care is needed to optimize those advantages.[33] It is important for nephrologists to routinely review each urgent-start PD encounter with other team members to assess the effectiveness of the patient selection process and identify areas for improvement.

CONCLUSION

Our commentary offers the insight of a diverse group of PD practitioners who believe that urgent-start PD offers a unique and timely opportunity to change the existing paradigm of dialysis care in the United States. Wider adoption of urgent-start PD therapy would increase home dialysis use and have the salutatory effect of reducing CVC use and its associated morbidity and mortality. The authors have seen few opportunities to reduce the default use of CVCs to initiate dialysis therapy—until now. If properly planned, coordinated, and delivered, urgent-start PD may give us the chance for a new beginning for how we treat ESRD in the United States, an impact with far-reaching consequences for our patients and present model of dialysis care.

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References

1. Golper TA, Saxena AB, Piraino B, et al. Systematic barriers to the effective delivery of home dialysis in the United States: a report from the Public Policy/Advocacy Committee of the North American Chapter of the International Society for Peritoneal Dialysis. Am J Kidney Dis. 2011; 58(6):879–885. [PubMed: 21903316]
2. Jiwakanon S, Chiu YW, Kalantar-Zadeh K, Mehrotra R. Peritoneal dialysis: an underutilized modality. Curr Opin Nephrol Hypertens. 2010; 19(6):573–577. [PubMed: 20639759]
3. Tam P. Peritoneal dialysis and preservation of residual renal function. Perit Dial Int. 2009; 2(suppl 2):S108–S110. [PubMed: 19270196]
4. Moist LM, Port FK, Orzol SM, et al. Predictors of loss of residual renal function among new dialysis patients. J Am Soc Nephrol. 2000; 11(3):556–564. [PubMed: 10703680]
5. Blagg CR. Dialysis composite rate bundling: potential effects on the utilization of home hemodialysis, daily and nocturnal hemodialysis, and peritoneal dialysis. Semin Dial. 2011; 24(6): 674–677. [PubMed: 22107483]
6. Klarenbach S, Manns B. Economic evaluation of dialysis therapies. Semin Nephrol. 2009; 29(5): 524–532. [PubMed: 19751898]
7. Collins AJ, Foley RN, Herzog C, et al. US Renal Data System 2012 annual data report. Am J Kidney Dis. 2013; 61(1 suppl 1):e1–e480.
8. Perl J, Wald R, McFarlane P, et al. Hemodialysis vascular access modifies the association between dialysis modality and survival. J Am Soc Nephrol. 2011; 22(6):1113–1121. [PubMed: 21511830]
9. Buck J, Baker R, Cannaby AM, Nicholson S, Peters J, Warwick G. Why do patients known to renal services still undergo urgent dialysis initiation? A cross-sectional survey. Nephrol Dial Transplant. 2007; 22(11):3240–3245. [PubMed: 17616535]
10. Liebman SE, Bushinsky DA, Dolan JG, Veazie P. Differences between dialysis modality selection and initiation. Am J Kidney Dis. 2012; 59(4):550–557. [PubMed: 22305859]
11. Casaretto A, Rosario R, Kotzker WR, Pagan-Rosario Y, Groenhoff C, Guest S. Urgent-start peritoneal dialysis: report from a U.S. private nephrology practice. Adv Perit Dial. 2012; 28:102–105. [PubMed: 23311224]
12. Lobbedez T, Lecouf A, Ficheux M, Henri P, Hurault de Ligny B, Ryckelynck JP. Is rapid initiation of peritoneal dialysis feasible in unplanned dialysis patients? A single-centre experience. Nephrol Dial Transplant. 2008; 23(10):3290–3294. [PubMed: 18424817]
13. Ghaffari A. Urgent-start peritoneal dialysis: a quality improvement report. Am J Kidney Dis. 2012; 59(3):400–408. [PubMed: 22019332]
14. Moran, J.; Shapiro, M.; Ghafferi, A.; Milligan, T.; Swanzy, K. Urgent-start peritoneal dialysis: a clinical process improvement report. Presented at: 33rd Annual Dialysis Conference; Seattle, WA. March 9–12, 2013;
15. McClernon, M. Rapid PD start: single-center experience in 30 patients—nursing perspective. Presented at: 33rd Annual Dialysis Conference; Seattle, WA. 2013.
16. Balsera, C.; Majirsky, J.; Malone, L. Urgent start program: an alternative protocol. Presented at: 33rd Annual Dialysis Conference; Seattle, WA. 2013.
17. Hartley, J. Rapid PD start: single-center experiences in 30 patients—administrator perspective. Presented at: 33rd Annual Dialysis Conference; Seattle, WA. 2013.
18. Jayavelu, B.; Cohen, R.; Kumar, V. Rapid-start PD: single center experience in 30 patients—clinical perspective. Presented at: 33rd Annual Dialysis Conference; Seattle, WA. 2013.
19. Ludden, R. Rapid PD start: single-center experience in thirty patients—renal dietician's perspective. Presented at: 33rd Annual Dialysis Conference; Seattle, WA. 2013.
20. Flanigan, S. Rapid PD start: single-center experience in 30 patients—social worker perspective. Presented at: 33rd Annual Dialysis Conference; Seattle, WA. 2013.
21. Povlsen JV, Ivarsen P. How to start the late referred ESRD patient urgently on chronic APD. Nephrol Dial Transplant. 2006; 21(suppl 2):ii56–ii59. [PubMed: 16825263]
22. Baxter Healthcare Corporation. Urgent Start. McGaw Park, IL: Baxter Healthcare Corp; 2009.

