Development of a Peritoneal Dialysis Program

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Key Words

Peritoneal dialysis · Chronic kidney disease · Patient education

Abstract

The development of a successful peritoneal dialysis program requires that the organization and structure of the program be carefully planned. Key ingredients include developing a robust chronic kidney disease education program, adequate training for physicians and nurses, full complement of supporting staff (including nurses, dietician, and social worker), appropriate continuous quality improvement programs, and a reasonable program size.

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The current status of peritoneal dialysis (PD) for the management of the patient with end-stage renal disease (ESRD) is being reexamined from a global perspective. Different trends of PD utilization are emerging in various parts of the world. For example, in many Western countries, PD utilization is declining. In sharp contrast, PD utilization in Latin America, the Middle East and Asia is growing. And, in certain developing countries, the role of PD as a treatment for acute kidney injury as well as chronic kidney disease (CKD) is being reexamined.

In the US, the percentage of ESRD patients maintained on PD has decreased to about 7% according to the most recent USRDS report [1]. In the UK, the percentage of ESRD patients maintained on PD has also gradually decreased over the last few years; while there has been about a 5% increase in hemodialysis (HD) patients, there has been about a 6% decrease in PD patients [2]. In Canada, while there has been a 55% increase in HD patients from 2000 to 2008, there has been only a 21% increase in PD patients [3].

In contrast, there has been a dramatic growth in PD utilization in Iran, Turkey, Latin America and the Far East [4]. In some countries, this growth has been driven by government policy and in some by a lack of available HD facilities. For example, in Hong Kong and Thailand the government underwrites the costs of ESRD care if patients try PD as their initial therapy. In other countries, the lack of available HD facilities has supported the widespread use of PD. Yet in others, PD appears to be a well-accepted option for managing a large percentage of ESRD patients.

In the developing world, there has been an interest in expanding the use of PD for patients with AKI and CKD [4, 5]. In fact, PD programs in these countries have been reporting excellent results in terms of patient and technique survival rates, peritonitis rates, etc. [4, 5].

Table 1. Important elements to consider when developing a chronic peritoneal dialysis program

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- 1 Adequate CKD education programs
 - 2 Adequate physician training in the basic principles of PD
 - 3 Adequate nurse training in the basic principles of PD
 - 4 Adequate support staff
 - a Physicians
 - b Nurses
 - c Dieticians
 - d Social workers
 - 5 Adequate size of facility
 - 6 Appropriate CQI program to monitor outcomes and modify treatment algorithm (see table 2)
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The challenges with the development of successful PD programs clearly vary, and the solutions to these challenges have revealed different approaches to dealing with these challenges – in part related to regional differences and issues, governmental policies, and economic factors. But, no matter what these differences are, there are several key factors that need to be considered in developing a successful PD program (table 1).

CKD Education

The importance of developing and implementing adequate CKD education programs cannot be overemphasized. The majority of patients approaching ESRD have surprisingly little knowledge about CKD and ESRD treatment options [6, 7]. This presents a particular problem for patients contemplating a home-based therapy since adequate consideration takes some understanding and thought and discussions with family. It has been suggested that this difficulty in part reflects lack of referral to nephrologists for care [6]. However, a recent study suggests that even in patients seen by nephrologists, the levels of patient perception of knowledge about CKD and therapeutic options for ESRD are limited [7]. The authors of this study suggested that the process of providing education for CKD patients needs to be reexamined. But there are challenges to providing adequate education for the CKD patient. Obtaining funding to support such programs has been difficult in many countries. In addition, training educators for CKD patients is an issue that has not been really discussed. Managing patients with CKD is complex, given the multitude of domains that need to be addressed. How CKD education

is incorporated into patient management is an area that needs further investigation. Patients do not often listen to or hear what physicians discuss when medical problems raise the specter of dramatic changes in lifestyles and roles, as occurs with progressive renal failure and the initiation of dialysis therapy. Training physicians and educators how best to communicate with patients around these discussions has received much attention in other areas of medical practice, such as alcohol and drug abuse, but not in the world of CKD care. It is indeed surprising that few studies have been done looking at the impact of education programs on patient outcomes and modality selection. Also, there is considerable information that is now available on the internet for patients – some of this is informative, accurate and useful, and some is misleading and distorted; how this should be incorporated into traditional education programs needs further exploration.

It is important to remember that the vast majority of CKD patients do not have contraindications to performing PD [8]. It is apparent from the experience in Hong Kong and Thailand that the vast majority of ESRD patients can in fact do PD successfully [4]. In Western countries, it seems that if patients are in fact provided with CKD education, then between 30 and 40% of patients will opt for PD [9].