23. Mehrotra R, Blake P, Berman N, Nolph KD. An analysis of dialysis training in the United States and Canada. Am J Kidney Dis. 2002; 40(1):152–160. [PubMed: 12087573]
24. Berns JS. A survey-based evaluation of self-perceived competency after nephrology fellowship training. Clin J Am Soc Nephrol. 2010; 5(3):490–496. [PubMed: 20089491]
25. Golper TA, Guest S, Glickman JD, Turk J, Pulliam JP. Home dialysis in the new USA bundled payment plan: implications and impact. Perit Dial Int. 2011; 31(1):12–16. [PubMed: 21282384]
26. Medicare program; end-stage renal disease prospective payment system. Final rule. Fed Regist. 2010; 75(155):49029–49214. [PubMed: 20712086]
27. Wong LP, Liebman SE, Wakefield KA, Messing S. Training of surgeons in peritoneal dialysis catheter placement in the United States: a national survey. Clin J Am Soc Nephrol. 2010; 5(8): 1439–1446. [PubMed: 20498240]
28. Jo YI, Shin SK, Lee JH, Song JO, Park JH. Immediate initiation of CAPD following percutaneous catheter placement without break-in procedure. Perit Dial Int. 2007; 27(2):179–183. [PubMed: 17299155]
29. Stegmayr BG. Three purse-string sutures allow immediate start of peritoneal dialysis with a low incidence of leakage. Semin Dial. 2003; 16(4):346–348. [PubMed: 12839511]
30. Society for Education and Research in Peritoneal Access Surgery. [Accessed June 24, 2013] PD University for Surgeons. http://pdaccesssurgery.org/index.html
31. Wong, LP.; Yamamoto, KT.; Reddy, V., et al. Patient education and care for peritoneal dialysis catheter placement: a quality improvement study. Perit Dial Int. published online ahead of print July 1, 2013http://dx.doi.org/10.3747/pdi.2012.00190
32. Griva K, Li Z, Lai AY, Chan CM, Foo MW. Perspectives of patients, families, and health care professionals on decision-making about dialysis modality—the good, the bad, and the misunderstandings! Perit Dial Int. 2012; 33(3):280–289. [PubMed: 23123668]
33. Tong A, Lesmana B, Johnson DW, Wong G, Campbell D, Craig JC. The perspectives of adults living with peritoneal dialysis: thematic synthesis of qualitative studies. Am J Kidney Dis. 2012; 61(6):873–888. [PubMed: 23177729]

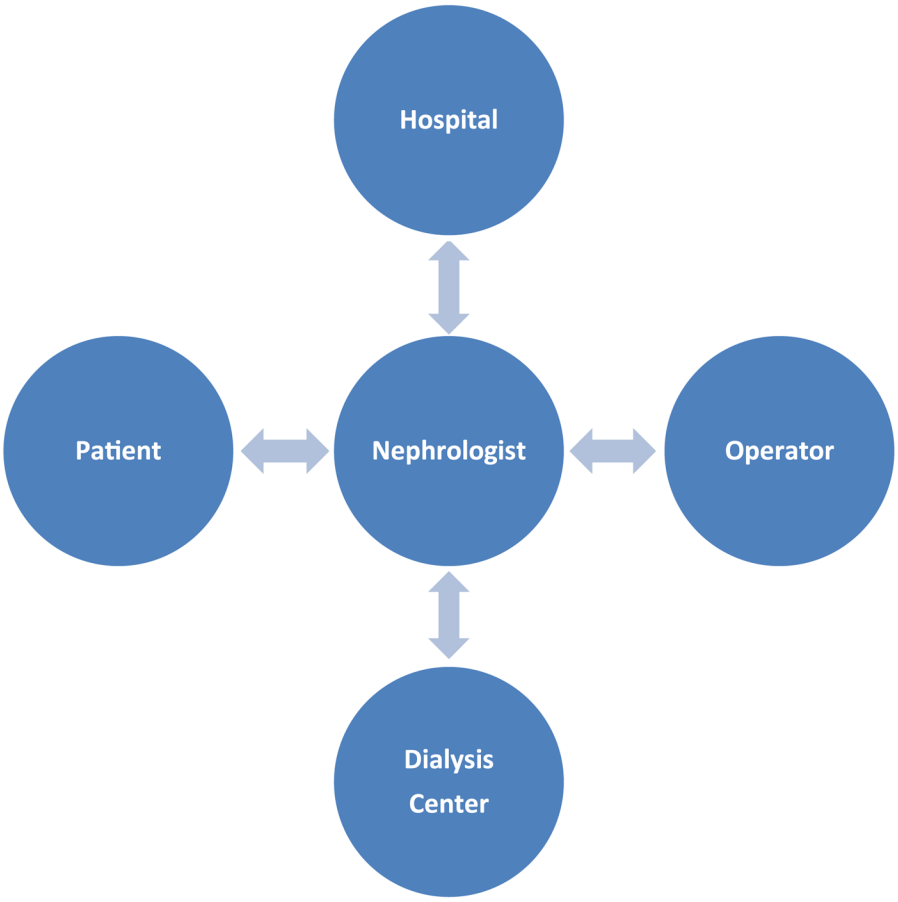

Figure 1.
Key elements of a successful urgent-start peritoneal dialysis program.

Table 1

Barriers to Urgent-Start PD Implementation

Barriers to Implementation	Solutions
	Nephrologist Level
Inexperience with urgent-start PD	Use PD expertise of nephrology colleagues, professional organizations
Appropriate patient selection	Consensus upon “urgent-start PD” definition to ensure medically appropriate referrals
Financial bias	Introspective evaluation of referral motive
	Operator Level
Inexperience placing PD catheter	Use formalized PD education for operators; evaluate literature regarding PD catheter placement techniques
Timely placement of PD catheter	Do not rely on a single operator, have alternative referral pathways
Agreement on perioperative care	Education on regional standardized care protocols
	Hospital Level
Buy-in from all departments that treat patients with ESRD	Educate staff on importance of urgent-start PD; collaborate on urgent-start PD protocols
Lack of adequate resources or supplies to provide urgent-start PD	Contract with outside acute dialysis provider
Discharge planning	Educate case manager and/or social worker, provide check-lists; provide verbal sign-out to outpatient PD center
	Dialysis Center Level
Dialysis staff buy-in	Engage staff in planning stages and patient selection process
Lack of staff education	Provide regular in-service education
Variability in physician practice patterns	Establish protocols in collaboration with referring physicians
Inadequate resources	Lobby dialysis administration to get more resources (ie, space, gurneys, recumbent chairs, nurses)
Potential for high complication rates	Periodic assessment of pre-established quality metrics and targeted quality improvement measures
	Patient Level
Lack of education	Dedicated time spent by nephrology team to educate patient and family
Unrealistic expectations of modality	Develop and provide dialysis modality education resources
Need for caretaker involvement	Coordinate support services provided by nephrologist, nurse, dietician, and social worker
Psychosocial stress	Early home visit to assess living situation

Abbreviations: ESRD, end-stage renal disease; PD, peritoneal dialysis.

Table 2

Urgent-Start PD Protocols

	PD Initiated			Prescription		
Reference	**Inpatient**	**Outpatient**	**Operator**	**Initial Dwell Volume (mL)**	**Hours**	**Frequency**
Casaretto et al[11]	x	x	Surgeon	1,000	6	3×/wk
Ghaffari[13]		x	Interventional radiologist	500–1,250	5–8	3×/wk
Lobbedez et al[12]	x		Surgeon	1,200–1,500	12	Daily
Povlsen & Ivarsen[21]	x		Surgeon	1,200–1,500	12	Daily
Satellite Healthcare–Wellbound[a]		x	Variable	1,000	5–8	5×/wk

Note: All prescriptions recommend the use of a cycler.

Abbreviation: PD, peritoneal dialysis.

[a]Unpublished data from urgent-start PD pilots.