It should also be remembered that CKD education programs are important not only in terms of facilitating modality selection, but because they can delay the onset of ESRD and improve outcomes after patients start dialysis [10, 11].

Physician and Nurse Training

The problem of providing adequate education to nephrology trainees and nephrologists has been noted and discussed [12, 13]. PD is a home-based therapy, and patients generally visit the dialysis facility monthly for routine follow-up care, limiting access for renal trainees. Integrating PD training into a rigorous nephrology curriculum presents challenges that are being discussed by program directors in various countries and by the International Society of Peritoneal Dialysis. Suggestions that are being proposed include developing an online PD curriculum, designating selected training sites as centers of excellence, where trainees can come for focused training courses, expanding short 2–3 day PD training sessions (so called ‘PD Universities’), and creating certain minimum standards that will be considered accept-

Table 2. Continuous quality improvement domains

1	Peritonitis rates
2	Exit site infection rates
3	Technique failure rates
4	Patient satisfaction
5	Health-related quality of life
6	Catheter-related problems and catheter survival rates
7	Adequacy of dialysis
8	Anemia management
9	Calcium, phosphorus metabolism
10	Blood pressure and volume control
11	Lipid control
12	Weight management

able for trainees. But whether these educational experiences can replace the actual ‘hands-on’ experience of working in a well-functioning PD facility remains to be determined.

The same challenges apply to providing adequate training for nurses. PD units generally operate on a primary nursing care model. The nursing staff provide the critical interface with the patient – providing the home training, being available for day-to-day problems that arise, providing monthly patient evaluations, scheduling retraining sessions, and functioning as the interface between the patient, the nephrologist, and the dialysis facility. The marked variations that exist in the training of nurses and in the ways that nurses train patients were emphasized in a recent study [14]. Although significant variation was noted, the importance of having well-trained and experienced nurses is clear. Having reasonable nurse to patient ratios is important since this permits the nurses to participate in other facility activities, such as continuous quality improvement (CQI), educational programs, and research projects.

‘Team’ Approach: Social Worker and Dietician

The PD unit needs to operate with a ‘team’ approach to managing the patient. Social work and dietary input are crucial ingredients for a successful program. Psychosocial assessments and interventions are particularly important for patients maintained on home therapies [15]. Various psychosocial factors can adversely impact patient outcomes, including patient depression and anxiety and caregiver stress [16, 17]. It is now mandated in the US that

health-related quality of life measures be assessed routinely and appropriate interventions planned. It is essential that each facility develop and incorporate a routine assessment tool to investigate areas of psychosocial difficulties for patients and then plan interventions once these areas are identified.

Dietary input is also essential. The importance of sodium restriction in terms of controlling blood pressure and limiting the dextrose exposure required to maintain fluid balance with PD needs to be emphasized. 80% of PD patients are hypertensive, requiring one or more antihypertensive medications. Sodium restriction has been shown to help ameliorate hypertension – but this requires a major educational effort. In addition, 45% of PD patients have phosphate levels >5.5 mg%. Because of the association of elevated phosphate levels with mortality, careful dietary instructions concerning phosphate intake and education concerning the importance of phosphate binder use require considerable attention.

Center Size and CQI Programs

Several studies have now documented the impact of center size on the outcome of PD patients in terms of peritonitis rates and technique failure rates [19]. The reasons for this impact are not clear, but likely relate to nursing and physician experience, the ability to develop a ‘support team’, and the development of effective CQI programs. One factor that has perhaps limited the growth of PD in some countries (such as the US) is the development of small dialysis programs rather than consolidation of small PD programs into larger centers. Certainly, the experience in the Far East suggests that large programs may be extremely successful. Many programs in China, Taiwan, and Hong Kong care for over 300 PD patients and they describe excellent results of the therapy, with low peritonitis and technique failure rates.

CQI programs are critical to the success of a PD program, as has been discussed in the K/DOQI guidelines. A modification of the domains suggested in the K/DOQI guidelines for CQI is summarized in table 2. The importance of addressing these domains on an ongoing basis cannot be overemphasized – successful PD programs, whether managed in the developed or developing world, need to track their outcomes and address the important areas that have an impact on outcomes of PD patients [20]. The areas of difficulty presented in managing a PD

unit vary from facility to facility, and each facility must identify and deal with the problem areas that are unique to their program [20].

Issues in the Developing World

PD as a treatment for ESRD in the developing world has major advantages but presents certain challenges [4, 5, 20]. The advantages include the relatively low cost of actually performing the dialysis, the lack of complex technology, and the often limited transportation available for patients to get to an HD facility. The problems, however, include the expense of shipping and importing supplies, the lack of a basic medical infrastructure to sup-

port home patients, the late referral of patients with advanced CKD, and the lack of training of nephrologists and nurses in PD. However, the basic structure and organization of the programs that have been successful in the developing world are not different from those in developed countries – the provision of good medical care requires the same infrastructure and cohesive approach [4, 5, 20]. Cost issues are certainly critically important and often limiting, but a basic adequacy of care needs to be provided that requires the appropriate infrastructure [18, 20]. Efforts are now being made, with the assistance of the International Society of Nephrology and the International Society of Peritoneal Dialysis, to expand PD in the developing world.

References

- 1 US Renal Data System, USRDS 2010 Annual Data Report: Atlas of Chronic Kidney Disease and End-Stage Renal Disease in the US, National Institutes of Health, National Institute of Diabetes and Digestive Diseases, Bethesda, 2010.
- 2 The Renal Association, UK Renal Registry: The Twelfth Annual Report, 2009.
- 3 CORR Report of ESRD therapy 2010.
- 4 Finkelstein FO, Najafi I, Hasan A, Lo WK, Abraham G, Pecoits-Filho R, Süleymanlar G: Peritoneal dialysis in the developing world: recommendations from a symposium at the ISPD meeting. *Perit Dial Int* 2009;29: 618–622.
- 5 Abu-Aisha H, Elamin S: Peritoneal dialysis in Africa. *Perit Dial Int* 2010;30:23–28.
- 6 Mehrotra R, Marsh D, Vonesh E, et al: Patient education and access of ESRD patients to renal replacement therapies: beyond in-center hemodialysis. *Kidney Int* 2005;68: 378–390.
- 7 Finkelstein FO, Story K, Firaneck C, Barre P, Takano T, Soroka S, Mujais, Rodd K, S, Mendelssohn D: Perceived knowledge among patients cared for by nephrologists about chronic kidney disease and end-stage renal disease therapies. *Kidney Int* 2008;74:1178–1184.
- 8 Mendelssohn D, Barre P, Mujais S, Soroka S, Brouillette J, Takano T, Mittal BJ, Singh AJ, Firaneck C, Story K, Finkelstein FO: A prospective evaluation of renal replacement therapy modality eligibility. *Nephrol Dial Transplant* 2009;24:555–561.
- 9 Manns BJ, Taub K, Vanderstraeten C, et al: The impact of education on chronic kidney disease patients' plans to initiate dialysis with self-care dialysis: a randomized trial. *Kidney Int* 2005;68:1777–1783.
- 10 Devins GM, Mendelssohn DC, Barre PE, Taub K, Binik YM: Predialysis psychoeducational intervention extends survival in CKD: a 20-year follow-up. *Am J Kidney Dis* 2005; 46:1088–1098.
- 11 Devins GM, Mendelssohn DC, Barre PE, Binik YM: Predialysis psychoeducational intervention and coping styles influence time to dialysis in chronic kidney disease. *Am J Kidney Dis* 2003;42:693–703.
- 12 Blake P, Finkelstein FO: Why is the proportion of patients doing peritoneal dialysis declining in North America? *Perit Dial Int* 2001;21:107–119.
- 13 Berns JS: A survey-based evaluation of self-perceived competency after nephrology fellowship training. *Clin J Am Soc Nephrol* 2010;5:490–496.
- 14 Bernardini J, Price V, Figueiredo A, Riehm A, Leune D: International survey of peritoneal dialysis training programs. *Perit Dial Int* 2006;26:658–663.
- 15 Wuerth D, Finkelstein SH, Finkelstein FO: Psychosocial assessment of the patient on chronic peritoneal dialysis: an overview. *Adv Chronic Kidney Dis* 2007;14:353–357.
- 16 Finkelstein FO, Wuerth D, Finkelstein SH: Health related quality of life and the CKD patient: challenges for the nephrology community. *Kidney Int* 2009;76:946–952.
- 17 Gayomali C, Sutherland S, Finkelstein FO: The challenge for the caregiver of the patient with chronic kidney disease. *Nephrol Dial Trans* 2008;23:3749–3751.
- 18 Afolalu B, Troidle L, Osayimwen O, Bhargava J, Kitsen J, Finkelstein FO: Technique failure and center size technique failure and center size in a large cohort of PD patients in a defined geographic area. *Perit Dial Int* 2009;29:292–296.
- 19 Plantinga L, Fink NE, Finkelstein FO, Powe NR, Jaar BJ: Association of peritoneal dialysis clinic size with clinical outcomes. *Perit Dial Int* 2009;29:285–291.
- 20 Elhassan EA, Kabbalo B, Fedail H, Abdelraheem MB, Ali T, Medani S, Tammam L, Basheir I, Taha A, Mandour M, El Awad K, Abu-Aisha H: Peritoneal dialysis in the Sudan. *Perit Dial Int* 2007;27:503–510.